Haunted/Haunting Digital Archives of the Fukushima Nuclear Disaster:
Weaving Ghost Stories around the Ongoing Disaster in the Past, Present and Future

PhD. Thesis

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I hereby declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is always clearly stated.

Signature

Date

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A few more things to add: I am writing this during the lockdown due to the global pandemic of Covid-19. There has been a drastic change to two archival platforms I discussed in the thesis: SimplyInfo.org has launched a live blog with daily updates about the latest development of the outbreak; Teach311.org changed its project name to "Teach311 + COVID-19 Collective." Given that "[t]he matter of access to the histories of various past and ongoing disasters […] shows how the COVID-19 crisis has cast uneven light across the stories that can be told," the new collective emphasises an imperative not to "let selective amnesia erect barriers to practices of empathy and to efforts to seek deeper understandings of phenomena, no matter how great or small" ("The New Teach311 + COVID-19 Collective"). The shift from the focus on the nuclear disaster in their archival storytelling might subsume the Fukushima nuclear disaster into a bigger picture of a global catastrophe. In addition to the level of mass panicking on the street and in the media, the fear of the invisible feels eerily familiar to me. This year, 11th March marks the day the WHO announced the coronavirus outbreak a pandemic. There are so many stories that have been left untold and will be told, while the present is relentlessly being overwritten. So this thesis might also be a little testimony of living between the moments of crisis.

And lastly, all my love and profound appreciation to my parents who have been supporting and believing in me all these years from thousands of miles away, and are now recovering from the infection of Covid-19. I hold dear everything they stand for.

Thesis Abstract

This thesis examines the digital archives of the Fukushima nuclear disaster that took place on 11 March, 2011. I propose key thesis questions regarding the roles of the digital archive in articulating the memory and knowledge about the disaster, in relation to its capacity of storytelling. I specifically focus on the production of "ghost stories," the stories concerning exclusions and invisibilities produced in the digital archive as a flexible, transformative vehicle of ephemeral data.

This research draws on interdisciplinary discussions in the fields of media studies, sociology and archival studies, as well as the contributions of feminism and queer theory to delineating the struggles to engage with lost histories and submerged narratives.

My contribution is both theoretical and methodological, in developing hauntology as a way of intervening to temporal and narrative modalities of the practices of digital archiving. In formulating hauntological methods, I attend to the creation of "haunted data" and the contingent dis/appearance of digital traces, which have allowed me to employ archival imaginaries to take into account gaps, absences and erasures as a constitutive part of archival storytelling. I also aim to demonstrate a multivalence of haunting at work in the mutual construction of the archive and the archived, with the Fukushima disaster as both haunted and haunting object of inquiry.

The digital archives I analyse in the empirical chapters are: two archival repositories on the website of the Tokyo Electric Power Company (TEPCO) that owns the damaged plant; the Japan Disasters Digital Archive (JDA); SimplyInfo.org and Nukewatch.org; Teach311.org. They are "moving" repositories that keep archival objects in motion, and I ask how they articulate and bring together the fragments of the disaster, by intervening to, and generating the intricate web of connections between the past, present and future.

Throughout the thesis, I argue that the constant and contingent retelling of the Fukushima disaster in the practices of digital archiving calls attention to narrative possibilities afforded by digital technologies. This research explores how the production of the digital archive entails the conflation of fact and fiction, of multiple temporalities that register different facets of haunting, and myriad regimes of remembering and forgetting, which would shape our understandings of the ongoing disaster with no definitive beginnings and ends.

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Preface

> Margrethe: Because everything is personal! […] I'm sorry but you want to make everything seem historically abstract and logical. And when you tell the story, yes, it all falls into place, it all has a beginning and a middle and an end. But I was there, and when I remember what it was like I'm there still, and I look around me and what I see isn't a story! It's confusion and jealousy and tears and no one knowing what things mean or which way they're going to go.
>
> ——*Copenhagen*, ACT TWO

Disasterpieces

It began at 2:46pm on 11 March, 2011.

The earthquake off the Pacific Coast of Tohoku (Northeast Japan) that came to be known as the Great East Japan Earthquake triggered tsunami waves along the shoreline. The magnitude of the earthquake was 9.0-9.1, which was one of the most powerful earthquakes recorded since the beginning of the 20th century. The Fukushima Daiichi (No.1) Nuclear Power Station (NPS) run by the Tokyo electric Power Company (TEPCO), located approximately 150 miles north of Tokyo was struck by the tsunami, which led to the complete loss of electricity and the subsequent failure of cooling systems. As the water level in the fuel pools fell quickly, resulting in climbing temperature of the core and the exposure of fuel rods, core meltdowns occurred at three of six reactors that had been operating since 1970s. The meltdown at the reactor 1 already began on the evening of 11 March, when the pressure of the containment vessel kept rising. This caused an

explosion that blew off the upper floors of the reactor building, and the subsequent release of radioactive materials into the surrounding areas.

It was later confirmed that the cores of reactor Units 2 and 3 also melted within the first three days after the tsunami struck, despite desperate attempts to inject a large amount of water to avoid the exposure of the fuel rods. The reactor Units 1, 3 and 4 were severely damaged due to hydrogen explosions, leading to a temporary rise in radiation levels in the vicinity of the plant. The evacuation order zone in the immediate aftermath of the incident was the 20km radius of the Fukushima Daiichi NPS, which was later revised to cover 726 ㎢ around the plant, approximately 5% occupation of the Fukushima Prefecture[1]. The incident brought about extensive controversies with regard to the health and environmental effects of radiation exposure as well as the decontamination procedures of the crippled plant. As of March 2018, more than 50,000 people from Fukushima continue to live as evacuees, and the disaster left severe scars in economy, agriculture and industry on both local and national scale. It was eventually rated level 7 (Major Accident) on the International Nuclear Event Scale (INES) issued by the International Atomic Energy Agency (IAEA), as the second biggest nuclear accident since the Chernobyl disaster. TEPCO estimates that it will take more than 30-40 years to complete the decommissioning of the plant.

This is an official account of the Fukushima nuclear disaster. This version of the unprecedented incident is based on retrospective assessments of the causes and effects of the unravelling event.

When I remember what it was like, I am often at a loss for words. My memory is as fragmented as the troubled consequences of the disaster, with many concerns emerging

[1] <http://www.pref.fukushima.lg.jp/site/portal-english/en03-08.html>

one after another, often overshadowing the previous ones. Not surprisingly, my recollection of the first few weeks after the disaster is related to the visual representations of destruction and devastation. My first vivid memory is the image of flames washing over the coast of Kesennuma city in Miyagi Prefecture (north of Fukushima Prefecture) after the earthquake and tsunami hit the region, and the fuel leaked from fishing boats caught fire that lit up the sky for days. It was the conflation of fire and water. The incompatible elements certainly struggled with each other on a small TV screen, somehow indicative of the bigger catastrophe to come. The number of deaths kept rising rapidly at the corner of the screen as if the toll were skyrocketing without end. Dozens of helicopters started clattering almost helplessly over the damaged areas so devastated that it was hard to imagine what the cities had looked like before the tsunami struck.

It was the next day when I first heard that there was "something" going on at the Fukushima Daiichi NPS which was a major source of electricity to a metropolitan area including Tokyo, where I was born and brought up, and watched the disaster unravel. My eyes were fixated on the minute-by-minute TV updates, without understanding what was really happening. In the midst of post-disaster confusion and a weird sense of excitement, I remember the exhausted face of the former Chief Cabinet Secretary Yukio Edano who was repeating "there is no immediate effect," which, however, suggested quite the opposite. Then the explosions at three reactors. They were recorded real-time by the camera previously installed at the site.

These are my early memories of the Fukushima nuclear disaster. My recollection is so fragmented that I can only remember several key moments like snapshots, such as the deployment of the Japan Self-Defense Forces (JSDF) on 17 March, when helicopters

started to drop seawater onto the overheated reactors. The futile attempt seemed, at that time, the only hope to prevent meltdowns that *had already happened*. I could not help but familiarise myself with scientific jargon like Sv and Bq (scientific units to measure the biological effects of radiation), as some media outlets prompted the purchase of a personal Geiger counter. The information overload had lasted until I had the symptoms of a TIA (transient ischemic attack), a premonitory sign of cerebral infraction about a month after the disaster, with the cause being unknown. I had something to worry about apart from the consequences of a nuclear disaster that suddenly became a part of everyday life. It was a relief.

This study is in part an attempt to reconcile the absence of my own memory of the Fukushima nuclear disaster with the proliferation of digital archiving praxes that enact multiple ways of recording and remembering the ongoing catastrophe. The digital archive was the first thing I turned to, as a lively, flexible, yet ephemeral repository of memory and knowledge when I traced back the information about the incident that now feels so far away in both time and space. It could be as fractured as my recollection, but simultaneously weave a myriad of stories – convincing, contradictory, irrelevant and full of surprises. These archives, both official and independent, are the site that is haunting and haunted by the Fukushima disaster, defying a single interpretation. Through attending to, and "reading" digital archives, I have identified several ghosts that dis/appear from the margins of the archive, which are a constitutive part of archival storytelling. The attempt to collect and put together the pieces of the disaster was doomed to fail, but the narrative and temporal modalities in the making of the digital archive open up to the perpetual reconfiguration of the unprecedented incident, in that they designate a refusal to succumb to oblivion. Before I move on to a formal introduction

of the thesis, I am going to say more about the stories that constitute this research.

The Origin Stories

> Stories are not "fictions" in the sense of being "made up." Rather, narratives are devices to produce certain kinds of meaning. I try to use stories to tell what I think is the truth – a located, embodied, contingent, and therefore real truth. (Haraway, 1997: 230)

There are several backstories to tell about how I decided to carry out a research on the Fukushima nuclear disaster, particularly on the digital archives that articulate memory and knowledge about the event. As time passes, I am struck by an eerie sense of distance that the disaster has faded into oblivion, despite plans for decommissioning to continue for the next 30-40 years. There is no finalised solution about where and how to dispose of contaminated soil and water produced during the clean-up operations. It is also the case that a number of lives are still affected, as those who were forced to evacuate have found it difficult to return to their homes. In contrast to the media frenzy in the first few months of the disaster, it became harder and harder to find up-to-date information about the unravelling disaster. I also desperately wanted to reconcile my vague recollection of the technological breakdown with my diverse academic background and interest in feminist technoscience and literary criticism.

At the time of the disaster – only if the expression is appropriate as the triple disaster has not yet seen an end – I was a graduate student at the University of Tokyo, writing my Master's thesis on the conflation of reality and fiction based on Donna Haraway's

theory of SF, a signifier for speculative fiction, scientific feminism, string figures, and speculative fabulation, based on the analysis of British novelist Richard Calder's *Dead* trilogy. I was somehow aware of being in the thick of emergent feminist practices of reconfiguring matter and materiality, most of which have drawn from Haraway's previous works on human-nonhuman affinities and boundary transgressions. For instance, the rise of such fields as new materialisms and object-oriented ontology is increasingly associated with the existing feminist critique of Western dichotomies, and a concern with how bodies and meanings contingently get made in the complex web of power. The question as to what counts as the body comes to the fore in these discussions, which is a stark reminder of the impact of the Fukushima nuclear disaster that has redefined bodily thresholds at stake, due to the uncertain effects of radiation on the human body and the environment. Another conceptual current that has underscored the inception of this research is theories of affect, an epistemological shift towards the body's world-making capacity to affect and to be affected. What these conceptual frameworks share appears to be the engagement with emergent technologies in the form of the rebuttal of representationalism, with an emphasis on the body's becoming, vitality and potentiality, not reducible to discourse (see Whetherell, 2012).

The contemporary fascination with technological apparatuses is apparent in Patricia T. Clough's (2007) work on "the affective turn," in which she discusses how affect can be theorised "with regard to the technologies that are allowing us to 'see' affect and to produce affective bodily capacities beyond the body's organic-physiological constraints," which she calls "the technoscientific experimentation with affect" (Clough, 2007: 2). Her argument underscores the shift in the political, social and cultural registers of the body that has self-generating capacities – the "biomediated body" (see Clough, 2010) whose

informational substrates and values are constituted by technologies. Questioning the condition of "the distinctly human" (see Blackman, 2012), especially from feminist perspectives resonates with my vague fear of radiation that, I am certain, derived from not knowing the impact of it. What appears to be the (re-)appraisal of sciences in the field of humanities also made me speculate about how the Fukushima disaster could be situated in current theoretical movements. For instance, if the body must be understood as "excess, force, vitality, relationality or difference that renders matter active, self-creative, productive, unpredictable," is the natural-technological disaster with profound historical repercussions a vivid example of such worldly relations of human-nonhuman becoming (Coole and Frost, 2010: 9)? Maybe yes, and no.

These debates, albeit new to me when I was writing my Master's thesis, sounded strangely familiar in the post-disaster landscape. The breakdown of a nature/culture boundary appears to have been taken for granted as a matter of fact in the face of the triple disaster. Kiyoshi Kurokawa, chairman of the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission (NAIIC), formed by the Diet of Japan on 7 October, 2011 issued a controversial statement on 5 July, 2012. In the executive summary report published on 5 July, 2012, Kurokawa maintains that the Fukushima nuclear disaster cannot be regarded as a natural disaster, because "[i]ts fundamental causes are to be found in the ingrained conventions of Japanese culture" that failed to learn critical lessons from Three Mile and Chernobyl ('The official report of The Fukushima Nuclear Accident Independent Investigation Commission: Executive summary,' 2012: 9). The implication is that the causes of the disaster are deep-rooted ignorance in what he calls a national "mindset," rather than the unforeseen damage by natural events. It is not surprising that his comments sparked controversy when the

scars of the disaster were being seen everywhere. His provocative statement suggests that the Fukushima disaster not only confuses the boundary between "natural" and "manmade," but is also deeply embedded in the culturally-informed emotional propensities of the Japanese people. After all, what the disaster entails is contingent on myriad practices of interpreting the event, whereby such discursive configurations of the Fukushima disaster becomes a conceptual battlefield, as a site where matter and meanings unfold.

So, before I chose to explore the Fukushima disaster academically, what I saw and experienced after the disaster had begun to be intertwined with theoretical discussions I described above. After the disaster, I always had a sense of living a kind of fiction where nuclear apocalypse suddenly became a part of everyday life: at the same time, it felt as though I was forced to comprehend the reality in the way I read fictional works. The only difference is that the end of the story has not been written, or, *will not have been written.* Although the initial formulation of this study was theory-driven, I can no longer distinguish my lived experiences of the disaster and what constituted my critical engagement with the incident – what the Fukushima nuclear disaster brought about was a poignant recognition that "theory is bodily, theory is literal" and "[t]heory is *anything* but disembodied [emphasis in original]" (Haraway, 2004: 68).

Spoiler alert: this thesis engages with a number of bodies: the body of the damaged reactors; the body of those who have been affected, and will have been affected by the Fukushima nuclear disaster; the researcher's body; the body of literature; the body of the archive, all of which tell different stories. When my argument does not directly address a specific body or bodies, they have always been there. These bodies are the key agencies that conjure the ghosts from both collective and personal pasts, even though

their boundaries are extremely malleable.

Forever Bound

Amidst mounting uncertainties about the causes and effects of the Fukushima nuclear disaster, the incident has come to entail a number of contradictions: natural and technological; everyday and exceptional; national and universal. When I set out to look at digital archives on the Fukushima disaster, what I discovered was a myriad of discrepancies in terms of their attempts to record the unfolding of the disaster, which evoke a subtle yet powerful sense of connection. Although my intellectual journey began with my own fragmented memories of the disaster, I became interested in what keeps the pieces of the disaster from falling apart. I tried to think of a word that could characterise my critical engagement with the modalities of storytelling in the making of digital archives, what they can (not) tell and how their archival stories come to have haunting resonance – a word that would stand for a bond that binds, something that generates unexpected connections across time and space.

In the early days of the disaster, I remember that the then-Prime Minister Naoto Kan issued a statement titled "Kizuna: The Bonds of Friendship" a month after the disaster. He expressed a feeling of gratitude for the countries and regions that offered support, by pledging "a rebirth" of Japan "through the fundamental strengths inherent to the Japanese people" ('Kizuna: The Bonds of Friendship,' 11 April, 2011). Four days after the statement was made, an op-ed article was issued in his name, outlining the importance of continuous efforts to work towards the dismantling of the Fukushima Daiichi NPS. He again appreciated "the kizuna" that the international community had shown to Japan, and emphasised that Japan would reciprocate "the strong kizuna and cordial friendship"

through its contribution to the development of a global society. It is striking that, in this follow-up article, Kan refers to WWII as a crucial turning point in Japanese history, juxtaposing with the triple disaster: "[t]he Japanese rose from the ashes of the Second World War using our fundamental strength to secure a remarkable recovery and the country's present prosperity" ('Japan's Road to Recovery and Rebirth,' 15 April, 2011). This is perhaps one of the earliest moments when the Fukushima disaster became a historical index. It was also the moment when I clearly recognised my discomfort with the rhetoric of "kizuna" and the collectivity it signifies.

Meanwhile, as the word "kizuna" grew in popularity in Japan as a simple and resonant catchphrase, what perplexed me was its etymology: although there are various theories about the glyph origin of the character 絆 (kizuna in Japanese), it generally means "something that binds/ties," such as the tether that ties an animal (usually a horse) to something so that it cannot move freely. It also means emotional ties that prevent a person from doing something. That the prime minister would rather keep the word untranslated seems to be an attempt to maintain the "Japanese-ness" of the word. This post-disaster episode has also made me speculate the temporal register of the disaster, which underscores my hauntological approach to digital archives. Not only did it sound strange to live in a time similar to the devastation after WWII, the logic that subsumes the Fukushima disaster into a linear temporal framework appears to foreclose the uncertainties and complexities of the event. It is as if there was an overlapping between the word's meaning and the "binding" effect it has, in such a way that *the word that means to bind also binds*.

Consequently, the call for national solidarity in the name of kizuna has taken on a suffocating force that constrains bodies and times. Alexis Dudden (2012), historian of

Japan and Korea calls attention to what is hidden behind the ubiquitous word with reference to: Geiger counters at evacuation centres to "prove" refugees' [evacuees'] health; uneven forms of compensation by the government and TEPCO, which do not sufficiently cover the refugees from contaminated areas; the continuous revision of dose limits by the government, which has become ever higher than the threshold limit for radiation control workers (20 mSv). In other words, while the word was used to insist on the importance of affective bonds at a difficult time, what is excluded from the exclusive web of connections becomes problematic, especially when it alludes to the imagined national unity.

In his lecture "Hope as the New Normal: National Recovery through the 3/11 Disaster[2]" held at Harvard University in 2011, political theorist David Leheny (2011) insisted that an extensive sense of connection obscures ongoing emergencies. With reference to a report issued by the Reconstruction Design Council in Response to the Great East Japan Earthquake, an advisory panel launched by the Japanese government in April 2011, he warns that the omnipresent language of connection and linkage in the reconstruction scheme makes invisible the victims of the disaster. In other words, such a discourse produces the nation as a violated, traumatised body, when the disaster is regarded merely as a "national" event. This is the rise of what he calls "disaster nationalism," which unites "the country with the region in [the] expression of grief and its collective victimisation" (Leheny, 2011). Consequently, the fate of damaged areas is translated into the fate of the nation through weak, yet smothering webs of connection. It is worth noting that Leheny concludes his lecture by drawing on Laurent Berlant's notion of cruel optimism with regard to the risks of attachment. "Cruel optimism" is a form of

[2] <https://www.youtube.com/watch?v=pZfcEf_c7Wk>

attachment to the object of desire that both enables and disables one's thriving, as "continuity of its form provides something of the continuity of the subject's sense of what it means to keep on living and to look forward to being in the world" (Berlant, 2011: 24). In similar ways, the outburst of "kizuna" in both official documents and media space appears to encompass the discursive enclosure of disaster experiences in reinstating "the national."

These discursive contexts surrounding the (ab)use of "kizuna" are relevant to my exploration of digital archives in terms of both threatening and promising aspects of making connections in order to articulate the memory and knowledge about the Fukushima nuclear disaster. As I will show, the unravelling disaster has come to attach itself to the nuclear imaginary that has its roots in the first explosion of the atomic bomb in 1945, and the consequent arms race and the "peaceful" use of atomic energy. At the same time, the making of the digital archive itself is also inextricable from the making of connections, arbitrary attachment and detachment, in the form of interlinks and classificatory systems that bring together archival objects. Where there is a connection – whether it is material, thematic or historical – there is a form of detachment and disconnection. Connection and connectivity – without which I could not have identified the ghost stories of networked digital archives, and any attempt to disconnect is always haunted by its own failure.

The Impasse

This research is also a story about detours.

In the first place, I decided to approach the controversies over the Fukushima nuclear disaster through a more systematic analysis by means of digital cartography and

controversy mapping. My original focus was not specifically on the haunting effects that emerge from the making of the digital archive, but rather on the formation of controversy in the contemporary media landscape, including the use of social networking service (SNS). It took me a while to realise the flaws in this approach because it was extremely difficult to identify how and where controversies emerge, due to a random distribution of terms related to the Fukushima disaster. When I attempted to map co-word occurrences on the Japan Disasters Digital Archive (JDA), the frequency of word appearance on the platform hardly constituted meaningful clusters, which ended up in further confusion (see Chapter Four). Co-word analysis is generally considered as a way of "measuring the meaning of words" via digital visualisation techniques. The method was intended for examining how networks of words around key issue terms generate semantic clusters that visualise the formation of topical controversy.

The messy data I managed to retrieve partly result from the platform's premise that it allows users to add tags and external links to their entries, yet how they employ individual archival schemes remains invisible. For instance, I encountered the co-occurrence of the words "Fukushima" and "Okinawa," whose connection remained ambiguous unless I looked into the details of a vast amount of entries. More importantly, the drawbacks and limitations of this semi-automatic digital method showed that interpretative intervention is inevitable to construe "what is at issue." The more texts and documents there are, the more complex and obscure the information they convey – and the words as "carriers of meaning" distributed across different archival domains diverge rather than converge: that is, "Fukushima" inscribed elsewhere in the archive may become a different signifier every time it is referenced in an archival entity.

My initial failure to look at a digital archive might indicate the difficulty of identifying

disaster-related issues. However, what is also raised is the impossibility of detecting coherent narrative flows in the production of memory and knowledge about the event. *It's confusion* and I did not know *what things mean or where they're going to go*. What I have learnt is the inexorable unthinability surrounding the ongoing disaster, since the discursive spheres would only multiply rather in the emergent media landscape. In addition, the definition of "archive" became blurry and abstract, since some online repositories do not claim themselves as an "archive," even though their main activities involve the collecting and organising of data about the disaster by means of classificatory systems and interlinks to external resources. On the other hand, user-oriented archives such as the JDA are not always capable of monitoring the rapid accumulation of data, and their archival categories are often too crude to pinpoint how disaster-related materials have been archived. In order to take into account different structures and archival protocols that those digital repositories employ, I went back to my primary concern with fractured memory as well as the promising and threatening modes of connection, which are brought together by the digital archive's capacity to produce what can (not) be told about the past, as a storytelling device.

Accordingly, there is no single analytic framework that can be applied to each archival platform I explore in the following chapters. Instead, the modalities of archiving, of generating a myriad of stories about the Fukushima disaster lie at the core of this research. Attending to how different digital archives constitute stories about the disaster allows me to engage with gaps, absences and erasure that underlie various facets of inclusion and exclusion, and the production of in/visibilities. Just as human memory is partial and flawed, the digital archive too produces ephemeral traces that cannot always be recovered, but are suggestive of what we have discarded in the processes of archiving.

The disparate practices of archiving the Fukushima nuclear disaster are a site where the meanings of the event have been negotiated and scrutinised, whereby new and unexpected connections between the past, present and future continuously emerge. Those digital archives also contingently produce gaps and ruptures that can only be discerned through the elusive traces of information, which requires a sort of detective work to speculate upon what might have been "lost." In other words, they are also a product of fragments that often fail to constitute intelligible narratives.

In the course of this research, I experienced and re-experienced the moments of the disaster through the eyes of several digital archives, as someone who lived in Japan in its wake, but who has subsequently spent the most of time abroad. To interrogate the digital archive on the Fukushima nuclear disaster is also to write *from within* the stories it produces, which often intersect with my own stories. Such stories should be read as ghost stories that reveal the conflation of "the reality of fictions and the unrealities of the facts," with the "fictive" signifying "the ensemble of cultural imaginings, affective experiences, animated objects, marginal voices, narrative densities, and eccentric traces of power's presence" (Gordon, 2008: 22; 25).

My turn to the digital archive has entailed following the traces of the ghostly figures that have haunted my memory and thought processes, as well as a myriad of fragmented objects and stories in-the-making that keep reconfiguring what the Fukushima nuclear disaster is and will be, as a controversial and contradictory entity. This thesis is also a result of sudden and unexpected encounters with the past in the ongoing present. The long path to mapping out research frameworks itself represents how I have not, and will not come to terms with the rapid flow of data transmission and a sense of confusion I experienced at the time of the disaster, not knowing where it began and where it ends.

To work on the Fukushima nuclear disaster is to work with the "here and now," along with the uncertain nature of a nuclear accident in an extended timeframe stretched into the future. Throughout this study, I hope to demonstrate how the digital archive and its archived objects constitute each other in creating and conjuring many times and places that haunt the Fukushima disaster, amidst uncertainties, detours and contradictions that are also part of my endeavour.

Introduction

0. Research Description

This research explores the roles of digital archive of the Fukushima nuclear disaster, with a specific focus on the modes of haunting that play out in conveying the memory and knowledge about the unfolding disaster. My thesis discussions revolve around the following research questions: What are the roles of the digital archive in articulating the memory and knowledge about the Fukushima nuclear disaster?; How do the practices of digital archiving create temporal and narrative modalities, in relation to the digital archive's storytelling capacity?; In what ways has the Fukushima disaster been contextualised and then historicised in the processes of archiving? These questions involve sub-questions I am going to answer in each empirical chapter, such as: How does an individual archive set up measures for storing and organising disaster-related data?; What do the gaps, absences and erasures in the digital archive signify in processing information about the disaster?; How do the vicissitudes in digital archiving encompass new and alternative relations among the past, present and future? These questions are oriented towards the im/possibility of weaving coherent and intelligible stories about the ongoing disaster that is itself an unstable and uncertain entity. Consequently, the making of the digital archive engenders dynamic relations with the archived – that is, the Fukushima disaster – and keeps reconfiguring what can (not) be remembered.

I would like to address that, throughout the thesis, I do not intend to make judgements about, or validate any viewpoints regarding the impact of the disaster, such as health and environmental effects of radioactive exposure. Neither do I attempt to evaluate

intense controversies surrounding a myriad of issues like evacuation, decontamination, the future implementation of nuclear energy in Japan, etc. Rather, my interest in the practices of archiving the Fukushima disaster in the digital domain grew out of the intrinsic impossibilities of fully comprehending what happened and is happening. The idea that the historical development of nuclear technologies per se have created new psychic and cultural registers (see Masco, 2006) by disorienting human senses underscores my intervention to the disaster that is both ongoing and situated in a broader historical discourse. At the same time, a nuclear event has always been told in relative terms, and thus inevitably haunted by the legacy of the very technology that is both promising and threatening. The "digital" features of the new ways of archiving, as I will discuss in the next chapter in detail, specifically provide significant insight into recording the fragments of such an event through a selective act of remembering and forgetting.

In the following sections, I contextualise the complexities of the Fukushima nuclear disaster and why it is such a difficult entity to archive, before moving on to outline key theoretical discussions that have helped formulate this research in the next chapter. I aim to demonstrate that the difficulty in situating the disaster would in turn lead to the proliferation of archiving projects to record the recent past and unravelling futures. Below, I delineate three pivotal entry points that underscore this research, in order to open up for further arguments in the following chapters.

1. The Abyss of Uncertainty: What is the Fukushima Nuclear Disaster?

First of all, it is important to acknowledge the impossibility to expose the full picture of the unravelling incident, and what makes it a fugitive object of study – as it is yet

uncertain when the disaster began and ends, because of its complex origin and the continuous effort to dismantle the damaged plant. On recollecting the moment she first knew about the triple disaster after her flight back from Tokyo, cultural theorist and filmmaker Trinh T. Minh-ha (2016) argues that "[t]he naming at first seems to say it all: the quake, the wave, the meltdown, then the cloud, emanation, the contamination," because "[n]ames are first and foremost guests of reality" (Minh-ha, 2016: 133). That is, the impossibility of naming the chain of devastating events eventually led to confusion and anxiety, the sense of being in a nightmare. The problem of situating the disaster in a single epistemological framework has particularly inspired me to explore digital archives that purportedly record multiple realities of the incident.

It has long been discussed that a nuclear accident cannot escape from various forms of mediation and interpretive intervention, as Ulrich Beck (1987) argues in his landmark essay "The Anthropological Shock: Chernobyl and the Contours of the Risk Society," published a year after the Chernobyl disaster. Beck describes the incident as a media event[3] because "nuclear contamination escapes all perception and turns everyday life into a 'political football' for experts and mass media" (Beck, 1987: 153). The essay addresses that all experiences are inevitably *mediated* in the nuclear age in that the threat of radiation is imperceptible and inaccessible to human senses, and thus a means of communication becomes under tremendous scrutiny as to whether they could convey accurate information about radioactive fallout. Although it is not only the case with a

[3] Although I will not go into detail about the definition of a "media event" here, it needs to be noted that Beck's use of the word is radically different from what Elihu Katz and Daniel Dayan (1985) first defined as "media events" in a 1985 essay "Media Events: On the Experience of Not Being There." While they refer to the nuclear accident at Three Mile Island in 1979 as an example of "spectacular breaking news," Katz and Dayan mainly explore the effects of live broadcasts that transform and integrate individuated masses into the whole society.

nuclear disaster that triggers immediate media response, Beck's remark on the transformation of sensory experiences intertwined with the imperceptible nature of radiation is particularly significant, as he maintains: "[i] n nuclear democracy, we the citizens have lost sovereignty over our senses," and "[t]he disempowerment of our senses forces us into a situation in which we must accept the dictation of centralized information which can at its best be relativized in the interplay of contradictions" (*Ibid.*, 156). His remarks in the immediate aftermath of the Chernobyl disaster are the important precursor in addressing that a nuclear disaster can only be intelligible through forms of mediation.

Undoubtedly, the wake of the Fukushima disaster brought about a list of questions to be answered, such that concerns "the amount of radioactive materials released, the precise locations where they settled, their take-up by plants and animals, and the extent of age and gender vulnerability of affected populations" (Perrow, 2014)[4]. In claiming that "[i]n a nuclear crisis, life becomes a nightmare for those people trying to make sense of the uncertainties," environmental anthropologist Barbara Rose Johnston (2011)[5] raises more specific issues that include: "Radiation is invisible, how do you know when you are in danger?; What level of exposure is safe?; What are the potential risks of acute and chronic exposures?; Whose information do you trust?" It is clear that these are recurrent questions in the nuclear age, since the profound uncertainties of nuclear fear have been imbricated in the most mundane experiences of everyday life, which could be seen in the implementation of personal Geiger counters and radiation "forecast" maps broadcast daily on TV in the immediate aftermath of the disaster. The lack of transparency and

[4] <https://thebulletin.org/2014/03/five-assessments-of-the-fukushima-disaster/>
[5] <https://thebulletin.org/2011/03/in-this-nuclear-world-what-is-the-meaning-of-safe/>

accountability of investigative bodies has also fuelled the widespread anxiety, as it was not until 20 March, 2015 that they finally confirmed that the melted fuel was "*gone*," which was an indication of the worst-case scenario of melt-through instead of meltdown[6]. The disclosure also showed the inability of the Japanese government and the officials of the Tokyo Electronic Power Company (TEPCO) to figure out what had actually happened to the reactors.

Tessa Morris-Suzuki (2014), historian of East Asia reflects on her own experience of having heard a story about a child who was born in Fukushima around the time of March 2011, and was never allowed to play outdoors. She argues that people in Fukushima now have to confront "mundane disasters" because "[w]hen the uncertainties and complexities of the science of radiation meet the very different uncertainties and complexities of everyday life, scientific rationality and mundane logic diverge, creating profound problems of communication and understanding" (Morris-Suzuki, 2014: 333). These uncertainties and complexities, despite having different origins and orientations, have come to engulf everyday experiences by calling upon an unexpected encounter with the long-overdue fear of radiation. While environmental and health concerns would often be the centre of controversy, the imperceptible nature of radiation has also become an epistemological and political battleground.

Olga Kuchinskaya (2012), whose work is informed by communication studies, science and technology studies (STS) and women's studies raises a crucial question regarding the equivocal appropriation of the notion of "invisibility" that renders it hardly possible to fully assess the impact of a nuclear accident, which is dispersed across time and space. Drawing on three different (and often contradictory) measures used in the aftermath of

[6] <http://ajw.asahi.com/article/0311disaster/fukushima/AJ201503200050>

the Chernobyl disaster, she delineates the politics of "double invisibility" that confounds public reaction to a nuclear accident. Kuchinskaya examines "formal representations" of radiation effects as a way of establishing tentative standards in order to define the threshold of what is to be considered dangerous contamination. Formal representations generally rely on evaluations from the perspectives of both scientific expertise and bureaucratic decisions in order to offer ad hoc solutions to the emergent problems. She insists that the agreement upon formal representations is about "which aspects of reality are made visible: which properties of empirical descriptions of reality are emphasized and which are discarded in the processes of abstraction, simplification, and standardization" (Kuchinskaya, 2012: 80)

As different scales and measurements introduced after the Chernobyl disaster reflected contemporary political predicaments, the question regarding "how to represent radiation danger" inevitably entails the politics of inclusion and exclusion, which privileges some judgements over others. It is also significant to address that the problem of invisibility is always already equivocal in the nuclear age, whereby the imperceptibility of radiation and the invisibility of information would collide and converge. That is, drawing a line between what is (made) visible and invisible does not merely indicate the difficulty in identifying the long-term effects of radiation, but also encompasses the processes of decision-making. In other words, when the invisibility of radiation danger echoes with that of information, the implication is that both elements are intertwined by scientific uncertainties and the manipulation of knowledge. In the aforementioned article, Minh-ha (2015) maintains that the Fukushima disaster made manifest "what turns out to be most perturbing are the *barely visible* details on the side, in the margins of media coverage and the largely invisible (or not-yet-fully-becoming-visible)

scope and consequences of nuclear threat [emphasis in original]" (Minh-ha, 2015, 133). The unknowability of its consequences expands to encompass a number of "what if…s," what they could have done, or what if it had not happened.

The unknowability of the effects of a nuclear event has led me to question what is regarded as *the* reality of the Fukushima disaster, by whom, on what platforms and through what selective acts of archiving. As communications scholar William J. Kinsella (2015) maintains that "[h]ow we talk about Fukushima does not simply *describe* the event's objective reality; rather, varied representations of Fukushima combine to *construct* or *constitute* its evolving meanings [emphasis in original]" with reference to proliferating terms such as "accident," "disaster" and "catastrophe," the Fukushima disaster is subject to diverse interpretations, which appears to entail "a representational crisis" (Kinsella, 2015: 3). Although I will not approach these discussions scientifically, they demonstrate the intrinsic ambiguities and uncertainties surrounding the Fukushima nuclear disaster, as well as the urgent need to constitute discursive frameworks to make sense of the ongoing event. I argue that they also underscore the construction of the digital archive and its flexible capacity to collect and preserve disaster-related data. I thus aim to engage with the production of multiple versions of reality in my analysis of digital archives, interwoven with the debates on the unknowability and uncertainty of a nuclear event.

2. The Return of Nuclear Imaginaries

> Japan. One of the world's most nuclearized nations, a nation that in every conceivable way has internalized the atom, attempted to master its traumatic

> history with the atom, as producer, champion, as apologist, as perpetrator, and, as victim, again.
>
> (van Wyck, 2012: 69)

Regardless of scientific and epistemological uncertainties that circumscribe the Fukushima nuclear disaster, there is an underlying tendency towards what Jacques Derrida (1984) calls "the assimilating resemblance of discourses" that threads through any narrative concerning the repercussions of a nuclear event (Derrida, 1984: 21). In attending to the digital archive's capacity to generate multiple modes of storytelling, it is through the resemblances, affinities and connections that I am going to employ archival imaginaries (see Chapter Two) to "read" and interpret the "ghost stories" produced in digital archives. That is, while the versions of reality appear to proliferate in archiving practices in the digital domain, the digital archive also contributes to articulating hidden affinities and submerged connections that might emerge from atomic pasts. The irreversibility and recursivity of nuclear fear is also exemplified in anthropologist Joseph Masco's (2006) argument that "[t]he [atomic] bomb is now a multigenerational, national-cultural, economic, and environmental mutation, one that has already colonized a deep future" (Masco, 2006: 38). Here, I claim that the conditions of conjuring the ghosts of the Fukushima disaster are entangled with historical specificities of the legacy of nuclear technologies, which resurface in the wake of the disaster, traversing the relations between the past, present and future. Those juxtapositions with historical events are often appropriated to account for a number of uncertainties surrounding the disaster, whereby the mundane and the exceptional, the national and the universal are meticulously intertwined to constitute our

understandings of the event. I suggest that the recurring historical analogies and juxtapositions provide several "entry points" to examine the way in which digital archives on the Fukushima disaster have been besieged by their ghosts.

The detailed account of the Fukushima nuclear disaster in the preface of this thesis is drawn mainly from a 2014 book *The Fukushima Daiichi Nuclear Power Station Disaster: Investigating the Myth and Reality* published by the Independent Investigation Commission on the Fukushima Nuclear Accident in association with the *Bulletin of the Atomic Scientists*, an academic journal established in 1945 by those who had contributed to the creation of the atomic bomb during WWII. This version is not a mere English translation of the original report published in 2012 by the Japanese commission, and has additional purposes of providing readers with the cultural and historical backdrop of the use of nuclear power in Japan. In the introduction to this volume, Kennette Benedict (2014), former Executive Director of the *Bulletin of Atomic Scientists* claims that it is inevitable to take into account the historical trajectories of the nuclear industry in Japan "from the atomic bombs that marked their society with death, illness, and trauma," in order to unpack the consequences of the Fukushima disaster (Benedict, 2014: xii). Japan's "unique" historical engagement with atomic power is once again summoned to emphasise its victimhood, as a country that understands the inherent dangers of splitting the atom. In the comprehensive report, Japan's atomic past is excavated and revisited to give account to what happened, and is happening at the Fukushima Daiichi NPS.

Another striking example of cross-historical referencing includes Robert J. Lifton's (2011) article titled "Fukushima and Hiroshima" published on 15 April, 2011 on *The New York Times*. As a psychiatrist known for his work on wartime psychological studies, he

maintains that it is difficult to eliminate the "doomsday language" used to describe radiation dangers in Fukushima because the "doomsday language has its source in the doomsday nature of the stuff that is feared, and in the realization that we have created a technology with which we can annihilate ourselves as a species" (Lifton, 2011). Yet, the article carefully delineates the globalised nuclear fear and the inextricable connections between the atomic bomb and nuclear reactors, since both accommodate "the splitting of the atom" to produce a massive amount of energy. Although he claims that "Fukushima is not Hiroshima: it is nuclear weapons that most endanger mankind," Lifton goes on to argue that what the effects of atomic bombing and nuclear accidents have in common is "invisible contamination," as "a poison that one cannot see, smell or feel, and whose effects are so lasting that, even if they do not show up in one year – or one generation – they may well do so in the next" (*Ibid.*). At the same time, the implication is that it is ironic for Japan to implement the same technology that killed more than 200,000 citizens in Hiroshima and Nagasaki bombings in order to boost its post-war economy.

With Japan being the only country that has experienced several severe damages done by atomic power, the emphasis on the "national" aspects of the Fukushima disaster has been appropriated in official documents. Due to a call for transgenerational assessment of the Fukushima disaster, Greenpeace issued a comprehensive report on the fifth anniversary of the incident, titled "Nuclear Scars: The Lasting Legacies of Chernobyl and Fukushima," consisting of commissioned reviews of scientific research and sociological case studies with regard to the patterns of evacuation, mental health consequences and the impact on local communities, etc. The report opens up with a rather provocative sentence that "history repeats itself," as it reiterates that the health effects of the Fukushima disaster "will probably never be known" because of our

understanding of radioactive exposure is strictly "limited to the lessons learned" from Hiroshima and Nagasaki bombings (Greenpeace International, 2016:1; 28). On the other hand, the Reconstruction Design Council in Response to the Great East Japan Earthquake, an advisory panel launched by the Japanese government in April 2011 made a more explicit remark about historical continuity in their proposal "Toward Reconstruction: Hope beyond the Disaster" published on 25 June, 2011. They claim that people began to see the Fukushima disaster as if it were "a flashback, on a single historical axis, of the atomic bombs in Hiroshima and Nagasaki that marked the beginning of the postwar period," whereas the incident has also marked "the beginning of the post-disaster period" (The Reconstruction Design Council, 2011).

These historical trajectories and juxtapositions are prevalent to contextualise the Fukushima nuclear disaster, and they provide different timeframes to understand the unravelling incident. As discussed above, the timeframes of the Fukushima disaster could be both extended and narrowed down, disrupting the formation of linear temporality. In the course of this research, temporal disruptions have proven to be the significant precursor to interrogate the stories that digital archives tell, especially in terms of the haunting persistence of the past in the present. As will be argued throughout the thesis, the legacy of the atomic age threads through the practices of archiving the disaster, from the omnipresent fear of radiation to Japan's historical engagement with nuclear technologies. To reiterate, the return of various historical "reference points" offers certain protocols in making sense of what does not (yet) make sense, which allows me to examine archival gaps and absences, as well as unexpected connections that underscore the contingent making of the digital archive.

3. Archiving the Impossible / the Impossible Archive

The recurrent discussions in the nuclear age – in relation to the uncertain effects of radiation and historical implications attributed to the implementation of nuclear technologies per se – have been amplified by new media technologies. As the means of communication has developed since the Chernobyl disaster, the worst nuclear accident before Fukushima, the rapid flow of information and the rise of the interactive media space have come to augment a range of stories to be told about a nuclear disaster. It goes without saying that the proliferation of diverse media platforms has contributed to creating differential modes of recording the consequences of the disaster that keeps unfolding by the second. These shifts have greatly influenced the construction of digital archives, afforded by technologies to report and record the ongoing event.

With regard to the major change in the media environment, Sharon M. Friedman (2011), scholar in journalism and communication, and member of the Three Mile Island Public's Right to Information Task Force argues that "[r]adiation coverage at Fukushima has been much more extensive and much better in many cases because of the emphasis on explanations and background information and the visual graphics of a number of media organizations" (Friedman, 2011: 67). In juxtaposing the coverage of radiation levels of three large-scale nuclear accidents (Three Mile, Chernobyl and Fukushima), she maintains that the advent of the Internet specifically played a crucial role in conveying news updates and opinions to a wider public in the immediate aftermath of the Fukushima nuclear disaster. The speed of data transmission and the wide range of informational sources made Fukushima an "iconic" event that provided "a major test of whether Internet resources could be used to provide better nuclear coverage," as online platforms encouraged debates among scientists, journalists and citizens (*Ibid.*, 60).

Undoubtedly, the shift in the media environment has influenced the way in which people remember and re-enact the moments of the disaster. Anders Ekström (2016), scholar in history of science who is working on the project "From Pompeii to Fukushima: Time Intermediality and Transregional Imaginaries in Disaster Discourse" maintains that "remote disasters are ideally reported in small screen media and through the modes of liveness that they enable," which blurs "the distinctions between media witnesses and victims, between virtual and non-virtual spectatorship, between an aesthetic of detachment and the experience of physical presence," producing a remarkable conjuncture of the past, present and future (Ekström, 2016: 118). In addition to the "real-time" recording of the event and the potentiality of recreating the scenes of the disaster, digital technologies have transformed the production of memory and knowledge. Specifically, they enable the articulation of "unofficial stories" that "would conjure a 'hidden reality' of undisclosed events," while the excess of information comes to threaten the integrity of reality (Morita et al., 2013: 93). These shifts in the contemporary media landscape need to be taken into account in the analysis of the making of digital archives, in that they have drastically influenced the range of archival stories to be disseminated.

In addition, the participatory and ephemeral aspects of online culture have contributed to the proliferation of digital repositories, since they have increasingly come to function as huge informational hubs that bring together a myriad of resources as well as human and nonhuman actors. Public participation in the production of knowledge most prominently characterises the post-disaster media landscape, thanks to the availability of a diverse multimedia means for communication, including social networking service (SNS) and web-based data sharing systems. The participatory character of post-disaster online interaction would allow the public to create their own

records of the disaster, which reflect their lived experiences. However, the intensity of data exchange and storage afforded by digital technologies is not immune to a sudden disappearance of data, which raises questions about the possibilities and limitations of digital archiving praxes to determine what is to be remembered or forgotten. Throughout the thesis, I further develop this point by introducing the idea of "haunted data" (see Blackman, 2015; 2019) and digital traceability in order to intervene to archival gaps and absences, as a constitutive part of digital archiving.

In going back to the notion of the archive, it is defined by Michel Foucault (2002) as "the law of what can be said, the system that governs the appearance of statements as unique events," which also "reveals the rules of a practice that enables statements both to survive and to undergo regular modification" (Foucault, 2002: 145-146). His argumentation that the archive dominates the system of enunciation is pertinent to Jacques Derrida's (1995) discussion of the intricate relations between the archive and the archived, with regard to what the archive as a mnemonic apparatus is allowed to convey. Even though the digital archive distinguishes itself from the traditional archive in terms of the implementation of new media technologies, it also plays a pivotal role in determining what objects should survive in the archive within the rapid transaction of data, as I will discuss in detail in the following chapter. In addition, the flexible capacity of the digital archive not only obscures the traces of data accumulation and removal, but engenders a multiplicity of temporalities in the processes of collecting and organising archival entities. The creation of temporal dynamics and narrative modalities are the result of technological affordances as well as what media theorist Wolfgang Ernst (2013) describes as the emphasis on "regeneration, (co-)produced by online users for their own needs (Ernst, 2013: 95). Consequently, my analysis of digital repositories revolves around

the complex interplay of archival measures, user participation, and the intrinsic power of the archive to constitute what can (not) be told, which produces haunting effects.

Throughout the thesis, I argue that the digital archive is not merely a conveyer or storage of disaster-related data, but is a significant actor that discloses the constant negotiation with the recent past-in-the-making. It is also a nodal site where the uncertain consequences of the disaster and disparate historical references come to converge, in the way that produces multiple plotlines to construe the repercussions of the event. Indeed, the Fukushima disaster itself is an elusive object of archiving, just as digital repositories generate ephemeral objects that dis/appear every now and then. The contingency of digital archiving thus designates the interlocking of narrative modalities to make sense of the ongoing disaster – with uncertainties, ambivalences and controversies woven into the stories those archives could tell. Again, the contemporary change in the media environment is one of the key factors that allow for public participation in record-making, but its technological predicaments simultaneously complicate the relation between the archive and the archived. Therefore, the multimodal practices of digital archiving are reliant upon the production of unexpected connections among archival fragments dispersed across time and space, whereby the digital archive itself also emerges as a haunting entity.

4. Chapter Breakdown

So far, I have signposted several "entry points" that have inspired my study of digital archives on the Fukushima nuclear disaster, in order to open up the theoretical and methodological underpinnings of this research (see Chapter One and Two). As will be clear in subsequent chapters, this thesis is a result of sudden and unexpected encounters

with the past in the ongoing practices of digital archiving. These "entry points" have helped me formulate key concepts, methodological parameters and empirical materials to interrogate the making of the digital archive. This rather long path to mapping out my research framework reflects the complicated status of the unravelling disaster that exists at the intersection where different realities collide. The difficulty of grasping the whole picture of the disaster has nevertheless helped me become attentive to ruptures and fragments produced in digital archiving praxes, which are constitutive of the production of myriad stories about the ongoing event. From the uncertain effects of radiation to the historical implications of nuclear incidents, I suggest that the digital archive articulates and aggregates fragmented and ephemeral data of the unravelling disaster that awaits future reworkings and interpretations. My turn to hauntology that I will extensively discuss in chapters One and Two, as the basis of my conceptual and empirical approach to the digital archive is based on these complex entanglements that shape the production of memory and knowledge about the Fukushima disaster.

In the first chapter (Literature Review), I will conduct an extensive review of literature by laying out central theoretical discussions that have formulated my thesis argument. Specifically, I am going to address the development of the notion of the digital archive as a fluid, processual and transformative storage of memory and its capacity to create multiple temporal and narrative modalities. I also delineate key discussions of hauntology, especially in relation to Avery F. Gordon (2008) and Grace M. Cho (2008)'s employment of the concept, by reflecting further on the haunting implications of the Fukushima nuclear disaster.

Chapter Two (Research Methodologies) expands the concepts I discuss in the first chapter, with a specific focus on technological affordances of the digital archive as a

storytelling device. The first section of this chapter introduces five online archives I am going to examine throughout the thesis, in relation to the methodological challenges and implications they pose. I then provide the ways of "reading" the digital archive hauntologically, drawing on such notions as haunted data, digital traceability, the production of gaps, absences and erasures, and archival imaginaries.

The following chapters Three, Four, Five, and Six are dedicated to the empirical analysis of digital archives. Chapter Three (TEPCO's Digital Repositories) explores two archival repositories on the website of the Tokyo Electric Power Company (TEPCO) that operates the damaged plant. It includes the Fukushima Daiichi Timeline after March 11, 2011, a "moving" timeline that keeps selected records of the events that took place at the plant, and the "Photo & Video Library," a multimedia archive that provides audiovisual materials. In Chapter Four (The Japan Disasters Digital Archive), I will discuss one of the biggest institutional archives on the triple disaster, launched by Harvard University's Reischauer Institute of Japanese Studies, by exploring their unique feature "Collections" that allows users to create their own archives-in-the-archive. Chapter Five (SimplyInfo.org and Nukewatch.org) examines two independent online repositories. SimplyInfo.org, previously known as "Fukuleaks" is one of the long-standing independent repositories since the wake of the Fukushima disaster, while Nukewatch.org, a non-profit organisation to promote nuclear safety launched "Fukushima Updates and Recent News Archive," a small repository of information dedicated to the collection of disaster-related materials across the web. And in Chapter Six (Teach311.org), I will analyse Teach311.org, a transnational, multilingual and interdisciplinary project to collect and create resources on the triple disaster for educational purposes.

The last chapter is a concluding chapter of the thesis, in which I summarise the roles of the digital archive in conveying the memory and knowledge of the Fukushima disaster, and in creating the "ghost stories" about its repercussions. I intend to claim a multiplicity of haunting that threads through the practices of archiving the disaster in the digital realm, by offering the alternative ways of reading the stories they could tell. I will also relate this research to the contemporary discussions that call into question the boundary transgressions between human and nonhuman, material and immaterial, subject and object etc., drawing on the way in which digital archives envisage temporal and narrative vacillations that circumscribe our lived experiences of the Fukushima nuclear disaster.

Chapter One

Literature Review

0. Introduction

In this discussion of literature, primarily in the fields of media, sociology and archive studies, I aim to unpack key theoretical discussions that have helped to formulate my research questions that critically engage with the concepts of the digital archive and hauntology. Specifically, I am going to explore the development of these notions across different disciplines, which is followed by the reflection on the conceptual overlaps that bring them together. I will first delineate what is seen to constitute and characterise the digital archive as a research object, with a specific focus on its flexibility and ephemerality, by reflecting on the fluctuations and ambiguities in its definition. In the second section, I address the significance of hauntology as both a conceptual and methodological framework, which underscores the development of my thesis arguments. I then focus more on the multivalent implications of haunting that arise in the historical contextualisation of a nuclear disaster and nuclear technologies per se. Lastly, I indicate how hauntology has become a significant epistemological tool to explore the multiple layers of haunting that permeate through the creation of the digital archive and the complex historicities attributed to the Fukushima nuclear disaster. In this chapter, I aim to situate the practices of making the digital archives of the Fukushima disaster as the centre of analysis through these different bodies of literature, which leads me to interrogate various archival attempts to capture and record the event with uncertain futures and unfinished or untold stories – an event laden with hidden histories, which presents itself as ghostly as the effects of radiation.

1. What is the Digital Archive?

While relentless, real-time news updates about the Fukushima nuclear disaster made it almost impossible to capture concurrent events, the velocity of data transmission in turn gave rise to the urgent need to archive the consequences of the event. Having mentioned that the contemporary media landscape enabled the proliferation of "unofficial" versions of the incident, how those stories are articulated and recorded is a crucial question – especially when it has become increasingly difficult to retrieve the targeted information on the web. In other words, the ephemerality of informational exchange calls into question the roles of digital repositories to capture the excess of transient data. From official bodies including TEPCO to citizens and independent organisations, a number of agencies are behind the construction of the digital archive of the Fukushima disaster. My turn to the digital archive as a research object is inspired by Jacques Derrida's 1995 essay "Archive Fever: A Freudian Impression" that raises important questions about the archive and communication technologies, along with his argumentation of haunting and its endorsement of the future-to-come.

Significantly, Derrida (1995) addresses how "the technical structure of the archiving archive also determines the structure of the archivable content even in its very coming into existence and in its relationship to the future," and that the "archivization produces as much as it records the event," which is also "our political experience of the so-called news media" (Derrida, 1995: 17)[7]. The mutual construction of the technical substrate of

[7] It is worth noting that Derrida describes the impact of communication technologies with a metaphor of "archival earthquake," followed by the "aftershocks" that will have transformed the production of the archive (Derrida, 1995: 17). This implicates the very physical and material effects of the advent of new media technologies, as archivist Verne Harris (2009) analyses the choice of the word as a manifestation of the death drive and forgetfulness (see Harris, 2009). Would the analogy mean more than the huge impact of

the archive and the archivable lies at the core of Derrida's understanding of "general archiviology," by which he refers to a general and interdisciplinary science of the archive. His turn to the impact of media technologies on the practices of archiving provides significant insight that needs to be further unpacked in relation to the contemporary archiving praxes and the specific technological affordances of the digital archive.

In order to look into the difference between the traditional archive and the digital archive, Mike Featherstone's (2006) definition of the latter is an important signpost. According to Featherstone, the traditional archive has been understood as an apparatus that enacts disciplinary power and governmentality (see Foucault, 1972), as a predominantly physical space to keep "official" records and produce national memory. On the contrary, he insists that the digital archive "should not be seen as just a part of the contemporary 'record and storage mania' facilitated by digital technologies, but as providing fluid, processual, dynamic archive, in which the topology of documents can be reconfigured again and again" (Featherstone, 2006: 596). One of the most striking aspects of the digital archive thus appears to lie in its flexibility and permeability to reconfigure the accumulated information, which brings forth an acute "counter-image" of the traditional archive.

The participatory culture on the Internet also plays an important role in the proliferation of digital archives in the aftermath of the Fukushima disaster, as I have indicated in the previous chapter. It has particularly contributed to the rise of online archiving and memory projects, with a number of online repositories having come to function as the informational storage where a myriad of resources become available,

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technological manoeuvre, when the archived object itself is the result of the aftershocks of an earthquake?

including radiation maps based upon individual monitoring by citizens. Atsuro Morita (2013), Japanese STS researcher points out that the Fukushima disaster is often characterised by "a flooding of various discourses, via mainstream media and through online forums, telling starkly different versions of the unfolding events" (Morita et al., 2013: 82). In this context, he asserts that the proliferation of online interaction provides opportunities for widely circulating "unofficial stories." That is, multiplying discourses in the digital domain "would conjure a 'hidden reality' of undisclosed events at the plant," since the rapid flow of information are "part material […] and part semiotic, as people's taken-for-granted senses of reality threaten to unravel to the point of existential disruption" (*Ibid.*, 90; 93). In other words, the digital archive's capacity to convey an alternative story about the disaster is crucial in both affirming and contesting people's sense of reality from a number of perspectives. However, these "versions" of reality are ephemeral and transient, which makes it more difficult to record ongoing events.

A growing interest in the creation of digital repositories has raised questions with regard to the legitimacy and ephemerality in the processes of collecting and organising disaster-related data. At the same time, the emphasis of the digital archive "moves to fluid and complex archival traces, in which the archive cannot provide a direct access to the past, but only a textual refiguring of it" (Featherstone, 2006: 595-596). Given that the archive helps reconfigure our relationship with the past, I ask how the emergent idea of digital archiving has come to redefine the roles of the archive as a transformative storage of information, which is always subject to change that may involve the contingent erasure and displacement of data. The first part of this chapter outlines diverse interpretations of the notion of "the archive," on the assumption that the shifting media landscape has greatly influenced the production of "the archivable" related to the

unravelling disaster. In the following sections, I am going to unpack the struggles over the definition of the archive in existing scholarship, in order to situate my empirical materials I examine in chapters Three, Four, Five and Six. Below, I first explore the schism between traditional archival studies and the extended notion of the archive in various disciplines, particularly from the perspectives of new media and software studies. Then, how the "metaphorical" use of the term has enabled new archival practices will be interrogated, followed by the discussions of two significant features of digital archiving praxes: its capacity to "move" objects across time and space and the production of ephemera. These distinctive (and often "messy") features of digital archiving open up for my employment of hauntology as both the conceptual and methodological scope.

1-1. "Archive" as the Definitional Battlefield

> Nothing is less reliable, nothing is less clear today than the word "archive."
> (Derrida, 1995: 57)

> What is at issue here is nothing less than the future. […] As techno-science, science, in its very movement, can only consist in a transformation of the techniques of archivization, of printing, of inscription, or reproduction, of formalization, of ciphering, and of translating marks.
> (*Ibid.*, 16)

While the term "archive" has always been slippery, it seems that the most recent debates concerning its meaning hinge on the intersection of archival work,

changing digital technologies, and evolving scholarly practices and needs. (Clement, et al., 2013: 112)

In this section, I aim to offer some clarification of the notion of "the archive" in the digital context and how the meaning of the archive has expanded at the intersection of the archive and the digital. Such terms as "collection," "repository," "storage," "constellation" and "containment" are increasingly used as synonyms of the archive in the digital environment (see Berry, 2016; Blom, 2016). In addition, there are concerns in the archival community about various measures in defining what counts as an archive, and the danger of definitions excluding the collection of "born-digital" objects, as I will discuss below. Thus, one of the biggest challenges I have faced in exploring digital platforms that constantly update and articulate information about the Fukushima nuclear disaster as "digital archives" is the fluctuating and ever-expanding notions of the archive itself at both metaphorical and empirical levels. Yet, the fluidity of (the notion of) the archive appear to reflect Derrida's (1995) conceptualisation of the archive that entails the disruption of temporality, intertwined with the technologies of archiving (archivization). This view is also pertinent to his arguments about the impossible nuclear apocalypse, in that nuclear war is a phantasm that can only be imagined, because of "its being-for the-first-time-and-perhaps-for-the-last-time," leaving no trace of the archive (Derrida, 1984: 26). In other words, the contemporary struggles to capture the meaning and functions of the archive would come as no surprise. Then, is it the case that, when we are talking about the digital archive per se, the very thing we are looking at cannot necessarily be identified?

Here, my questions are: How would these epistemological and terminological

differences matter in defining what the digital archive is, and in distinguishing the digital archive from the "traditional" material archive?; Is there a common ground that traditional archival research shares with that of digital archiving?; Would the "slippery" nature of the archive open up possibilities, rather than multiplying conceptual constraints – particularly in terms of how researchers might engage with the roles of digital archives in articulating memory and knowledge, and their capacity to generate new modalities of remembering and forgetting?

I do not intend to claim that the digital platforms I examine throughout the thesis are exemplary of, or are the definitive model of the digital archive. For instance, there are only two self-claimed "archives" in my analysis: the Japan Disasters Digital Archive (JDA) and Nukewatch.org's small online repository "Fukushima Updates and Recent News Archive" that I explore respectively in Chapter Four and Five. The other three online platforms might be more aptly called the "repository" of disaster-related data, or a mash-up of interlinks drawn from the external sources of information.

However, I insist that the incommensurability of different archival platforms, in terms of their media formats, classificatory systems, user accessibility, etc. is a productive and generative feature of the digital archives I analyse in the thesis. They are characterised by fluidity as well as unique and contingent decision-making processes that engender multiple temporalities and modes of storytelling in shaping the records of an unravelling disaster.

With regard to the proliferation of different meanings attributed to the word "archive," I share a similar frustration with archivist Kate Theimer (2012) who describes her encounter with the use of the term in digital humanities as an experience akin to being a tourist in a foreign country: people speak almost the same language, but the same

words are used to mean different things. Her anecdotes include confused responses from digital humanities scholars when she asked them about the appropriateness of using the word to describe digitised collections. She thus insists on the importance of being aware of the fundamental principles of archival research, which differentiate archives and other forms of "collections": provenance, collective control and the original order. In order that the notion of the archive is properly contextualised according to the established understanding and practices in the archival community, she defines an archive as "the repository for the historical records of its parent organization" endowed with the connotations of authority, rarity, and "specialness" (Theimer, 2012).

However, as a researcher whose academic background rests in literary criticism, feminist and queer technoscience and cultural studies, I do not have the same concerns as Theimer expresses. Rather, I have been fascinated by the way in which "the archive" has come to signify different and diverse entities and practices in the digital preservation of data. With the formal definition of the (material) archive taken into account, the organisational and authoritative aspects of a repository do not always apply to the making of the digital archive for several reasons; there are a number of actors involved in its creation, including various technological apparatuses and funding organisations; the act of evaluating the "permanent value" of archival objects is almost impossible, especially when what is deemed "historical" is constantly under scrutiny in the face of the ongoing disaster; "the original order" of records can hardly be maintained, given digital repositories increasingly rely on interlinks and external resources in various media formats such as images, videos, etc.; the speed and flexibility of informational exchange may lead to the sudden disappearance and erasure of data.

In other words, the fact that scholars in diverse disciplines continue to use the word

"archive" to describe collections and repositories that do not necessarily abide by the formal rules, conventions and regulations in the archival community indicates that the word or concept itself attracts a myriad of interpretations. The practices of traditional archival research with its focus on governmentality and regulation appear to have less traction when it comes to the roles of emergent technologies in the transformative act of archiving, collecting and preserving information.

Even though Theimer's suggestions are a critical response from archival studies to the use of the word "archive" in digital humanities in particular, Marlene Manoff (2004), associate head and collection manager at the MIT Humanities Library acknowledges the capaciousness of the term as an opportunity to push forward interdisciplinary debates about "how new modes of scholarly production and communication are transforming the ways we collect, organize, preserve, and provide access to the archive" (Manoff, 2004: 21). With reference to a growing interest in archives in women's and postcolonial studies with a focus on the absences and distortions of the archive, she argues that these new modes of engagement with the archive would radically challenge the notion of the archive as a site of scholarly negotiation and knowledge production. Manoff's intentional use of the term "in its broadest sense" in order to achieve productive consciousness across different disciplinary practices contrasts with Theimer's warnings, especially in terms of the formulation of the archive as an abstract and metaphorical set of concepts.

Despite the criticism among historians about the ambiguous rendering of the word "archive (see Steedman, 2001)," Manoff attributes the implosion of the meanings of the archive to the changes in information technology that has engendered innovative scholarship over time, or what Derrida (1995) calls "archivization," the technologies of archiving. It is important to point out that Foucault (1972) and Derrida's

conceptualisations of the archive as the law and system of governance that determines what can (not) be said, and as a site that poses the question of the future through repetition and erasure have influenced both sides of the debate regarding the multiple uses and meanings of the archive, not to mention the formulation of the digital archive. To reiterate, the introduction of the digital environment to archival discourses does not eradicate key questions concerning what should belong to the archive, because archival objects "cannot provide direct and unmediated access to the past," for "[w]hatever the archive contains is already a reconstruction – a recording of history from a particular perspective" (Manoff, 2004: 14).

These two different positions about the emergence of new archival praxes, however, do not invalidate Mike Featherstone's (2006) comprehensive understanding of the digital archive that was introduced in the previous section, as a fluid, dynamic and processual repository enabled by new information technologies. Although he points out that the traditional material archive has functioned mainly as the basis for the construction of national memory, he contests that the archive is inherently the potential place of discovery and surprise, which "depends upon the contingent status of the fragments that found their way into the archive, while much of the fellow contemporary source material, the alleged key to richness of lived culture and everyday life from which it arose as imperfect recordings, lies destroyed or at best undiscovered" (Featherstone, 2006: 594). The elements of discovery and surprise in the construction of the archive pertain to my focus on "archival imaginaries" as a pivotal notion to explore the digital archive's capacity of storytelling in relation to the haunted/haunting forces of return that permeate through its construction, which I will further develop in the methodological chapter (see Chapter Two). The dilemma of defining the archive could also be regarded

as the result of the intrinsic "in-between-ness" of the archive as sociologist Thomas Osborne (1999) puts it. Although Osborne does not refer to the practices of digital archiving, he claims that "what makes the notion [of the archive] really useful is its elasticity; that it goes beyond such a literal reference, or that it can be used to do so," since the archive exists in-between "two extremes of literalism and abstraction" (Osborne, 1999: 53). Here, this "elasticity" of the archive appears to engulf the fluid and transformative aspects that the digital archive designates.

The problem with identifying *what the archive means* has made my choice and analysis of digital repositories difficult, but it has simultaneously allowed me to explore disparate archiving practices of the consequences of the Fukushima nuclear disaster, regardless of the implementation of different media formats and classificatory systems. I argue that the underlying question is not *what archivists do* in order to legitimise and account for the construction of official records, but the expansion of *what the archive does*, especially when various technological affordances come into play in the making of the digital archive. The decentralisation or dispossession of the archive therefore contributes to shifting a focus from the management and governance of material objects to more participatory aspects of archiving and its meaning-making processes. In the next section, I will draw on an extensive literature and existing scholarship on digital memory and archiving, which has helped me bring together the five distinctive repositories I will examine in chapters Three, Four, Five and Six as partial yet pertinent examples of practices of digital archiving.

1-2. Further Abstractions: Metaphorical and Empirical Uses of the Archive in the Digital

In this section, I will discuss how the struggles over the definition of the archive have

intensified particularly in the studies of media and memory, in response to the shifting digital environments. There are varying definitions and terminological struggles with regard to the emergent storage to preserve data, depending on one's research interests and disciplinary locations, especially among those who work in new media and software studies. One of the key characteristics of the implementation of digital technologies in the praxes of archiving, as scholar in media aesthetics Ina Blom (2016) argues, is that "[w]ith digital archives, documents and contents are no longer separated from the archival infrastructure: once the archive is based on networked data circulation, its emphatic form dissolves into the coding and protocol layer, into electronic circuits or data flow" (Blom, 2016: 12). According to digital humanities scholar David M. Berry (2016), the introduction of digital technologies has also radically transformed researchers and archivists' "power to interpret the archives" through enhanced accessibility, and the shift might be considered not only as "a de-archiving of what we previously understood an archive to be but also as a creation of new archival forms through practices of re-archiving[8]" (Berry, 2016: 103). These arguments demonstrate how new informational technologies have affected the way in which the archive functions, but not the meaning of the archive itself.

Wolfgang Ernst (2013), one of the most prominent media theorists outlines a number of difficulties in defining the digital archive and its functionality. In the broadest sense,

[8] By "de-archiving," Berry indicates "the transformation of the archive from a static place into one that is informed and interpenetrated by computation that restructures space through formatting, structuring, and classification" (Berry, 2016: 120). In addition to these transformative aspects of digital archiving, it is worth noting that Berry also points towards the multi-layered structure of digital archives with reference to the possibility of "archives within archives" that may entail deeper and shallower forms of an archive. The JDA's "Collections" feature (see Chapter Four) exemplifies the production of "archives within archives" that implement different organisational structures from the repository's semi-automatic aggregation of data from its partnership websites and contributors.

he argues, the Internet itself could be conceived of as a dynamic archive when considering the metaphorical use of the word to signify "all possible forms of memory and cultural memory" (Ernst, 2013: 84). In other words, the emergence of the Internet is a crucial factor that redefines the meaning of the archive, since the Internet could function as a collection or assembly of data stored in the network. However, digital archives *on* the Internet are increasingly understood in relation to its unique technological infrastructures and protocols, as well as operative algorithms. According to Ernst (2013), the major difference between the traditional (official) archive and the Internet as an archive is that "[t]he [traditional] archive is defined as given, preselected quantity of documents evaluated according to their worth for being handed down," while the Internet is "an aggregate of unpredictable texts, sounds, images, data, and programs. (*Ibid.*, 86).

At the centre of Ernst's arguments about the digital archive is its "metaphorical" aspects, whereby multimedia and networked repositories create "the archival phantasm" that the term archive has become the description of multimedia storage processes. The impact of the emergence of multi-media archives has therefore "confused the clear-cut distinction between the (stored) past and (the illusion of) presence and thus is more than just an extension or re-mapping of well-known archival practices" (Ernst, 2000: 119). Not unlike Ernst, American media scholar Wendy Hui Kyong Chun (2013) argues that the metaphorical aspects of "software" are the fundamental elements, on which all new media objects rely. This inclination of turning new media objects into metaphorical entities complicates the changes that digital technologies have brought about, in that it "challenges the process of consignation – of indexing and organising – that grounds the archive; it also fundamentally changes how archived materials are retrieved, or

'reanimated' and thus experienced" (Chun, 2013: 100).

Consequently, metaphorical attributes of new media technologies and the archive itself gesture towards how they have become the objects of translation and interpretation. Despite the extensive emphasis on the operativity and programmability of technological apparatuses in the discussions surrounding the technologies of archiving and storage, Chun warns of the "promising" rhetoric and the tendency to regard the digital as archives' salvation, because digitisation as a preservation method once seemed to solve the problems of deterioration or "decay[9]" of archival artefacts. She also claims that computer archives "have been targeted as *the source* of archival decay and destruction, their liquidity threatening both the possibility and the authenticity of cultural memory [emphasis in original]," because digital media disrupt the archive as "they themselves are difficult to archive or have not be properly archived or both" (*Ibid.*, 137-138). In other words, digital media's promise becomes its own threat, and this dilemma adds to the delusion of "total memory[10]," and further abstraction of the archive and archival objects.

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[9] It cannot be dismissed that the language of decay time and the notion of "shadow archives" I examine in the following section have particular resonance with my engagement with the archived – the Fukushima nuclear disaster. For instance, the half-life of radioactive decay is constantly called into question when it comes to the enduring environmental and health effects of radiation in the aftermath of the disaster, but it simultaneously refers to the decline of media attention to the unfolding of the incident (see Massumi, 2015).

[10] Andreas Huyssen (2003a), widely known for his works on cultural memory and historical trauma addresses the contemporary obsession with the past in relation to the accelerating speed of technological innovation and the fear of oblivion facilitated by new technologies. He insists that the need for "more" memory is now measured by memory bytes, and that the desire for "total recall" or "the total archive" is invoked by "a crisis of temporality in our lives, centrally brought on by the interface of technological change, mass media, and new patterns of consumption, work and global mobility" (Huyssen, 2003a, 21). The "crisis of temporality" is augmented by the emergence of digital media, which allegedly provides an infinite and enduring place for memory storage. It is worth noting that Huyssen's notion of temporal crisis takes into account the technological affordances of digital media, for he argues that "we cannot discuss personal, generational, or public memory separately from the enormous influence of the new media as carriers of all forms of memory" (Huyssen, 2003b: 18).

Andrew Hoskins, scholar in digital media and memory studies has developed the notion of "the connective turn (see Hoskins, 2011; 2018)," an epistemological and empirical shift designated by digital technologies that would transform relations between people and machines. He claims that the connective nature of digital media to share, edit and record information has generated "the memory of the multitude," which is essentially "archival." That is, while the immediacy and fluidity of digital transfer are salient factors that produce the incommensurable multitude in memory-making, they also confound the agency of memory, because of the dynamic interaction between digital devices and the human. To describe archives that contingently appear as the result of a multitude in memory-making practices, he introduces the idea of "shadow archives[11]" that are "entangled and distributed through uncertain times and spaces, forms and times of decay, and emergences" (Hoskins, 2018: 86). Shadow archives created in the digital transaction of data are the consequence of the blurring of the conscious and the unconscious, the public and the private, since these conceptual archives are being

[11] Akira Mizuta-Lippit (2005) coincidentally uses the same term in rephrasing Derrida's notion of an "archive of the virtual" (see Derrida, 1995). He introduces "the shadow archive" to signify an impossible task of the archive "to protect the secret, its heterogeneity, and divide the archive from itself," whereby the archive "seeks to repress, efface, and destine its own interiority to oblivion" (Mizuta-Lippit, 2005: 11). Mizuta-Lippit's conceptualisation of "the shadow archive" differs from that of Hoskins', however, they both appear to be "haunted by the histories and excesses of their own storytelling" in that they return to the production of traces, both material and immaterial (Blackman, 2019: 166). He further develops the notion from Derrida's concept of "cinders," the remains of a body that has vanished without the trace, just as the shadows left on the pavement after the atomic bombings in Hiroshima and Nagasaki. Mizuta-Lippit often returns to the site of atomic destruction in order to speculate upon the intrinsic paradox in Derrida's discussions of the archive that is built on repression, and "the shadow archive" comes to signify "the trace, or cinders, which threaten to reduce the immanent divisibility of the trace to an irreducible, indivisible, invisible afterimage: it threatens an atomic reaction that will incinerate the archive" (Mizuta-Lippit, 2005: 28). Even though I argue against a naïve trope "Fukushima is Hiroshima," it is the untimely return of hidden histories that renders the digital archive both material and immaterial, especially in relation to this curious finding of "shadow archives" in Hoskins and Mizuta-Lippt's texts.

produced regardless of one's intention of preserving or letting go of information. Thus, "shadow archives" are to be recognised as the archives of one's digital traces that may unexpectedly dis/appear out of time and place.

Lisa Blackman's (2019) notion of a "haunted archive," an archive consisting of data that "disappear, are removed, become submerged or displaced, are lost, overlooked, deemed irrelevant, [and] make accidental connections" offers significant insight to develop Hoskins' "shadow archives" from hauntological perspectives (Blackman, 2019: 57). As I will further discuss the employment of hauntology to the analysis of the digital archive in the latter half of this chapter, her interpretation of "data" in the exploration of the hauntological dimensions of the studies of media and mediation is particularly helpful to eschew an unspecified and naïve adaptation of the term in this research. Blackman argues that data "bear the traces of human, material, technical, symbolic and imaginary histories that are often displaced and occluded in data metrics," which can also be "extracted, mapped, aggregated, condensed, measured and translated, acquiring autonomies and agencies that extend beyond the original event or transaction" (*Ibid.*, xiii; xxi). Without defining data solely as code, or computational and mathematical units, the idea of data being laden with the traces of submerged histories and narratives opens up the way in which the dynamic production of data in the digital archive calls into question the issues of subjectivity, temporality, affect and embodiment.

Ironically, the conflation of the archive as a malleable and transformative storage of memory objects and the idea of the Internet and/or every computer being an archive does not resolve the definitional problems I have raised. Rather, further abstractions of the archive from its representation foreground the impossibility of "containment," for instance, of avoiding the leaks and the unintended exposure of information, which takes

on physical dimensions when it resonates with the status of the archived (see Kuchinskaya, 2012 for the notion of "double invisibility" of informational and material leaks in the aftermath of a nuclear accident). In addition, this "slippery" nature of the archive simultaneously makes the status of archived objects unsettled and unsettling, turning them into the objects of "shadow archives," or haunted data that "look backwards and forwards to what has been left behind after particular narratives and sorting processes have taken place, as well as to those traces and absences, which operate as a double to this process" (Blackman, 2019: 57). I thus claim that the proliferation of meanings of "the archive" in the aforementioned arguments radically defies closure, and allows for the past to be re-enacted and reanimated every now and then. The impossibility of containing or keeping information intact in the production of the dynamic archive, in other words, generates alternative connections with the past and reconfigures what can (not) be archived. Thus, the abstraction of the concept of the archive also points towards the way in which archival entities get abstracted and fragmented, and then assembled in an unexpected and haunting manner.

1-3. Key Functionality of the Digital Archive

In the previous sections, I have delineated the problems of defining the archive per se across different disciplines, which underscores the contemporary discussions the making of the digital archive. While digital archives seem to designate a departure from "traditional" archival studies, the issues raised particularly in new media and software studies demonstrate the radical imagining of the notion of the archive, entangled with the development of digital technologies that call into question human-machine relations. That is, the definitional struggles over the notion of "the archive" have brought about

various forms of archivization, or the way in which the technological substrate of the archive affects the practices of archiving. In the following subsections, I further my argument about two distinctive features regarding how the digital archive works, in relation to the implications of its "moving" aspects and the production of ephemera. I aim to highlight these characteristic facets of digital archiving praxes, of all complexities and ambiguities surrounding the definition of the digital archive, in order to formulate hauntological approaches to the analysis of digital archives of the Fukushima nuclear disaster.

1-3-1. The Moving Archive

Originally coined by media theorist Eivind Røssaak (2010), the notion of "an archive in motion[12]" encompasses the intrinsic paradox that the archive was traditionally conceived of as a means of allowing historians to access "frozen" sections of past time, which simultaneously calls into question the archive's capacity to deal with temporal and contemporary phenomena. According to Røssaak, the transition from an archive *of* motion to an archive *in* motion was driven by the Internet, in which "constant transfer and updating functions as well as 'live' communication and interaction redefine the temporality of the archival document itself" (Røssaak, 2010: 11). That is, the problem of temporality is always pertinent in the construction of the archive, which is amplified by those issues regarding the frequency and velocity of editing and erasing archival objects in

[12] The concept of "the moving archive" can be traced back to earlier writings on the archive. For example, drawing on Pierre Nora's (1989) influential piece on "memory place" that concerns the constitution of national memory, memory studies scholar Astrid Erll (2011) claims that memories are "constituted through movement" instead of the reification of the "sites" where they belong, creating routes as "the paths which certain stories, rituals and images have taken; and not so much by echoing what social groups may claim as their *roots*: the alleged origins of a cultural memory [emphasis in original]" in the age of global media technologies (Erll, 2011: 11).

the digital domain. Specifically, the introduction of digital technologies into the making of an archive has come to challenge four important functions of theclassical archive: storage, preservation, classification and access. Røssaak insists that these emergent facets of digital archiving have allowed researchers to engage with the "new working-time" of spontaneous information storage and processing, thanks to the development of networked interfaces.

In a landmark book *Performing Digital: Multiple Perspectives on a Living Archive* (2015), a volume that brings together theoretical and empirical discussions about digital archiving praxis, the contributors introduce an extensive notion of a "living archive." For an archive to be "living," Australian media researcher Adrian Miles (2015) claims that archival research in the digital domain needs to seek a way for an "archive to make visible what has been lost or excluded, and the archival decisions – those that have or *have not* been made – that form the particular history of the archive, decisions that obviously inform the institution in its performance as an archive and that might exist as a discursive layer around the artefacts themselves [emphasis in original]" (Miles, 2015: 42). In other words, not unlike the traditional material archive, the production of the digital archive also involves arbitrary processes of inclusion and exclusion, which, however, could become invisible through the digital transaction of data. Yet, it is important to indicate that "the loss of the thing becomes not its erasure but its displacement," whose eventfulness – "that it has happened" – would "become its own artefactual entity within the archive, with its own archival rights and obligations" (*Ibid.*, 43). In this regard, the prerequisite condition that makes the digital archive "alive" or moving intertwines the use of digital interfaces and the decision-making processes as to what to be kept (hence "remembered") in the archive.

In addition, these "moving" or "living features" of the digital archive have more profound implications in terms of the material effects it enacts. Ross Gibson (2015), filmmaker and researcher in contemporary arts and communications raises the following questions with regard to the digital archive's movement as a cultural activity: "How can archives be truly moving?"; "How can they be used not only as passive repositories but also as stimulant memory?" (Gibson, 2015: 29). He addresses the affective registers in our engagement with the digital archive in relation to the pun "moving" – that the archive is simultaneously *moving* in the way that evokes certain "e-motional[13]" investment into the production of memory preserved within. From this perspective, feminist literary scholar Ann Cvetkovich's (2003) argumentation of cultural archives of ephemeral lived experiences in the absence of institutionalised documentation is helpful to comprehend the implications of the equivocal idea of the "moving archive." Cvetkovich points towards the archival functions of cultural texts as repositories of feelings and emotions that generate intergenerational transmission from the past to the present by evoking shared historical trauma, which lurks behind the construction of "the public." Drawing from Avery Gordon's (2008) work on haunting, she also maintains that the notion of haunting particularly "offers a compelling account of how the past remains simultaneously hidden

[13] It is worth noting that Ernst (2013) uses the same equivocal expression to indicate that the electro- mathematical and algorithmic aspects of digital media enable the transformation of an archive into an archive *in* motion, whereby the notion of the material also becomes so dynamic that it affects human perception of temporal continuity (see Ernst, 2013). It also coincides with feminist scholar Karen Barad (2010)'s appropriation of "e-motion" that originates from the model of electrons orbiting the nucleus in quantum theory (see Barad, 2010). She further elaborate on the idea to delineate "the very condition of feeling the suffering of the other, of literally being in touch with the other, of feeling the exchange of *e-motion* in the binding obligations of entanglements [emphasis added]" to address how inhuman [sic] actors constitute the condition of every being and becoming (Barad, 2012: 10). The curious overlapping in the use of the term may be suggestive of the focal point where affective politics, the objects of technoscience and the making of a "moving" digital archive may converge.

and present in both material practices and the psyche, in both visible and invisible places" (Cvetkovich, 2003: 38).

These "moving" features of the digital archive provide a significant backdrop to a further examination the archive's capacity of generating ephemeral data traces, and of creating different temporal and discursive registers, which count as "haunted data" (see Blackman, 2015; 2019). However, it is significant to reiterate that the digital archive is also constituted by a series of exclusionary gestures. The margins and ruptures produced by such gestures are evocative of "what might be missing," and of archival imaginaries I discuss extensively in the next chapter. At the same time, archival entities themselves are constantly "set in motion," or moved and re-moved in the processes of digital archiving. Consequently, the temporality of the Fukushima nuclear disaster as an unravelling incident criss-crosses with a multiplicity of temporality in the production of archives-in-motion, especially when the disaster keeps being reconfigured through archival decisions unique to each digital repository. I argue that the digital archive's capacity of spawning a movement between archival objects, and also between the past, present and future is a starting point to explore hauntological dimensions in relation to the ephemerality of the archive and that of the archived.

1-3-2. Digital Ephemera

In addition to the "moving" aspects of the digital archive, another striking feature of it can be seen in the production of ephemera, that which may dis/appear in the transaction of data. I suggest that the power of ephemera, albeit trivial, permeates through the practices of digital archiving, because it forges new and alternative connections with the fragmented past – the past that multiplies in the networked

production of digital archives. On the production of the ephemeral within the development of digital media technologies and new memory production, Chun (2008) makes a significant contribution. She argues that the enduring ephemeral is a condition of what appears to be a permanent machine storage of data. Specifically, she warns of the conflation of memory and storage in archiving practices in the digital domain, because:

> Memory, with its constant degeneration, does not equal storage; although artificial memory has historically combined the transitory with the permanent, the passing with the stable, digital media complicates this relationship by making the permanent into an enduring ephemeral, creating unforeseen degenerative links between humans and machines (Chun, 2008: 148).

Despite the long-standing dream of permanent storage in which *no* data can be lost, digital technologies leave a number of archival problems in terms of the questions of malleability and degeneration, as I have discussed above. Chun's idea of the "enduring ephemeral" extends to include machinic memory fraught with the ever-updating dynamism, in which "[a]n older post can always be 'discovered' as new; a new post is already old" (*Ibid.*, 169).

The production of the ephemeral in the digital archive has been the centre of argument in terms of its capacity of transgressing the boundaries between human and nonhuman, memory apparatus and its content (i.e. the archivable). According to literary scholar James Mussell (2012), archival ephemera also entails "what we choose to remember," since it enables us to "tell certain stories about who we think we are and construct a

future that corresponds to who we want to be" (Mussell, 2012: 78). Archival ephemera is, in other words, the trace or remnant of the objects used to delineate what ought to be remembered, and thus it constitutes itself as the repressed. More importantly, Mussell indicates that "[o]ut of time, ephemeral objects *haunt* us with their presence and remind us of what we have discarded," since "[t]here is a well-documented history of *haunted media*, in which the machines with which we produce language are found to develop unexpected voices of their own [emphasis added]" (*Ibid.*, 78). That is, the surfacing of ephemera is marked as the unexpected return of the repressed, which produces uncanny effects. His contestation that archival ephemera belongs to the realm of the dead offers a significant precursor to the intersection of digital archiving praxes and hauntology. It is also important to point out that the unexpected return of ephemera resonates with Avery F. Gordon (2008)'s idea of "rememory," the notion I will further elaborate in empirical chapters, in that it points towards "a memory already indicated as uncanny by its fundamental repetitiousness and by its gesture to haunted house" (Gordon, 2008: 165). As the selective act of remembering and forgetting can only be revealed through the contingent emergence of ephemera that belongs to the uncontrollable realm of memory construction, the "out-of-time-ness" of ephemera makes it possible to attend to the traces of erasure, subjugation and displacement in the production of the digital archive.

In relation to the notion of ephemera defined by what is missing (or what appears to be missing) from the archive, the accidental encounters with hidden archival objects would also include the *afterlives* of data. That is, archival entities that seem to "pop out" into view may also stay within the systems that originate them, and "[p]asts and presents, and hence possible futures, can be flattened out into a record which may trap

or shape the people and things that the data tags along with" (Fuller, 2009)[14]. As digital data inconspicuously live on as haunted/haunting entities, even when they seem to have disappeared, the act of archiving is complicit in bringing life to those hidden objects. The temporal lapse triggered by the ephemerality of the digital archive, therefore, testifies to the uncontrollability of a sudden disclosure, of subjugated fragments of the past that could accidentally become animated.

Throughout the thesis, I specifically attend to the digital archive's capacity to move and to be moved, and to produce ephemeral objects from hauntological perspectives. I claim that the recurring notions of haunting and disjointed temporality emerge from these two characteristics of the practices of digital archiving, regardless of different technological affordances each archive relies on. My engagement with the digital archive, therefore, departs from the difficulty of identifying the definition of the archive across diverse disciplines, to the analysis of "ghost stories" with a specific focus on how ephemeral objects in the digital archive could be set in motion, assembled and produce narrative modalities about the Fukushima nuclear disaster that registers itself as a haunted/haunting event, as I will argue below in relation to the employment of hauntology as a theoretical framework of the thesis.

2. Hauntology: Towards Reading the Ghost Stories of Fukushima

So far, I have outlined existing literature on the digital archive and its key features. In this section, I will introduce the concept of hauntology in order to explore the digital archive's ephemeral and moving aspects to produce temporal and narrative modalities in telling disparate stories about the Fukushima nuclear disaster. My contribution here

[14] <http://fuller.spc.org/fuller/matthew-fuller-active-data-and-its-afterlives/>

is both theoretical and methodological, in foregrounding the significance of hauntology as an epistemological and analytic tool. I thus intend to synthesise the aforementioned discussions, with critical approaches to hauntology as a way of intervening to hidden histories and submerged narratives that dis/appear in the making of the digital archive. As I will further the argument about the method of "reading" digital repositories and the "ghost stories" (see Gordon, 2008) they produce in the next chapter, here I map out an extensive literature on hauntings and ghosts, which have come to represent many different facets of the Fukushima nuclear disaster.

Firstly, with regard to the emergent discussions of the digital archive, it is significant to reflect on how new media technologies have been considered to produce haunting effects. For instance, Mark Fisher (2013) argues that it is the spectres of "lost futures" that haunt contemporary popular culture in the 21st century, because "what haunts is the spectre of a world in which all the marvels of communicative technology could be combined with a sense of solidarity much stronger than anything social democracy could muster" (Fisher, 2013: 26). The "lost futures" or the disappearance of the future are considered to block cultural and social imaginations in the present, as what haunts is "the not yet" of the futures and their virtuality that never materialised. On the other hand, with regard to the tendency of digital media towards the production of "the digital eternal," media theorist Amanda Lagerkvist (2018) asserts that digital media inherently relate to haunting, because they "are replete with historical layers of news items and popular cultural representations, that is of haunting and echoes" (Lagerkvist, 2018: 54). That is, digital technologies obliterate the idea of loss by the illusion of permanent data transmission and preservation. Although her argument revolves around a growing demand for the erasure of personal data and digital traces and a number of "digital estate

planners" that provide services for the post-mortem management of data, the im/possibility of closure is even more pertinent to the ephemerality of archival objects in the digital archive that defies the notion of linear time, and engenders the unexpected "bumping into" submerged and disavowed pasts. Martin Pogačar (2018), researcher in memory and digital media also claims that "the past is ghostly alive and randomly resurfacing and we are incessantly seduced into connecting with the many different pasts as we navigate the material and virtual places both as media archaeologists and micro-archives" via technologically-mediated memory production (Pogačar, 2018: 29).

With the Fukushima nuclear disaster as an ongoing event that nevertheless evokes the traces of the past, and simultaneously creates the moments of suspension or the crisis-shaped historical present (see Berlant, 2011), I intend to intervene to these multiple valences of hauntings that encompass the practices of archiving the incident as a "ghostly matter." In developing hauntology as a methodological backdrop of this research, I claim the difficulty of distinguishing between the ghosts that emerge from the digital transaction of data and those that inhabit the history of nuclear events. However, it is this collision of disparate haunting entities (technological, material, historical, etc.) that generates all the possible stories about the disaster.

The notion of hauntology originally coined by Derrida in his book *Specters of Marx* (1993) centres on the disruption and dysfunction of linear time through the recurrence of the ghost. He defines the logic of haunting as "[r]epetition and first time, but also repetition and last time, since the singularity of any first time, makes of it a last time. Each time it is the event itself, a first time is a last time" (Derrida, 2006: 10). In his argumentation, the ghost that has inhabited European history belongs to the past as well as the future-to-come, and its affirmation and repression constitute every hegemony.

What is highlighted in this concept is that the ghost creates a disjointed temporality that affects the living present, leaving traces that appear and reappear in the course of history. Derrida maintains that this condition of "being-with-specters" would be "a politics of memory, of inheritance and of generations" (*Ibid.*, xviii) and points towards the importance of recognising and living with ghosts:

> It is necessary to speak *of the* ghost, indeed *to the* ghost and *with* it, from the moment that no ethics, no politics, whether revolutionary or not, seems possible and thinkable and *just* that does not recognize in its principle the respect for those others who are no longer or for those others who are not yet *there*, presently living, whether they are already dead or not yet born. [emphasis in original] (Derrida, 2006: xviii)

I argue that hauntological perspectives not only serve as an important vector to excavate temporal discontinuities and informational traces in the making of the digital archive, but they also circumscribe historical implications and analogies attributed to the Fukushima disaster. In the following subsections, I address the importance of hauntology as both the conceptual and methodological underpinning of the thesis, by introducing prominent discussions about the ghost and hauntings. The Derridian rendering of hauntology has been developed as a way of attending to submerged histories and narratives, social silencings and invisible figures, which intersects with several disciplines, not least archival studies, upon which Derrida's conceptualisation of the archive has had a significant impact.

Esther Peeren (2014), the author of *The Spectral Metaphor: Living Ghosts and the*

Agency of Invisibility suggests that "the invocation of the ghost as a figure of return" is capable of "expressing the persistence of the past in the present, and the general workings of repetition as inevitably combining sameness and difference," whereas the ghost itself may also signify "a present absence: despite being ephemeral, something is *there* and has to be taken into account [emphasis in original]" (Peeren, 2014: 10). This broad notion of spectrality and haunting engulfs the multiplicity of contested histories produced by exclusions. In other words, attuning to the ghost requires attention to the social and political conditions under which certain figures are turned into invisible and marginalised entities despite their sudden recurrence at a specific historical moment.

To reiterate, my arguments derive from multiple interpretations of hauntology in order to avoid certain dualisms such as those relating to an im/possible nuclear catastrophe and the ephemerality of the digital archive that perpetually creates temporal gaps and ruptures through the production of data traces. The interdisciplinary discussions about hauntology have provided me with crucial insight in situating digital archives of the Fukushima nuclear disaster at the centre of critical investigation, as an archival object imbued with historical trajectories that resonate with the past, as well as the "haunting" effects of nuclear technologies. In the sections below, I outline how the extended notion of hauntology underscores my analysis of the digital archive in many different ways, from the archive's intrinsic power of creating temporal disjunction to the "ghostly" attributes of nuclear technologies per se, which altogether make the Fukushima disaster a haunted/haunting field of inquiry.

2-1. The Critical Employment of Hauntology: Avery F. Gordon and Grace M. Cho

Although my research is situated in a different historical backdrop from Derrida's

primary focus on the enduring legacy of Marxism, the question "what is the ghost?" remains an important matter. In claiming hauntology as both the conceptual and methodological framework to examine the digital archive on the Fukushima nuclear disaster, I specifically draw on Avery F. Gordon and Grace M. Cho's extended arguments about haunting. Their work has considerable influence on the development of my research, especially in relation to their engagement with ghostly figures in an attempt to read and write their stories. Of many theoretical approaches that derive from Derrida's initial conceptualisation of hauntology, I indicate that they specifically offer crucial perspectives to think through the way in which the Fukushima nuclear disaster as an archival object is always already "seized" by the past.

According to Gordon (2008), "[t]he ghost is not simply a dead or missing person, but a social figure, and investigating it can lead to that dense site where history and subjectivity make social life" (Gordon, 2008: 8). Her insistence on the "social" aspects of the ghost is particularly important because the ghost enables the analysis of social contexts within which the dynamics of exclusion and invisibility are produced. That haunting is conceived as an extended social practice foregrounds the formation of social norms and power dynamics along with systematic modes of foreclosure, through which certain narratives are privileged and legitimised over others, but a key point is that some experiences/events are not narratable. As Gordon's empirical materials include novels, photographs and personal testimonies that portray the production of knowledge outside the institutions, her discussion of those texts and images explores the salience of telling a ghost story, a story about social exclusions and silencings: "a story about what happens when we admit the ghost – that special instance of the merging of the visible and the invisible, the dead and the living, the past and the present – into the making of worldly

relations and into the making of our accounts of the world" (*Ibid.*, 24). Here, it is important to maintain that the ghost is not an entity that is invisible, immaterial or buried in history, but it brings to the fore our accountability for the world-in-the-making. In Gordon's theorisation, the ghostly figure calls into question how we write about power, knowledge and experience in a web of all possible connections.

Sociologist Grace M Cho's (2008) work on the Korean diaspora and the forgotten history of the yanggongju, the women who were forced to provide sexual labour for the U.S. military under the American occupation of South Korea pushes further the importance to attuning to ghost stories. Cho's combined methods for the study of haunting are informed by historical accounts and fictionalised narratives, which includes stories told by interviewees, performance-based work and autobiographical reflections on her own family history, in order to explore transgenerational trauma and dislocated memories. The striking variation of her empirical data is intended for destabilising authorised knowledge production and dominant histories, whereby the boundaries between the subject and the object, fact and fiction are obscured. Moreover, Cho's remark on "methodological byproducts" of her research is crucial, in that they produce "unexpected juxtapositions, repetitions, discarded thought fragments, and the same story told differently each time" (Cho, 2008: 47). What she calls "the altered repetitions of past experiences" would mark a phantomatic return that points towards displaced memories and silenced histories. I argue that the idea of the same story being told differently each time is pertinent to the fragmented, divergent modes of storytelling that digital archiving enables, for the processual and transformative archive proliferates narrative modalities and digital traces that may dis/appear at any time.

On the mediated nature of haunting, it is important to reflect on Gordon's observation

that the ghost is resurrected through embodied social practices, as a form of *mediation* that confounds established social structures. According to Gordon, "mediation describes the process that links an institution and an individual, a social structure and a subject, and history and a biography," because the power of mediation confounds the gaps and distances between analytic and social separations. That is, the process of mediation conflates the way systematic hauntings are produced, and articulated or incorporated in everyday life. Furthermore, Cho's employment of a "distributed perception" is significant to engage with multimedia archives that engender a cacophony of voices and multiple views. Developed from John Johnston's (1999) notion of "machinic vision," a distributed perception is both synesthetic and transitive, and operates when "[t]he sensation belonging to one sense organ reverberates through the others" (Cho, 2008: 181). This perspective is significant in intervening to different structures and technological affordances of digital archives, especially when the integrity of the archive is challenged by user-oriented, collective acts of archiving.

The unique contributions of Gordon and Cho in their use of hauntology have paved the way for attending to the production of ghost stories, and identifying the past's lingering effects in the constitution of the historical present as well as possible futures in digital archiving praxes. Since the Fukushima disaster is regarded as an ongoing event with uncertain consequences, the multiple "reference points" to evaluate and predict its potential impact are deeply rooted in what came before. Although Gordon and Cho's research practices mainly involve literary texts, personal testimonies and interviews, these methods are not directly applicable to my analysis of the digital archive. However, their reflection on ghost stories and the ghost's capacity to tell fragmented and dispersed narratives has helped me formulate my research parameters. Along with Gordon's

critical attentiveness to ghost stories, Cho's emphasis on "nonlinear temporalities, repetition, fantasy and fiction" as a way of conveying haunting specifically reminds me of the importance of the complex aggregation of data in the digital archive, in which the past keeps being reconfigured, by signalling hidden, erased and disavowed narratives through the contingent process of archiving (Cho, 2008: 18). The debates here will be further developed in the next chapter as the basis of my methodological formations, where I elaborate on hauntological approaches to the analysis of digital repositories.

2-2. The Haunting Legacy of Everything Nuclear

> *The phantom which returns to haunt bears witness to the existence of the dead buried within the other*.
> (Abraham and Torok, 1994: 175)

In the process of engaging with different literature on hauntology, I have faced the challenge of looking into the way in which the language of haunting has permeated through, and been prevalent in the production of the nuclear imaginary. It does not seem coincidental that Derrida had written about the nuclear age in his 1984 essay "No Apocalypse, Not Now (Full Speed Ahead, Seven Missiles, Seven Missives)" published nearly ten years before *Specters of Marx*, with some indication of hauntology he later refined. In "No Apocalypse," Derrida maintains:

> There is perhaps no invention, no radically new predicate in the situation known as "the nuclear age." Of all the dimensions of such an "age" we may always say

one thing: it is neither the first time nor the last.

(Derrida, 1984: 21)

In this essay, the claim that the nuclear age is a fantasy, a fable or textual phantasm derives from the premise that the possibility of all-obliterating nuclear war is something one can only think about, and that it *will have* never occurred for this reason. The nuclear apocalypse thus only inhabits the realm of imagination because of its potential of remainderless self-destruction that shatters all possibilities of human thought. Derrida further describes the nuclear age as a palimpsest of history in which "it is neither the first time nor the last (Derrida, 1984: 21)." The idea of the first and the last time being merged together certainly resonates with his discussion in *Specters of Marx* (2006) and "Archive Fever (1995)." Here, I am going to suggest that the striking consistency in Derrida's line of argument exemplifies how the nuclear age has somehow become a convenient signifier to conceptualise the production of "time out of joint" and differential modes of historical hauntings.

The coherence among these different texts of his is, therefore, indicative of the way the advent of the nuclear age has influenced the theoretical formulation of hauntology. In other words, Derrida's obsession with the aporia of the nuclear referent cannot be ignored and should provide a significant starting point to analyse the intersection of the logic of haunting and the all-too-impossible nuclear age triggered by the invention of the deadly technology[15], which might be incorporated into the making of the spectral archive. It is

[15] In suggesting the linearity of Derrida's argumentation of hauntology and an impossible nuclear war, English philosopher and artist Liam Sprod (2012) discusses that living in the nuclear age is equal to living in both apocalyptic and messianic realities. He claims that the nuclear debate cannot be reduced to a matter of scientific concern because "nuclear criticism as textual analysis is also a way of critiquing the structure of technology and diplomacy which it contains" with an emphasis on the importance of

important to note that Gordon (2008) also calls to attention the language of radiation in her reading of *White Noise* (1985) by Don DeLillo, by arguing that "*in the end it doesn't matter what they see or think they see* is the language of waves and radiation, a language in which the ghostly (or the living for that matter) cannot get a word in edgewise [emphasis in original]" (Gordon, 2008:15). Such a haunting language threads through, and often comes out as the limit of reading "ghost stories" about the ongoing nuclear disaster in the digital archive.

The discussions below illustrate how a nuclear referent has generated haunting resonance over years in the way that reinforces historical trajectories between disparate events, along with the metaphorical attributes of the logic of quantum mechanics. Here, I aim to show the multivalence of haunting potentially at work for the construction of both the archived and the archive, which will be brought together in my analysis of the digital archive.

2-2-1. Historical Trajectories: National and Universal Imaginaries

While nuclear technologies seem to have long appropriated the language of haunting and the notion of a disjointed temporality, the history of atomic power has always been populated by ghosts. As I have signposted the analogies drawn between the Fukushima disaster and other nuclear events (see Introduction), it is now a commonplace that the disaster is associated with a number of historically-charged events that evoke radiation threat and the "doomsday language" that looms over the world since the invention of the atomic bomb (see Lifton, 2011). Consequently, the definition of what returns as "the ghost"

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turning to rhetorical conditions of reality, or reality constructed by discursive intervention (Sprod, 2012: 22).

multiplies in ways that encompass an entity that leaves both physical and epistemological traces over time. In this regard, it is crucial to reflect on the argument of Lisa Onaga, STS scholar and co-founder of Teach311.org I examine in Chapter Six and Aaron S. Moore, historian of science and technology in modern Japan. On launching Teach311.org, they point to the emergent discussions about "preserving traces of disaster for historical commemoration […] amid the processes of recovery and healing," and suggest that there is a "need for deeper, reflexive historical inquiry," which is embodied in the wake of the Fukushima nuclear disaster (Onaga and Moore, 2017: 154-155). They argue for the importance of attending to what they call "knotted histories," myriad historical conditions that have shaped the political, social, economic and technological backdrop of the disaster. The idea of "knotted histories" is significant especially in terms of the collision of different temporalities as well as shared historical imaginaries triggered by the unravelling incident.

Akira Mizuta-Lippit (2015), known for works on cinematic vision and visual representations of atomic light lucidly addresses the entanglement of histories in the face of the Fukushima disaster. He raises a question "[w]hat exactly returns in the ghosts of Hiroshima and Nagasaki, in the figures of atomic victims (hibakusha) in the very apparition of hibakusha in the wake of 3.11?" (Mizuta-Lippit, 2015: 5). The idea of a disaster "always having been there" echoes with Maurice Blanchot's (1995) notion of the impossibility of situating it in the future (see Blanchot, 1995), yet Mizuta-Lippit gives a specific emphasis to what the 3.11 disasters summon from the nation's past. Describing the Fukushima disaster as "a medium disaster embedded in the traces of Japan's recent past," which conflates different temporal and spatial registers, he points towards the structure of memory and recollection attached to particular moments in history inflicted

by atomic power. This is because his argument departs from the scenes of Hiroshima and Nagasaki, which have dominated the political and cultural landscape of post-war Japan.

His previous writings include the devastating power of atomic light that creates a phantasm, a shadow of shadows[16], which "plunges into and out of history, forward and backward into a timeless history, a history without history" (Mizuta-Lippit, 2005: 102). He also explores this "virtual" or "mnemic" archive inscribed on, and carried by the bodily surface, by bringing together Derrida's notion of the destructiveness of the archive and his observations of the fable of nuclear war. That is, so long as the condition of the archive relies upon the task of effacing and repressing its own repression, it keeps reconfiguring the boundaries between memory and oblivion, and of the enunciable that preconditions what is archivable. The impossibility of nuclear war is employed as an epistemological tool to account for how the archive articulates "the story of a possible history yet to come," which may serve "as the limit against which the archive survives" (*Ibid.*, 25). Thus, the archive of atomic destruction gestures towards the double invisibility and negation with regard to the archive's self-effacement and that of atomic power, because it can only operate through a return of repressed atomic bombings submerged in the ongoing present.

While Mizuta-Lippit's discussion attributes the modes of haunting to the figures of

16 The "shadow of shadows" is represented by the vanished corporeality of atomic victims in a mode of "avisuality," a neologism Mizuta-Lippit defines as "not a form of invisibility, in the sense of absent or negated visibility: not as the antithesis of the visible but as a specific mode of impossible, unimaginable visuality" (Mizuta-Lippit, 2005: 32). Here he refers to the bodies vaporised in a flash of atomic bombing, without leaving any identifiable trace but shadows that prove their "having-been-there." That is, the extremity of atomic bombing could only be detected in "a shadow without the body," the corporeality of the victims of Hiroshima and Nagasaki when their material bodies instantly vanished while photographic effects atomic light left their negatives on the ground. The notion of avisuality resonates with Avery F. Gordon's practice of writing ghost stories that concern exclusions and invisibilities so that the ghost as a social figure buried in the social matrices of power can open up "a constant negotiation between what can be seen and what is in the shadows" (Gordon, 2008: 17).

atomic victims in relation to post-war Japan's ambivalent investment in its own past, it is also significant to take into account to the way in which nuclear threat has perpetually transformed the future-to-come as well as all our lived experiences in the present. Even though the Fukushima disaster is a monumental event that evokes the nation's traumatic past through the contingent reiteration of the scenes of the disaster, it cannot escape from the universalised image of nuclear threat. For instance, American anthropologist Joseph Masco (2006) elaborates on the ubiquity of nuclear fear that has drastically altered our perceptions of the world. In his landmark book *The Nuclear Borderlands: The Manhattan Project in Post-Cold War Mexico,* he maintains:

> Fear of radioactive contamination has also colonized psychic spaces and profoundly shaped individual perceptions of the everyday from the start of the nuclear age, leaving people to wonder if invisible, life-threatening forces intrude upon daily life, bringing cancer, mutation, or death. […] The uncanny evokes fear, then, because it is an instant when modernist psychic and cultural structures become momentarily undone or out of joint, thus revealing the dangerous vulnerability of the human sensorium to an uncertain and uncertainly haunted universe.
>
> (Masco, 2006: 28-29)

According to Masco, the world would never be the same as it used to be before the birth of the atomic bomb because "a banal acceptance of violence" has become the predicament of the post-nuclear world order, which produced "a world that is simultaneously normal and extreme, at once capable of ending it with a flash" (Masco, 2013: 26). Drawing on

Freud's concept of the uncanny (das Umheimlich), he also points to the impossibility of distinguishing the living and the dead, the imaginary and the real, which renders human sensorium "haunted."

Masco's understanding of the haunted universe of the atomic age appears to be twofold: first, he indicates that the imperceptibility of radiation danger triggers sensory confusion that makes one's body untrustworthy and feel "other"; then the nuclear fear[17] enters into everyday modes of experience, which forces people to "either numb themselves to the everyday threat," or to be "conditioned to separate themselves from their own senses" (Masco, 2006: 32). That is, the nuclear age is imbued with contradictions, such that we are now on the verge of sensory anaesthesia and extreme sensitivity as a result of persisting and uncertain effects of radiation on the human body and psyche. However, the historical ties that connect different atomic incidents can be severed and remade every now and then, becoming a reminder of the perpetually haunted universe. In this radical shift in perception, the Fukushima nuclear disaster registers itself as an indication of what has always already been present, as a recurrent moment that provokes the collective experiences of nuclear fear dating back to the summer of 1945.

Reflecting on the production of both national and universal nuclear imaginaries has helped me examine how the Fukushima disaster has been framed within the intricate

[17] Masco (2008) suggests that "nuclear fear" might be distinguished from "nuclear terror," with the latter signifying the systematic and affective manipulation of public feelings to produce the docile body that is "prepared" to stay calm and uptight on the verge of the Cold War arms race. According to Masco, the subtle exchange of fear and terror was deployed under the Truman and Eisenhower administrations to redefine "the [atomic] bomb as a mechanism for accessing and controlling the emotions of citizens," in order to aim at "'feelings' that would unify the nation in the face of apocalyptic everyday threat" (Masco, 2008: 366-367). These remarks are pertinent to the production of archival imaginaries and that of what can (not) be remembered in digital archiving praxes I will extensively discuss in the next chapter.

web of discourse that encompasses the haunting effects of "everything nuclear" – as a way of employing hauntological scopes in order to construe several modes of haunting that permeate through our comprehension of nuclear events across time and space. I suggest that, what those debates about historical connotations attributed to nuclear technologies per se have in common is an attention to the recurrence of specific figures and moments buried in the past, from the atomic bombings in Hiroshima and Nagasaki to the American technoscientific projects during the Cold War period. The Fukushima disaster cannot be exempted from this lineage of argument because of its status as an ongoing crisis with unknown futures. Above all, acknowledging these historical trajectories drawn between disparate events, whether conspicuous or not, comprises an important part of my intervention to the modes of storytelling in the digital archive, since they offer significant epistemological parameters to engage with the dispersed past, present and future under the influence of omnipresent nuclear fear.

2-2-2. Technoscientific Apparition: the Implications of Quantum Haunting

Behind the recurrence of historical narratives in the aftermath of the Fukushima nuclear disaster, however, there exists another overarching discourse about the uncertainty of radiation effects, as a key factor that specifically labels nuclear events as "haunting" and/or "haunted." In other words, the origin story of nuclear catastrophe that commenced in the year 1945 has an immense impact on developing a discursive space around the use of nuclear technologies. Therefore, it cannot be dismissed that the technological premises of atomic power have also contributed to the creation of the haunting imaginary. That is, even before the bombings of Hiroshima and Nagasaki came to have "a universal referentiality" or a "master code for catastrophe" (see Yoneyama,

1999) that can annihilate the entire human race, the innate contradictions (such as the wave-particle paradox) within the context of quantum physics also feed into the language to decipher the implications of the deadly technologies. As there has been growing attention to "the turn to sciences" in the field of humanities and cultural studies (see Braidotti, 2013; Coole and Frost, 2010; Clough, 2004; 2010; Gibbs, 2002; Puar, 2010), scientific tropes are particularly rife in the discussions regarding the reconfiguration of boundaries between human and nonhuman, self and other, and material and immaterial. However, applying the all-encompassing metaphors of science could be simultaneously reductive and problematic in a way that overshadows the complexities of phenomena. Nevertheless, these scholarly developments reveal the struggles in making sense of the uncertain effects of radiation (discussed further in relation to the measures of archival classification in the digital repositories I analyse in chapters Three, Four, Five and Six). Here, my aim is to outline the overlapping metaphors and analogies attributed to nuclear technologies, by examining how these contribute to the epistemological framings of the Fukushima nuclear disaster.

It is not surprising that media scholar Richard Grusin (2015) refers to the Fukushima disaster as one of the historical events whose "agency, trajectory, and development were operating according to their own laws, their own temporality, their own scale," generating "temporalities distinct from and indifferent to the pace and scale of human time" (Grusin, 2015: 37). Drawing from Karen Barad's (2007) notion of "intra-action," the mutual constitution of objects and agencies of observation, Grusin indicates the workings of different temporal axes with an example of the "half-life" of radioactive decay, and then "excavates" the traces of historical commitments of the North American enterprise that commissioned nuclear power plants in Japan. A similar logic can be seen in Canadian

philosopher Brian Massumi's (2011) article "The half-life of the disaster" published in *The Guardian* on 15 April, 2011, in which he discusses a decline in the media narrative of shock after the triple disaster. He later reflects, "[o]ur bodies and our lives are almost a kind of resonating chamber for media-borne perturbations," which enables "differential attunement: a collective in-bracing in the immediacy of an affective event" (Massumi, 2015: 114-115). In recognising "a turnover time" of a disaster, in which an event will have lost affective intensities, Massumi points to the role of media in triggering a vague foreboding as well as a call for collective resilience rather than grief. However, the issue here is a rather a figurative one about how to measure the intensity of a media-driven response to the disaster, which is considered to "half" its effects to trace levels just like radioactive atoms lose energy and their capacity to emit radiation over time.

The use of the (pseudo-)scientific language has more profound connotations when there is a conflation between the signifier (scientific tropes) and the signified (a nuclear disaster) – such that the latter is regarded as exemplary of the law of science, regardless of its social and political implications. For instance, Karen Barad, known for her work at the intersection of modern quantum physics and feminism has drawn inspiration from scientific experiments including Schrödinger's cat. These were thought experiments to verify quantum superposition in order to discern the inseparability of both objects and subjects in knowledge production, through which the dominant discourse about identity, agency and linear temporality is brought into question. Given her unique theoretical background, Barad's turn to hauntology based on Derrida's conceptualisation of "time out of joint" is inevitably intertwined with technoscientific anecdotes. Barad (2010) insists that "[t]he point is not merely that something it here-now and there-then without ever-having been anywhere in between, it's that here-now, there- then have become

unmoored" in relation to the ghostly attributes of quantum physics (Barad, 2010: 247-248). Her argument is particularly reliant upon physicist Niels Bohr's phenomenological interpretation of physical systems which hold that there is no given time or determined state of things without apparatuses and agencies of observation, in his response to the uncertainty principle. Of her examples of "spooked" time, time off its hinges, it is worth noting that there are references to Hiroshima and Nagasaki as "cities populated with the living dead; a ghostly/ghastly scene, hauntings," along with such events as Niels Bohr's winning of the Nobel Prize in Physics and Newton's prediction of the end of time as various forms of inheritance[18] (*Ibid.*, 243).

As such, (the consequences of) scientific endeavour contributes to Barad's engagement with hauntology, whereby matter and meaning are relentlessly entangled. According to Barad, the spectral quality of quantum physics, especially the one that can be seen in the process of a quantum leap, lies in its immanent discontinuity, in that the position of an atomic electron can only be determined retroactively through the emission of a photon because the pattern changes over time. The uncertain state of being plays a pivotal part in bringing together quantum phenomena and the logic of haunting, whereby "[t]he contingent determination of the meaning of any concept necessarily entails constitutive exclusions," and thus "[e]very concept is *haunted* by its mutually constituted excluded

[18] Brian Rotman (2008), British philosopher of mathematics also refers to the analogy between the movement of atoms and how it generates "ghost tendencies." The "ghost tendencies" of quantum system derive from the premise that any attempt to measure quantum states would limit knowledge, or "the other" aspect of reality when the object is dragged out of uncertainty and its value is determined once measured. Rotman draws on "many-worlds interpretation" in quantum physics, which poses "one totally determined, un-ghostly state at a time in each of a multitude of 'simultaneously occurring' worlds," but replaces "parallel unreal occurrences in the world with real occurrences in parallel unreal worlds" (Rotman, 2008: 86). This paradox of "many-worlds interpretation" echoes with Barad's remark that intrinsic contradictions in quantum physics would produce "[a] ghost that is the very specter of multiplicity itself," which allows for the co-existence of (at least) two irreconcilable views (Barad, 2010: 263).

other [emphasis added]" (*Ibid.*, 253). Yet, that Barad draws parallels between the historical development of quantum physics and its by-products (such as atomic bombings) in order to conceptualise hauntology entails a weird causal link: nuclear technologies have been haunted *in their origin,* because the theoretical foundation that produce them gestures towards the disruption of fixed time and space, whereas the dire consequences of the implementation of nuclear technologies testify to the haunting nature of quantum physics.

Although the uncertainties surrounding the Fukushima nuclear disaster might be reduced to these scientific hypotheses that take for granted the haunting nature of quantum phenomena, it is crucial to eschew a naïve interpretation that simply associates a nuclear event with a myriad of undifferentiated ghosts that inhabit its history. What the potentiality of parallel or undetermined states of phenomena might lack is a critical orientation to the structure of inclusion and exclusion at work when the very situatedness of a phenomenon has become a conceptual battlefield where stories are told, erased and overwritten. Even though the nuclear imaginary may derive from technoscientific uncertainties that engender differential engagement with the recent past inscribed with myriad historical imprints, or "knotted histories," it is important to make clear that my use of hauntology as both the conceptual and methodological basis of this research is intended for the analysis of multifaceted modes of haunting enabled by the making of the digital archive for an ongoing disaster that carries with it the traces of the past into the future. I am thus going to interrogate the complexities of the spectral quality of the archived phenomenon and the technological substrate that renders the archival artefact "haunting" throughout the thesis.

All of the above discussions bring about the power of absences and ruptures to tell

fragmented stories about what could be constituted as reality in the aftermath of the Fukushima nuclear disaster. My purpose in introducing these discussions above is, therefore, not to criticise the appropriation of scientific metaphors and analogies to make sense of the unknown. Rather, I have wanted to attend with care to the formation of discursive confinements and limitations that have long governed the epistemological spheres when we tell stories about nuclear events, which also produce haunting forces in congruence with the contingent practices of digital archiving.

3. Conclusion

In this chapter, I have outlined key discussions that have contributed to the formation of my research questions, laying out the theoretical ground for conceptualising the digital archive and hauntology for my study of the practices of archiving the Fukushima nuclear disaster in the digital realm. In delineating the flexible, ephemeral and even abstract production of the digital archive, I have indicated how the digital archive and its archived artefacts constitute each other in the way that its ephemeral and "moving" aspects become conflated with interdisciplinary debates on hauntings and ghostly figures, especially those that inhabit the nuclear imaginaries. Drawing from a range of literature, my research stands at the intersection of several different fields that engage with the modalities of storytelling afforded by digital technologies, the disruption of linear time and the past's repercussions in the present that constitute both material and epistemological predicaments of the unfolding present and the future-to-come.

In this regard, the work of Gordon and Cho has particularly helped me contextualise how divergent modes of haunting can play out in the production of memory and knowledge about the Fukushima disaster, in relation to the return of the repressed past

that has lingering effects on the present and possible futures. I aim to contribute to developing the argument about the complex layers of haunting at play in digital archiving praxes, in bringing together disparate approaches to ghostly figures, as will be discussed in detail in the next chapter. Since there has been little research dedicated to the digital archive's capacity of storytelling, it is significant to acknowledge that the archive's ephemerality becomes intertwined with that of the archived object. That is, what I call "stories" could only emerge from the dynamic relations between the archive and the archived. In addition, given the remarkable affinities in the language of haunting used to describe digital archiving praxes and the ghosts that haunt the nuclear age, I argue for the importance of attending to these theoretical cross-currents and overlaps that make the digital archive both haunting and haunted. My employment of hauntology has thus proved decisive in bringing together the ephemeral aspects of digital archiving and the historical implications of a nuclear event, which I will discuss throughout the empirical chapters.

In the next chapter, I will outline the selection of my empirical materials, which is followed by the introduction of my methodological parameters that I have developed from the theoretical texts I complied in this review of literature, with a specific focus on the employment of hauntology as a research method to analyse specific digital archives.

Chapter Two

Research Methodologies

0. Introduction

In this chapter, I outline methodological implications of adopting hauntology as a key approach to analyse digital archives of the Fukushima nuclear disaster. As discussed in the previous chapter, hauntology constitutes the conceptual basis of my research, and I aim to employ it as the central analytic tool. The approach and method I have developed focus on the modalities of storytelling afforded by the practices of digital archiving, in relation to the implications for what can be told, remembered and what exists below the radar or is rendered invisible. The development of these practices are related to how the digital archive becomes a site that enables critical interventions to the proliferation of multiple "versions" of the disaster, when one particularly focuses on gaps, erasures and data traces that hauntological methods bring to life.

I argue for the importance of establishing ways of reading hidden and submerged narratives that dis/appear in the process of making digital archives, which I approach as "ghost stories" (see Gordon, 2008), stories concerning exclusions and invisibilities that nevertheless produce effects on the ongoing present. In order to weave and read these ghost stories generated by digital archives, I aim to combine different empirical approaches to formulate my methodological parameters. The key questions I address in this chapter include: How can one develop hauntology as a research method to analyse the digital archive?; What kind of measures and criteria can apply to choosing particular archives for my empirical analysis?; How and to what extent would the ephemeral and

flexible aspects of the digital archive affect research practices?; How do archival platforms enact disparate modes of storytelling, and what are the ways of "reading" them? ; What makes archival gaps and absences intelligible and what are their roles in creating archival stoties?

In the sections below, I will first contextualise the emergent practices of archiving the triple disaster in the digital domain, which is followed by the description of selection criteria and the introduction of five online archives I analyse in chapters Three, Four, Five and Six. I then provide a rationale and an overview of my different methodological approaches that were adopted to meet the specific digital configurations of each archive, by explicating key methodological challenges they pose. These challenges involve the technological affordances of each archive, the contingent dis/appearance of data, the classificatory imaginary and the construction of differential temporal indexes, which have guided me to formulate the ways of interrogating different archives-in-the-making. Significantly, in identifying, and attending to the "ghost stories" that the digital archive generates, I claim that these stories are devoid of a beginning and an end. They cannot be reduced to a single plotline, but instead defy the linear narrative of progress. While their structural and organisational differences affect their unique storytelling capacity, I address the significance of the concepts of digital traceability and archival imaginaries (see Denver, 2010: Gilliland and Caswell, 2016; Arondekar, 2009; 2015) in order to weave the ghost stories about the ongoing disaster. The hauntological method I have developed is significantly inspired by feminist literature on submerged and disavowed histories and narratives (see Cho, 2008; Freeman, 2010; Gordon, 2008; Love, 2007) to challenge the underlying power dynamics that constitutes the regimes of remembering and forgetting.

1. Fukushima Archives

In this section, I introduce the empirical materials I will analyse in the chapters that follow, and contextualise the methodological challenges they pose. When I began my search for digital archives, I first found the biggest online archive dedicated to the 3.11 triple disaster called the National Diet Library Great East Japan Earthquake Archive, also known as "Hinagiku ('daisy' in Japanese)." It was launched by the National Diet Library and the Ministry of Internal Affairs and Communications of Japan on 7 March, 2013. It allows for "the comprehensive searching of relevant sounds, videos, photos, web information and other materials in order to convey the record and lessons learned from the Great East Japan Earthquake to later generations and to use [sic] in recovery and revitalization projects for stricken areas, as well as future disaster prevention and mitigation measures" ('About,' the National Diet Library Great East Japan Earthquake Archive). The archive aggregates both official and independent archival databases that share searchable metadata, as well as academic repositories that offer public access. The metadata entries are retrieved from approximately 45 databases and 39 organisations. Overall, the archival project is based on the basic principles proposed by the Reconstruction Design Council[19], an advisory committee for the then-Prime Minister Naoto Kan, which emphasises the importance of perpetually preserving the records of the disaster. In addition, its nickname "Hinagiku" signifies future, hope and sympathy in the language of flowers, for it represents the project's aim of supporting recovery from the unprecedented disaster.

In 2016, there was a symposium titled "The Future of Digital Disaster Archives to 'Pass Down and Utilize,'" facilitated by the NHK, Japan's only national broadcasting

[19] <https://www.cas.go.jp/jp/fukkou/english/pdf/7principles.pdf>

organisation. Although the event highlighted the growing interest in the creation of digital archives on the 3.11 disaster and the utilisation of archived data, the panel discussion also addressed deep concerns such as the "sustainability" of online platforms, since a number of archives had already begun to close down five years after the disaster. All the participants had engaged in the construction of disaster-related archives, including Yasuko Suwa, Chief Librarian at the Electronic Information Department of the National Diet Library. Suwa (see Yamaguchi, 2016) states that the National Diet Library is "the archive of last resort," but it is becoming difficult to rescue all the data contained in the digital archives managed and funded by the government, once they have closed down. Although the content of "dead" archives would become the responsibility of the national library, it is often impossible to clear usage rights when data providers are out of touch. Even worse, the URLs of many 3.11-related websites have already been changed, in such a way that "previous data were overwritten by new ones or silently deleted," and "[m]any organisations, including the central and local governments, opted to refuse many of their archived pages to be viewed on the Internet" (Okumura, 2014: 572).

The roundtable is suggestive of the problems of digital archiving, in that digital repositories may disappear at any time, and they have gone through contingent changes and erasures, regardless of its status (either official or independent). While the participants all agree on the importance of remembering and recording the consequences of the disaster, it is often overwhelmed by the lack of funding as well as the ephemerality of digital data. This is a significant entry point to further engage with data traceability and how the ephemerality of the digital archive determines the constitution of what is to be remembered and forgotten, from a hauntological perspective. In addition, it is

indicated that the Fukushima Prefecture is particularly reluctant to create a municipal or regional archive, while other Tohoku (Northeast Japan) regions already have plans to create online disaster repositories. The prefecture's hesitation and request for a national archive facility instead of local and independent ones, according to Masaru Yamaguchi (2016), moderator of the symposium and principal researcher of Media Research & Studies Division of the NHK Broadcasting Culture Institute, is due to the uncertain situation at the damaged power plant. In other words, the uncertainties surrounding the Fukushima disaster have put on hold the decision to digitally archive the consequences of the incident, which entails the dilemma and confusion regarding what is deemed to be archivable, or worthy of archiving. This also indicates a different sense of temporality that underlies the official decision-making processes to archive the unravelling disaster.

When the biggest national archive is not able to exercise the traditional archival power of establishing the dominant discourse about the Fukushima nuclear disaster, the proliferation of digital archives continues to multiply possible stories about the incident. In my critical engagement with digital archives on the Fukushima disaster, I outline these subjugated or submerged stories as the main focus of the hauntological method I develop and employ, in relation to the challenges of digital archiving that include: the issues of technological affordances; the traceability of data; the system of temporal and discursive classification, which I will discuss with reference to the digital archives I have chosen as my empirical materials.

1-1. Selection of Empirical Materials

In order to delineate the archives that I analyse in the thesis, I initiated a search for online archives that are still "alive," or keep being constantly updated, regardless of the

status of archiving bodies, whether they are made by institutions or individuals. This is to examine the "moving" aspect of digital repositories I discussed in the previous chapter, which uncovers the digital archive's dynamic capacity to set archival objects "in motion," or to turn them into ephemeral entities subject to constant scrutiny and erasure. The "moving" or "living" condition of the digital archive is also indicative of its transformations and transitions over time, and of different temporalities it generates. For instance, SimplyInfo.org (Chapter Five) and Teach311.org (Chapter Six) became dormant or less frequently updated during the course of this research. The different protocols in temporal indexing are also indicative of how the unfolding of the Fukushima disaster has been defined in a specific temporal framework.

In addition, in order to explore the digital archive's capacity of telling "ghost stories," I have selected online archives that show thematic organisations and topic-based classification systems, especially by means of tagging and/or the list of keywords to organise data. On the function of tagging in the digital archive, sociologists David Beer and Roger Burrows (2013) call for a "classificatory imagination," which involves any form of differentiation in everyday life. A classificatory imagination is prominently visible in the digital archive through the practice of tagging or labelling. It is important that Beer and Burrows argue that "[i]t would of course be a mistake that these classifications become unconstrained and unanchored simply because they are the products of decentralised media" (Beer and Rogers, 2013: 55). The differential modes of tagging and classificatory systems are particularly crucial precursors to identify the discursive formation of the digital archive. They have simultaneously helped me formulate what constitutes archival stories, by attending to "archival imaginaries" that emerge from the unexpected "bumping into" archival traces as well as gaps, erasures and absences.

However, I was aware of the difficulty of accessing all the information available on the digital archives I would analyse, because of the vast amount of data they process and preserve. Unlike the traditional material archive, the digital archive has the capacity of updating and deleting its content almost instantly. This was one of the biggest challenge in formulating my methodological approach, and what I could examine was often dependent on the archive's presentation of classificatory modes (such as tagging and the introduction of predetermined categories), which count as unique technological affordances of each archive. For instance, my analysis of TEPCO's digital repositories is specifically based on the company's implementation of a "moving" timeline, which was a main feature of its disaster-related database. It shares a number of interlinks with other archival repositories, which led me to another archive called the Photo & Video Library that has its own keyword-based search options. In addition, participatory archives such as the Japan Disasters Digital Archive (JDA), SimplyInfo.org and Teach311.org rely on users and contributors' effort to draw from a wide range of resources with more disparate archival schemes, which makes it difficult to juxtapose the structure of these archives.

The digital archives I have chosen can be divided into two categories: institutional and independent. While the former has a close relationship with the government and both national and international institutions including scientific bodies of investigation and research institutes, the latter could be characterised by heterogeneous participants in the making of the archive. However, as I look closely into the formation of different digital archives, the difference between institutional and independent archives is not always clear-cut (see Foot et al, 2006), because they have in common the ephemeral and flexible capacities of the digital archive to constantly delete and re-organise the materials on the repository. Although both institutional and independent archives could be regarded as

the conveyor of "official" stories, they are not devoid of archival ruptures – including the curious disappearance of data and the gaps between archival objects, which would signal myriad ways of remembering the consequences of the ongoing disaster.

It is clear that different affordances and structures of online archives call into question the applicability of a single analytic tool. However, I argue that they have in common significant features that evoke various modes of haunting in the complex relation between the archive and the archived. Such features include data traceability, non-linear narrative structure and the classificatory imaginary, all of which are constitutive of the digital archive's capacity of telling "ghost stories." Most importantly, the difficulty in providing a full overview of the digital archive itself becomes a part of my own archiving practices. While I thoroughly examined specific archival categories such as the JDA's "Collections" feature and the archival entries tagged with "Fukushima" on Teach311.org, I was unable to look into the complex classificatory system on TEPCO's online repositories and SimplyInfo.org. The partial intervention to these archives would in turn point towards the "openness" of the archive (see Derrida, 1995), in that archival objects "can be enlarged, viewed in different lights and with different contrasts, flattened, cut up, annotated, compared side by side with other objects and, above all, set free on social media for others to play with" (Moss, 2018: 264). In other words, the flux produced in the "moving" digital archive also moved me as a researcher to employ specific visions and scopes in attending to various modes of haunting at work in its creation. This suggests that archival records in the digital domain can be simultaneously connected and disconnected, which engulfs the processes of remembering and forgetting, inclusion and exclusion at its core every time such dis/connections are made.

I would also like to add that all the archives I analyse are either English or

bi/multilingual (the Japan Disasters Digital Archive and Teach311.org). This is because of a broader audience they aim to reach. However, the outcome of this research could have been different if I had focused only on Japanese platforms, especially the ones that engage with the recording of local documentations. While there are a number of institutional and independent online archives in Japanese, including the platforms made by local citizens, it is often difficult to find the original sources of information, especially when they only draw on Japanese media outlets. There was also a problem of translatability in terms of the complexity of national and local contexts in which the Fukushima disaster has been understood, as the aforementioned roundtable suggests. In addition, relatively small online archives in the Japanese language have continued to disappear, or become "frozen" over years partly because of the lack of funding, and/or the loss of intensity in the media coverage of the triple disaster. This led to my selection of digital platforms I introduce in the following sections, but it needs to be noted such archives as SimplyInfor.org and Teach311.org too became temporarily dormant while I was examining them.

Interviews have been conducted with administrators and contributors of these archives on a voluntary basis, in order to have a better understanding of the structure of a platform in terms of its archival measures and intentions. The data collected by interviews not only serve as supplementary information, but also disclose plotlines behind the constitution of a digital archive. The aims and scopes of digital archiving often become obscured and invisible as these archives keep expanding thanks to various forms of participation, which simultaneously gesture towards the proliferation of narrative frameworks that encapsulate the consequences of the Fukushima nuclear disaster. Consequently, that the practices of digital archiving produce contradictions, ruptures

and ambivalences is a constitutive part of this research in order to engage with divergent stories they generate, unsettling relations with the past, present and future. Below, I delineate five archival platforms I am going to analyse throughout the thesis, in relation to both limitations and possibilities of the production of memory and knowledge about the disaster in the digital domain.

1-1-1. TEPCO's Online Repositories

TEPCO's multi-faceted online repositories are exceptional from other digital archives, in that the company's special web portal "Fukushima Daiichi Decommissioning Project" dedicated to preserving and updating disaster-related information and data with various media type and topics is the direct archival intervention of the company that is accountable for the clean-up operation of the damaged plant. Small repositories on the portal are not necessarily called "archives," but describe the chronological unfolding of the Fukushima disaster. What initially caught my attention was its presentation of a "moving timeline" called the Fukushima Daiichi (No.1) Timeline after March 11, 2011 at the top of the website, in which the company lists significant events that happened to the plant with an embedded search engine. It also "sums up" each year with a headline, which does not always express a sense of progress. The timeline has interlinks to documents, images and videos uploaded in different archival repositories including the Photo & Video Library and Press Releases. There are apparent gaps and absences in the company's description of post-disaster events on the timeline extended towards 30 to 40 years in the future. My search within TEPCO's website began with the representation of the moving timeline that led to other archival function of the company's database.

The company's website is a key source of information when it comes to the latest

updates about the situation at the Fukushima Daiichi NPS, including working conditions and the use of robot technologies for decommissioning. The company has also made an ephemeral inventory by installing webcams at the site in order to provide visual clues of recovery and decontamination work. In addition, TEPCO's archives are particularly unique in the way that they make use of multimedia means of archiving, such that involves the implementation of remotely controlled "robot cameras" in the areas where humans cannot enter. However, their complex and layered practices of archiving hinder a comprehensive search for information, as opposed to the company's incentive to communicate with the public.

However, sociolinguist Barbara Pizziconi's (2015) observation of the changes made on TEPCO's website in the early days of the disaster is particularly useful in considering what might (not) have been there. She argues that the company had deleted early reports and statements that turned out to be false, while introducing new features to offer "comprehensible explanations" to the public. Similar claims have been made in relation to TEPCO's insufficient efforts and failures to record the data in the immediate aftermath of the disaster (see Okumura, 2014). In other words, what is considered as an "official" archive has also been subject to change and erasure, and my intention of examining the company's archival features is to intervene to discursive and temporal ruptures that underscore the making of official records of the Fukushima disaster.

1-1-2. The Japan Disasters Digital Archive

As another example of an institutional archive I analyse is the Japan Disasters Digital Archive (JDA), previously known as the Digital Archive of Japan's 2011 Disaster in Chapter Four. This is one of the biggest networked archives dedicated to the collection

of materials related to the triple disaster of 11 March, 2011, with most of the latest updates concerning the Fukushima nuclear disaster. The JDA was officially launched by Harvard University's Reischauer Institute of Japan in 2012, and it works as an informational hub that assembles data from other digital archives including: 311 Memories (National Institute of Informatics); All 311 Comprehensive Archiving Project that primarily focuses on the recovery process for educational purposes; the National Diet Library of Japan, etc. Although this archive contributes metadata to the aforementioned national portal Hinagiku, its participatory aspect distinguishes itself from the National Diet Library's comprehensive archive that does not accept contributions from individuals.

In addition to the affiliation with major media outlets and official websites, the JDA calls for participation from registered users who freely can upload their own materials such as images, videos, tweets and testimonies. The conflation of both official and personal archival objects makes it a distinctive repository, which, however, often leads to the inclusion of inaccurate or unaccounted-for information. As the JDA semi-automatically archives articles, images and videos broadly related to the triple disaster from its partnership websites, my interest lies in how these archived objects are articulated and animated by users' contributions or "second-order archiving." This is because the question of "who uploads what, and why" remains ambiguous across various archiving practices that the digital archive enables, since the JDA has neither absolute control over its users' activities nor strict archival measures. Therefore, the objects in the archive at first appear to be the result of the contingent and random aggregation of data about the triple disaster.

However, its distinctive feature "Collections" helps contextualise the archive

differently. It allows users to curate and share their own "archive-within-the archive," which foregrounds the "afterlives" (see Fuller, 2009) of previously archived entities. In reorganising and reprocessing already-existing artefacts on the JDA by means of several search options, users can create their versions of the disaster as a part of their own practices of archiving. I specifically focus on this function to approach the digital archive hauntologically, in analysing how fragmented information about the unravelling disaster is arbitrarily brought together to form disparate forms of storytelling across time and space.

1-1-3. SimplyInfo.org and Nukewatch.org

I chose SimplyInfo.org as my empirical material because this is one of the few surviving online repositories that I have been looking at since the wake of the Fukushima disaster. It is an independent platform solely dedicated to recording key events and providing up-to-date information about the disaster. The fact that SimplyInfo.org had changed its name from the original "Fukuleaks.org" interested me as a sign of transformative aspects of a digital repository, and I started a conversation with its communication manager Nancy Foust, regarding the changes and principles in developing this archival project in April, 2017. SimplyInfo.org is based in the United States, a transnational and volunteer-driven project with experts and activists from diverse disciplines, and covers broad issues including global energy policy and weapons test fallout in the U.S.

Albeit remaining independent from any affiliation or funding from government, industry or university, the vast repository of disaster-related data has generated its own research activities, and is often referenced in academic works. Its administrators often

express strong criticism about the current status of the damaged facilities, and engage with off-platform advocacy, including the appearance on radio networks. It is worth noting that SimplyInfo.org claims diversity as its strength, in its ability to offer independent reports and analyses related to their frequent uploads of disaster-related materials. Regardless of a number of topic-oriented categories that help users to explore the repository in addition to regular updates of the conditions at the Fukushima Daiichi NPS, some sections have not been updated and thus "frozen," as observed in a subcategory "Worker Death and Injury Information." I was particularly drawn to their porous description of deaths and injuries at the plant, after my exploration of TEPCO's online archives. The confusion and uncertainty regarding the health effects of radiation thread through other digital archives I analyse, and open up alternative ways of interpreting, and weaving possible stories about the Fukushima disaster.

I need to note that my exchange with Foust suddenly ended, and the platform has been less frequently updated over the past two years compared to the constellation of archival materials uploaded in the first three years of the disaster. My engagement with SimplyInfo.org is unfortunately left with unanswered questions with regard to its archival measures and intentions, but SimplyInfo.org's refusal to delete any old data exemplifies how the same issue has been reiterated and differently framed, or "re-engineered" over time, which leaves informational traces across the platform.

Another independent archival repository I am going to discuss is that of Nukewatch.org, a non-profit organisation based in New Mexico that has been conducting research on diverse issues related to denuclearlisation and the safety at nuclear facilities since 1999. My encounter with this platform was accidental, because it came up second after the Japan Disasters Digital Archive in the search result on Google Search when I

looked up “Fukushima disaster” and “archive.” While the organisation’s website engages with much broader, more comprehensive debates surrounding the implementation of nuclear technologies, the multimedia “Fukushima Updates and Recent News Archive” is listed along with dossiers about atomic histories, the plutonium disposition and weapons complex in the United States as well as Russia and North Korea’s nuclear arsenal. Curiously, that the Fukushima disaster is the only nuclear accident distinctively archived on the website specifically gestures towards the emergence of historical trajectories that encapsulates the incident within a narrative framework that has evolved since the dawn of the atomic age.

Nukewatch.org’s Fukushima archive specifically demonstrates how the disaster has been situated in a broader historical framework, and generates unique temporal and spatial registers. What underscores the archived articles and objects is a transnational insight into the disaster, which reveals that the Fukushima nuclear disaster has always already been understood in relation to, and within atomic histories. The two U.S.-based online repositories I discuss in this chapter share a sense of anticipation and possibilities of future reworkings of an ongoing disaster through archiving practices.

1-1-4. Teach311.org

Although the online repository is relatively small in terms of the number of archived objects, Teach311.org also appears in academic publications as an international hub of educational resources regarding the 3.11 disaster. Although it does not originally claim itself as an archive, its purposes of storing and disseminating knowledge about the triple disaster for future generations resonate with those of other digital archives. The repository was launched as a multilingual, volunteer-based collaborative project online

in April 2011, in order to "enhance the collective knowledge of scholars worldwide working at the intersections of history of science and technology and Asia by presenting, annotating and organizing pertinent scholarly work and teaching materials" (Teach311.org, 2011). Accordingly, the digital repository applies more rigorous standards, and it allows contributors to include broader cultural materials such as film projects and interview collections in the repository. The educational purposes of Teach311.org reminds users of what has been central to the interdisciplinary debates since the wake of the disaster, and it simultaneously puts an emphasis on the collection of archival objects for future research.

Importantly, the international network of academics who have contributed to this project aims to establish a participatory forum to draw on "a range of what might otherwise be overlooked sources," in order to answer the "seemingly simple" question of "Why did the disaster happen?" (Onaga and Shell, 2016: 225). That is, Teach311.org expects its archival materials to be translated and interpreted in the future-to-come, to further our understanding of the disaster and its legacy. Specifically, the tags associated with each entry demonstrate historical trajectories that entail connections between the disaster and past events, which would result in users' encounters with distant places and events including Hiroshima, Nagasaki, United States and Hansin[20]. Although the tags are only available in English, they may count as an important guideline for users to explore the digital repository, since they disclose historical connotations attributed to the Fukushima disaster. Furthermore, that each entry is annotated by contributors suggests how certain archival objects are translated, interpreted and deemed pertinent to the

[20] It refers to the Great Hansin earthquake or the Kobe earthquake that struck the southern part of Hyogo Prefecture known as the Hanshin area in 1995, as the biggest earthquake that hit Japan before the 2011 Tohoku earthquake.

understanding of the incident.

The future-oriented nature of the repository with the educational purpose of passing over the knowledge about the disaster helps situate the Fukushima nuclear disaster in a rich web of connections. My search for entries related with the Fukushima disaster began by following the tags, and one of the key findings is that annotated entries often dismiss the tag "Fukushima" and instead use other place-specific tags, even when the annotation refers to the disaster. While the discursive sphere surrounding the disaster expands thanks to the contributions from scholars in multiple disciplines, I found a "dead link" to an annotated material that problematises the traceability of data. It was a deleted video of a controversial cartoon in the 90s to promote nuclear energy in Japan, which made an uncanny "comeback" on the web soon after the Fukushima disaster. My informal exchange with Lisa Onaga, co-founder of Teach311.org revealed that there was a debate as to whether the annotated entry with an expired link should remain in the repository.

Consequently, what is deemed relevant to the Fukushima disaster on the archival repository keeps reconfiguring the meaning of the incident, especially when the reference to "Fukushima" is missing. The involvement of international scholars contributes to a number of archival entities that come to be associated with the disaster, and thus generates unexpected cross-historical and transnational connections among disparate events distant in time and place, which points towards the differential contextualisation of what the Fukushima disaster is. The archival significance of this project therefore lies in its collective approach to mediate and open up discussions about the ongoing event, which simultaneously multiplies the spaces that the disaster occupies.

1-2. Methodological Challenges and Implications

On choosing these digital archives as my empirical materials, the biggest challenge was to formulate an overarching analytical framework that enables critical interrogation of different structures and affordances of those platforms. That is, the way in which they create discursive and temporal tensions to articulate myriad "versions" of the ongoing event are dependent on the employment of different timescales and thematic organisations afforded by their unique design. Before moving on to discuss hauntology as a methodological framework in order to engage with temporal and narrative modalities of digital archives, I outline what their "technological affordances" would signify in my analysis of digital repositories listed above, which will be followed by key topical issues I aim to unpack in relation to the development of hauntological methods: data traceability, archival imaginaries, and the possibility of "reading" the digital archive as a storytelling device. Although I draw extensively on Derrida's (1995; 2006) articulation of the archive and hauntology, it is important to address that my hauntological approach to the digital archive is not necessarily a deconstructive gesture towards the law of the arkhé, the place of commencement and commandment. Rather, my formulation of hauntological methods has been particularly influenced by both theoretical and empirical contributions from feminism and queer theory to the analyses of submerged and disavowed histories, as well as untold stories that do not have beginnings and ends. I thus argue that methodological challenges and implications below as a means of opening up new ways of exploring the emergent relations between the archive and the archived, by attending to the complexities of haunting forces in the construction of the digital archive.

1-2-1. What is It That Makes the Digital Archive Work?: Technological Affordance and the Construction of the Interface

Although my analysis of digital archives does not specifically focus on the technological and infrastructural substrates that may be "hidden" from users, the question of affordance, in terms of what the digital archive allows its users to do is a crucial starting point to provide a methodological backdrop of this research. Indeed, digital devices play significant roles in recalibrating our relationship with the past, as the intermediaries that make those archives function. While both institutional and independent repositories I analyse throughout the thesis implement different technological apparatuses, I argue that they share the pivotal features of Andrew Hoskins' (2018) concept of shadow archives that are "subject to the dependencies on, and thus viralities and the contagion of the network," which I discuss here in relation to the notion of affordance and the interface as the crucial elements that characterise the production of the digital archive (Hoskins, 2018: 94)

It is yet important to mention that the technological affordances of the digital archive do not necessarily reinforce the idea of technological determinism that technological developments are the quintessential factor of social change. Rather, what the digital archive affords users to do is intertwined with the development of the archive, or the processes of archivization (see Derrida, 1995), and has the potential to transform the archive itself. Here, the affordances of digital technologies should be understood to allow "storing and accessing large amounts of information, displaying multimedia documents, fast full-text searching, quick links to related materials and dynamically modifying or updating content," which enable people to be involved in different collaborative and distributed networks (Ketelaar, 2007: 174). The idea of technological affordances is

particularly significant in order to engage with the dilemma in digital archiving, in terms of the possibilities and limitations in providing users with the information they look for, as well as the involvement of multiple actors, whether human or nonhuman. Given that the records stored in the digital archive are far from stable entities, the way in which the archive creates pathways to the past testifies to the exercise of power over accessibility and meaning-making. At the same time, the pathways to archival objects open up the possibilities of weaving through narrative fragments dispersed across the repository, and of transgressing temporal boundaries without any "exit points" or closure.

Martin Pogačar (2018), researcher in memory and digital media defines technological affordances as the functions of digital media that "enable and drive digital connectivity, or hyperconnectivity," facilitating "the fragmentation of grand narratives into individual, intimate, affective renditions of the past" (Pogačar, 2018: 29). In other words, digital technologies not only aggregate information, but could also proliferate the margins in the archive to be interpreted. In addition, new archival practices dependent on digital devices, especially on networked computers offer "[d]ynamic information rasters and new search methods that go beyond rigid indexes of traditional finding aids," through which "users then create further archive elements to be digitized and stored" (Ernst, 2013: 81). Consequently, the queries in the digital archive highlight user-oriented, participatory practices of archiving, which engenders the movements among archival objects. The active employment of digital technologies, therefore, does not represent "a dead repository or a neutral tool for memory," because those technologies "are rather a living system where memory itself becomes a mode of action" (Røssaak, 2016: 203).

In order to further the understanding about how technological preconditions of each digital archive would affect and reconfigure its relationship with archival objects, I argue

that the idea of interface is a recurring notion, which, however, could be as metaphorical as the digital archive itself. For example, Wendy Hui Kyong Chun (2013) maintains that the interface is "*haunted*' by the processes hidden by our seemingly transparent GUIs [Graphical User Interface][21] that make us even more vulnerable online, [emphasis added]," and that we should nevertheless make our interactive interfaces between man and machine "more productively spectral – by reworking rather than simply shunning the usual modes of 'user empowerment'" (Chun, 2013: 64). Not only does the interface refer to the things that exist between human and machine, its invisibility is often taken for granted to maximise users' sense of manipulation. However, the definition of an interface as a threshold foregrounds its capacity of interlinking different archival records and organisations, which can only be seen in the way it operates for and with users.

In going back to the earliest use of the word "interface" that would stand for "a shared boundaries between two objects, bodies, materials, or spaces," film studies scholar Debra Ramsay (2018) offers crucial insight into how this notion has come to signify the complex economy of digital archiving, as it becomes indicative of "both boundary and convergence" (Ramsay, 2018: 280). Instead of adapting the common usage of the word in the field of computing as the way in which digital technologies represent themselves (see Johnson, 1997), she further develops and redefines the notion as a site of critical negotiation and connection that involve both human and nonhuman actors, as well as various cultural, technological and economic factors. Even though the interface generally refers to the component that creates interactions between the user and diverse systems, and/or

[21] In computing, Graphical User Interface (GUI) means "(a) an interface that allows a user to manipulate graphics on-screen; (b) an interface in which programs, files, data structures, commands, etc., are represented on screen by graphical symbols which can be manipulated or activated directly without the need to learn a command language" (OED). Chun's use of the term refers to the second definition of the GUI.

between one system and another (see Kirshenbaum, 2004) in the context of software studies, those broader implications of the interface also challenge interdisciplinary barriers in the making of the digital archive.

Supposing that the interface is something that enables users to access information, Ramsay emphasises that *not* all interfaces in the practices of digital archiving are digital: that is, the archival institution and archivists themselves could act as interfaces. Such examples in my analysis of digital archives include the JDA's commitment to creating mini-archives by "user-curators (see Dinmore, 2015 in Chapter Four)" who enrich understandings of the disaster by forging unexpected links, while the digital archive itself is funded by an academic institution, and given extensive support from international media outlets. SimplyInfo.org's complex design of classificatory options as well as the way in which its contributors mediate and annotate data from external sources could also count as the operation of interfaces. I argue that this perspective on the modalities of connectivity and convergence in relation to what affords users to "move" and "to be moved" within the archive offers a broader understanding about technological affordances, far beyond the specific functions of certain programmes and systems.

According to Ramsay, one of the most critical aspects of structuring the interface, whether human or nonhuman, is the capacity to "craft pathways," which entails a process of "crafting meaning and constructing memory[22]" (Ramsay, 2018: 294). Here, the role of the interface in "creating pathways" also signifies the act of interpretation in the form of archival description. That archival records could be read otherwise contributed to the formulation of my methodological framework to "read" the digital archive, by

[22] She takes an example of archiving the historical records of LGBT concerns in the United Kingdom, since derogatory and criminalising terms would frequently be attributed to describe the LGBT community and individuals in the past, which reflects the attitudes of the time, not of today.

attending to the discursive formation of each repository. In other words, the notion of the interface that the digital archive is dependent on, and differential technological affordances that create a myriad of pathways to the past would give an important incentive to engage with junctions and connections among archival objects – and their implications in the production of memory and knowledge alongside the entanglement of technological, political, social and cultural factors. However, this highly mediated structure of digital archives discloses the difficulties and limitations in formulating a single analytical framework, which has led me to delve into, and signpost the following questions that those archives on the Fukushima nuclear disaster raise.

1-2-2. Key Questions from the Fukushima Archives

In addition to various forms of technological mediation employed by digital archives, I have identified several topical issues in analysing those archives as storytelling devices from hauntological perspectives. As I set out to choose archival repositories of the Fukushima nuclear disaster, what caught my attention was the differential modes of indexing and organising archival data that include documents, annotations, images, videos, etc. In claiming that the digital archive is an assemblage of interfaces as threshold technologies, Ramsay (2018) returns to the significance of archival terminology in terms of how an archive "represents" what is contained in particular categories. With an example of The National Archives (TNA), the UK government's official archive, she argues that the management of users' expectations is an important issue, when introducing archival options such as "guidance," "advice," "how to" and "help," even though what TNA offers might be better described as "access" and "research," and even "records" (Ramsay, 2018: 295). That is, the discrepancy between what is on offer on

the archive and what users can expect from the archive raises questions about the technologically-mediated interaction between the archive and its users.

At the same time, the archive's function to navigate or "guide" users to access information is not always conspicuous. For instance, TEPCO re-uses the same materials on its archival repositories, and their search options vary across the website, with such ambiguous categories as "fatal accident" and "trouble," which include the records of the same incident. On the other hand, the JDA provides comprehensive guidelines for users in the "About (HOW IT WORKS)" section with an introductory video and a diagram, which show different stages of users' contribution including "discover," "link," "preserve," "curate," "author" and "annotate." These are the prominent example of the archive's reliance on user interaction, and indicates that the user-centric design of a repository designates a multiplicity of stories that could emerge from users' participation. In contrast, SimplyInfo.org's complex system of classification with a number of subcategories would often lead to a deadlock, where no information is given or the archival section is left blank.

How each archive uses specific forms of classification and categorisation has led to my focus on the digital archive's capacity of storytelling, of putting archival fragments together, alongside a sense of "what might have been there." Katherine N. Hayles' (2012) reflection on the importance of narrative in her critique of Lev Manovich's (2002) characterisation of narrative and database as "natural enemies" is pertinent here, in order to attend to the generation of "ghost stories" in digital archives. Although "database" here refers to a general storage of data in the networked computer, Hayles insists on the inextricability of narrative intervention from the construction of a database, because it "always involves assumptions about how to set up the relevant

categories, which in turn may have ideological implications," whereby "narrative enters in the interpretation of the relations revealed by database queries" (Hayles, 2012: 178; 182). The relational database she discusses shares similar facets with the digital archive in that both generate certain forms of connectivity and relations among stored data, even though the database operates on simple queries that allow data from different tables to be combined, without a clear indication of how data are to be qualified for collection. In other words, for the database to be meaningful, it requires narrative that tells a different story about the collection of data. Thus, Hayles points out that narratives are intertwined with "how minds think and how the world works, projects in which temporality and interface play rich and complex roles," and that "no one narrative is likely to establish dominance as *the* explanation, for the interpretive possibilities proliferate as databases increase [emphasis in original]" (*Ibid.*, 179; 182).

The refusal of a single explanation of data is particularly significant, given that the digital archive's flexible and transformative aspects set archival objects "in motion," turning them into haunted entities (see Blackman, 2015; 2019) that can be removed and brought into life at any time. In addition, the way in which each digital repository sets up detailed search options and categories demonstrates that their construction is predicated upon unique narrative framings of the Fukushima nuclear disaster. For instance, SimplyInfo.org has detailed classificatory systems divided by issues and topics, while the JDA accommodates a search option by date, media types and the source of information (only when it comes from one of its partnership websites), instead of topics. I broadly define narrative formations of each archive in relation to the descriptive features used to categorise and classify the archived objects, including the use of tagging and specific keywords, since they are a constitutive part of the archive's storytelling

capacity. These features are the critical precursor to interrogate the organising power of the digital archive, which simultaneously points towards what becomes foregrounded and foreshadowed in the processes of archiving. In other words, how archival objects are grouped together under a category highlights the making of connections among archival objects and users in the practices of digital archiving, which would often forge unexpected ties among them.

In addition, the question of data traceability is of particular importance in relation to the ephemerality of archival objects and how these repositories have collected multimedia materials over time. Even though I encountered the purported absences and erasures of data in those archives, the signs of dis/appearance are not always intelligible. For instance, the trace of erasure is conspicuous when one reaches expired or "dead" links to the original object (Nukewatch.org and Teach311.org). However, the traces of data are hard to recognise, especially in institutional archives including TEPCO's online repositories. Thus, it needs to be addressed that digital traces are the product of both disappearance and uncertainties that underscore the constitution of the digital archive. Consequently, it is often difficult to acknowledge whether the data have been erased or have never existed in the archive. At the same time, this dilemma of digital archiving urged me to employ archival imaginaries to interrogate the flexibility of those archives as a reading practice to approach "ghost stories" they produce. Within this context, the purported gaps, erasures and absences in the digital archive become the significant field of inquiry, whereby data traceability poses a crucial question as to the archive's potential to reconfigure and disrupt the relations between the past, present and future in the processes of recording the consequences of the unravelling disaster.

Another key feature of digital archiving praxes is the production of multiple

temporalities, intertwined with the idea of digital traceability. While digital archives employ different timeframes to organise their archival objects, the im/possibility of retrieving disappeared data disrupts the linear temporality of the archive and its archival objects. For instance, there were a few structural changes in the platforms I examined, including the transformation of TEPCO's disaster-related website and Nukewatch.org's coverage of the Fukushima nuclear disaster. The time of the disaster is also challenged when users are allowed to create their own archives within the archive on the JDA, bringing together disparate materials dispersed across the archive. Furthermore, archival repositories like Teach311.org bring to the fore historical implications of the Fukushima disaster in the processes of archiving. That is, Teach311.org's list of tags indicates historical juxtapositions in relation to the names of places that come to be associated with the disaster, whereas Nukewatch.org's geographical positionality in New Mexico and its historical contribution to nuclear disarmament situate the disaster in a different temporal framework. These multi-faceted questions about temporality underscores my analysis of the digital archive from hauntological perspectives, in terms of how the digital archive's flexible and transformative aspects would produce differential temporal registers.

It is crucial to address that the use of disparate technological affordances as to what they allow users to do complicates the narrative and temporal modalities of the digital archive, and of the Fukushima nuclear disaster as an archival object-in-motion. In the latter half of the chapter, I explicate how these methodological challenges and limitations of digital archiving have inspired me to integrate hauntology into the structuring of my methodological framework.

2. Hauntology as a Method

In the review of literature, I have delineated the theoretical backdrop of hauntology and my focus on the criss-crossing of haunting forces in the construction of the digital archive and those attributed to the historical development of nuclear technologies. In the latter half of this chapter, I aim to develop hauntology as a method to explore the digital archive's potential of generating narrative and temporal modalities as "ghost stories," by attending to: the "haunted" attributes of digital data; data traceability; the production of gaps, erasures and absences in the practices of digital archiving; the employment of archival imaginaries. I thereby intend to contribute to opening up interdisciplinary debates on hauntology for the analysis of digital archives, and formulate methodologies that enable critical engagement with different facets of haunting that thread through the practices of digital archiving.

On hauntology as a method, Avery F. Gordon (2008) argues that "[t]o be haunted and to write from that location, to take on the condition of what you study, is not a methodology and consciousness you can simply adopt or adapt as a set of rules or an identity; it produces its own insights and blindness," and that "[f]ollowing the ghosts is about making a contact that changes you and refashions the social relations in which you are located" (Gordon, 2008: 22). This implicates the impossibility of applying an all-encompassing analytical framework to attend to hauntings and "ghost stories" that uncover the seething presence of past exclusions and invisibilities. Instead, to be haunted and to recognise the haunting require the researcher's own reflexivity as to where s/he is positioned in the very stories s/he attempts to write. It is also important to revisit Grace M. Cho's (2008) employment of hauntology as a method to tell ghost stories about gaps and absences not as a negative space, but as a potential presence. In her

empirical analysis of an uncertain history of yanggongju, she maintains that telling their stories may be a failure because of too many uncertainties, and because "the very act of telling them in a way that makes sense would involve smoothing over the gaps" (Cho, 2008: 17). Instead, she focuses on entering the "empty spaces" left out by ghostly figures to find what emerges from them, in order to listen to their silence. Her practice of telling ghost stories is the refusal to resort to the dominant narrative of progress, which is put under scrutiny by uncertainties and contradictions intrinsic to the processes of summoning the stories of the subjugated. I would like to reiterate that their arguments provided a starting point to employ and develop hauntology in my analysis of digital archives, which involves a speculative interpretative approach to archival storytelling.

Specifically, I claim that the way in which I identified the production of ghost stories in digital archives was often a result of unexpected and accidental encounters, of "bumping into" the traces of the past. My exploration of digital archives has been guided by the sudden dis/appearance and return of archival objects that reconfigure what the Fukushima nuclear disaster is in the web of connections. With regard to a sudden and unexpected encounter with ghostly matters, Gordon (2008) draws on the notion of "rememory" from Toni Morrison's 1987 novel *Beloved*, in which a conversation between mother and daughter discloses the unreliability and volatility of time. The idea of "rememory" repeatedly comes up in the novel, representing the protagonist Sethe's suffering and hallucinations. Gordon delineates rememory as a form of social memory that "forgets some things and never others," and as "a memory already indicated as uncanny by its fundamental repetitiousness and by its gesture to the haunted house" (Gordon, 2008: 165). It also designates the ghostly imprints of what one has never experienced, which nevertheless come back as his/her own memory and make the

present “waver.” This “bumping into” underscores this research and the formulation of hauntological methods, because I often found myself following the traces of someone else’s memory about the disaster every time I examined archival fragments dispersed across an archive. Such occasions include my encounters with small collections on the JDA, as well as a number of archived artefacts with annotations on SimplyInfo.org, Nukewatch.org and Teach311.org. They are imbued with fragmented recollections and interpretations of the disaster, which often belong to anonymous others, and the incomplete and partial accounts of the Fukushima nuclear disaster too create haunting effects in the making of the digital archive.

To reiterate, my hauntological intervention to the practices of archiving the Fukushima nuclear disaster sheds light upon, and revolves around the acknowledgement of those unexpected “re-” aspects of digital archiving: return, rememory re-processing, re-possession and reanimation afforded by digital technologies. The unexpectedness and contingency in the making of the digital archive helped me attend to the constant reconfiguration of the Fukushima nuclear disaster as an unsettling and unsettled event to be archived. Yet, I do not intend to claim that hauntology is a comprehensive tool to uncover the repressed and the submerged, or that *all* digital archives are haunted. Instead, I am going to examine diverse modes of haunting I have come across in my exploration of digital archives, which situates myself in the position of a “ghost hunter,” a person who unexpectedly summons the ghost that exposes disrupted temporalities and narrative modalities surrounding the Fukushima disaster. In the following sections, I will further develop Gordon and Cho’s accounts of hauntological methods as the methodological basis of this research in relation to the specificities of ghostly haunt in the production of the digital archive.

2-1. Data as Haunted Entities

As Gordon and Cho's empirical objects differ from my own, I aim to address how digital archiving praxes allude to the emergence of ghostly figures, in order to elaborate on the applicability of hauntology to examine digital archives. Lisa Blackman's (2015; 2019) notion of haunted data particularly offers significant insight into the intersection of hauntology and the study of the digital archive. According to Blackman, haunted data work "with what remains foreclosed despite its absent-presence," which creates digital traces in the formation of online controversies (Blackman, 2015a: 13). The idea of haunted data is especially salient in understanding the haunting implications of the digital transaction of data and its ephemerality. Her project on online controversies as "potential scenes of entanglement which re-move, or have the potential to set traces in motion" points towards "[the] dynamic process of re-staging multiple temporalities and the gaps, contradictions, events, figures, objects and entities," which is captured by haunted data (*Ibid.*, 13). That is, attending to the modes of haunting in the digital transaction and accumulation of data enables a critical reflection upon different structures and processes in which knowledge is produced.

The idea of haunted data has also allowed me to analyse traces, gaps and absences to make a critical claim that "there is something more to say" (see Blackman, 2015b) in their production. Such sensitivities imbricated in hauntological methods pertain to the creation of archival imaginaries as a strategy to "read" the stories that digital archives tell, as I will further discuss in the following sections. Blackman's employment of hauntology for the analysis of scientific controversies in the digital environment has particularly helped me bring together the digital archive's capacity of telling ghost

stories and forging unexpected relations between the past, present and future. One of her key questions involves how data acquire afterlives and their own agencies, and become re-moved or reanimated ("kept alive") in circulation. The practice of analysing cross-platform data in various formats becomes something akin to what Avery Gordon (2008) describes as "following the ghost," as Blackman likens her role to a ghost hunter who "focuses on what sometimes appear as insignificant or minor details to the plots," and attends to "outliers, gaps or links, which insistently return, while at the same time being subject to processes of redaction or recording" (Blackman, 2019: 19).

Consequently, to view data as haunted entities unsettle the assumed stability of what has been archived or the arhcivable. In other words, the question regarding what can (not) be archived is intertwined with the conditions and forces (i.e. affordances) that make the ghost appear, as a figure of return that disrupts the linearity of time. The dis/appearance of data is often visible, as seen in the two versions of disaster-related archive on Nukewatch.org I discuss in Chapter Five, or a sudden bumping into with "dead links" on several archival repositories. The ephemeral data in the digital archive are then re-enacted, re-animated and re-contextualised through the practice of ghost-hunting, which brings about unexpected connections between the past, present and future. The concept of "haunted data" also calls into question "the proper object[23]" of the archive, which is "extended, contested and re-animated by the re-moval of science's pasts and possible futures within an archive of haunted data" (Blackman, 2019: 172). Not only

[23] In relation to the notion of the "proper object," I cannot help but reflect on Judith Butler's (1994) paper "Against Proper Objects" as a precursor to intervene to the power dynamics that produce the "proper" matters of concern. Butler argues that the institution of the "proper object" takes place "through a mundane sort of violence," which involves the fabrication of legitimating histories "through a retroactive narrative, burying complicity and division in and through the funeral figure of the 'ground'" (Butler, 1994: 6). Where the proper object is "grounded" is indeed a burial ground, of histories of violence, which conceals differences through the act of prohibition.

does the "proper" object of archiving entail constitutive exclusions at work in the making of the archive, it contests the existing paradigms for remembering and forgetting.

Engaging with archival data as haunted entities also involves imaginative intervention to lost histories and subjugated narratives. This is because I would often find myself in a deadlock when I could not trace the relevant data to the point when they were made, or accidentally discovered "dead" objects including expired webpages and documents that are no longer accessible, in an anticipation of something that might have been there. This is a sense of haunting that has accompanied my exploration of digital archives on the Fukushima nuclear disaster. Consequently, the unknowability and uncertainty of the repercussions of the disaster would conflate with that of archival entities as "haunted data."

The notion of haunted data is a significant precursor to develop a methodological framework that takes into account the haunting aspects of digital archiving – the ephemerality of archived data (see Chapter One), the digital archive's capacity of disrupting temporality, technological affordances that create a myriad "pathways" to the past, etc. I thus argue that the data that can leave traces, or be moved and re-moved acquire their own agencies and afterlives that keep challenging the production of memory and knowledge about the Fukushima nuclear disaster. Albeit fragmented and dispersed, those data stored in the digital archive "assume rhetorical forms, functions and strategies," whose dominant form is "the speculative, anticipative relations shaped from the aggregation and enactment of data patterns, put to work in order to generate future value and capital" (Blackman, 2019: 56). Instead of the product of programmes and algorithms, they entail the "stories that tell stories (see Haraway, 2017)," which require interpretation and imagination as to their capacity of making connections.

2-2. Reading "Ghost Stories" in the Digital Archive

My methodological contribution in this research lies primarily in the way of "reading" the ghost stories that the digital archive affords us to tell, in relation to how those archives collect, assemble and organise disparate information about the Fukushima disaster. I have already indicated the unique classificatory modes of digital archives, which come to signify their storytelling capacity. Ross Gibson (2015) asserts that every investigation into the digital archive requires "a breath of intuition" as "the pattern-seeking faculty that can supply the not-so-obvious connections that might account for the mystery at the root of the inquest" (Gibson, 2015: 32). In other words, any research concerning the act of digital archiving requires the recognition that digital data may only become discursive and intelligible through the practices of interpretation. As I have argued above, tagging and classificatory systems are the significant clue to intervene to narrative formations of the digital archive, because "each classification system opens up new avenues in to [sic] the material, yet also closes off others," since "[i]t is impossible to approach the data in a way in which is can be 'made to speak' neutrally, objectively and once and for all" (Featherstone. 2006: 593). The problem of classification is pertinent to all archives I am going to examine. For instance, Teach311.org's tag cloud indicates how certain words such as Hiroshima and United States come to be associated with the Fukushima disaster, whereas the JDA allows users to add an unlimited number of tags to archival objects. A number of thematic categories can be seen on TEPCO's online repositories and SimplyInfo.org, which provide users with multiple entry points to engage with specific aspects of the disaster.

On the importance of "reading" the digital archive, environmental sociologist Claire

Waterton argues that "[w]e need new, culturally deeper ways of 'reading' archives (including mundane 'database') so that we can get a grasp not only of the complex processes which constitute the making of 'the record,' but also the ways in which these archives, beyond their immediate performative effects […] simply project and perform ideas of the human subjects" (Waterton, 2010: 648). She offers striking insight into the digital archive's function to reveal and hide the underlying politics, histories and power relations, just like the traditional written archive. Consequently, the act of "reading" digital archives is intertwined with other practices of interpreting the world, situated within culturally and historically-informed "grids[24]" to order and organise things.

Moreover, it is important to argue that the digital archive brings together both factual and fictional accounts of archived artefacts, since the boundaries between the two would often blur. Such examples include the annotations to the collections on the JDA, which exemplify that their description of the Fukushima disaster would often contradict with the official discourse about the disaster, whereas SimplyInfo.org's incentive to reserve all previous entries demonstrates the potential of denying and reworking on past decisions and assessments in a retrospective view. The impossibility of identifying the distinction between fact and fiction relates to the haunting aspects of those digital archives. Gordon (2008) defines "the fictive" as "not simply literature but that complication with which [she] began: the ensemble of cultural meanings, affective experiences, animated objects, marginal voices, narrative densities, and eccentric traces

[24] Here, I refer to the word "grids" from Michel Foucault's (2002) work *The Order of Things*, in which he maintains that "[o]rder is, at one and the same time, that which is given in things as their inner law, the hidden network that determines the way they confront one another, and also that which has no existence except in the grid created by a glance, an examination, a language; and it is only in the blank spaces of this grid that order manifests itself in depth as though already there, waiting in silence for the moment of its expression" (Foucault, 2002: xii).

of power's presence" (Gordon, 2008: 25). In other words, the fictive, and/or the accounts of the unravelling disaster that have not yet been proven constitute archival storytelling, which often threatens the dominant discourse by generating narrative ruptures and discrepancies.

I argue that the practices of digital archiving designate a complex interplay of fact and fiction, presence and absence, which contributes to the emergence of narrative modalities regarding the repercussions of the Fukushima disaster. For I do not intend to eliminate ambiguities and contradictions intrinsic to the making of the digital archive, my aim is to attend to diverse plotlines they produce to demonstrate the multiple realities and "versions" of the disaster. In relation to the methodological challenges I have raised, my "reading" practices point towards narrative fragments and connections that archival objects make. In the following sections, I further break down key notions that constitute a way of reading the digital archive as a storytelling device and as the transformative and flexible vehicle of haunted data and digital traces, through the production of gaps, erasures and absences, and of archival imaginaries.

2-2-1. Digital Traceability

The archives I am going to analyse make data traceable by different means, whether conspicuous or not, including the implementation of interlinks and the preservation of web caches. For instance, digital traces can be observed in users' intervention to reanimate archived objects on the JDA, or in the organisation of interlinks attributed to each entry on TEPCO's moving timeline. However, not all data are retrievable in digital transaction, since I have encountered a number of expired or "dead" links in those archives. While the traces of digital data appear to be trivial remnants of the processes

of data accumulation, acknowledging their re-surfacing requires patterned and self-reflexive ways of translating social, political and economic underpinnings of "what might have been there."

Philosopher of science Tyler Reigeluth (2014) defines digital traces as "assemblages processing certain intents and references," so that these traces become "both objects and products of interventions, the normativity of which must be objectified and approached critically" (Reigeluth, 2014: 244). I develop his notion of digital traces in order to interrogate the way in which they become a constitutive part of the archive's capacity of storytelling, and create haunting repercussions that produce multiple temporalities. As the digital archive's flexible and transformative features make possible the sudden disappearance and reappearance of data, the challenges of digital traceability gesture towards the contestation of the evolving relations between the archive and the archivable. Although digital traceability is often reduced to its most visible representations (i.e. "404 Not Found," or YouTube's notification that "this video has been removed"), it is significant to address that traces in the digital archive are not to be confused with fixed data, because these traces themselves are the product of the malleability of the digital archive.

James Mussell's (2012) argument of ephemera in the archive is particularly important to consider digital traces as signifying "the return of the repressed," and the result of arbitrary selection of what to remember and forget. Since the ephemerality of the digital archive relates to "what might have been lost," the rediscovery of something we had forgotten accompanies "the distinctive affectual shock" which is "not just nostalgia, an opportunity to recollect and reframe a moment from the past, but also a peculiar reminder of the constructedness of memory" (Mussell, 2012: 80). What he considers as the contingent emergence of ephemera is pertinent to how we recognise and evaluate

traces as the sign of disclosure, of what has been hidden behind every archival decision. Significantly, that the arbitrary process of archiving is reliant on the production of the forgotten comes to resemble Julia Kristeva's (1984) notion of abjection[25], as a process of getting rid of something for a system to complete. That is, the collection of artefacts in the archive is predicated upon exclusions, and its traces do not simply return as the repressed, but must be understood as something that may "present only in the negative as gaps and repetitions" (Freeman, 2010: 13).

With regard to the role of data traces in the digital archive, Andrew Hoskins (2012) claims that "[t]he tension between the traces of the past versus the contingencies of the present in the production of memory is even more profound with the onset of the digital media" (Hoskins, 2012: 95). The question of digital traceability is intertwined with the production of gaps and absences I will argue in the next section, but it is important to address that the entities in the digital archive are always already "haunted" by those traces of displaced and suppressed narratives (see Blackman, 2015; 2019) as well as their potential return from the future. Thus, identifying digital traces is akin to "detective work (see Morimoto, 2017 in Chapter Four)" that involves interpretive practices as the significant intermediary to detect, observe and associate dispersed and often unorganised data in danger of disappearing at any time.

Digital traces as the result of exclusions take different forms, such as the production of a "missing link" on SimplyInfo.org, or historical trajectories between disparate events on Nukewatch.org and Teach311.org. They too constitute the digital archive as a "moving" storytelling device and, significantly, bring to the fore the "re-" aspects of digital

[25] The abject is established as an essential component for the subject to sustain its integrity, whereas it simultaneously threatens the contours of the subject. The complicity intrinsic to the functioning of abjection does not account for the pre-existent division between what Kristeva calls "the I" and "the not."

archiving I have discussed above, which point towards discursive and temporal discontinuities. Again, these data traces are lively because they "can be moved, re-moved, redacted as well as remixed, and require the work of articulation, translation, and staging in order to be made visible" (Blackman, 2015c: 264). Following the traces of interaction and intervention in the digital archive thus becomes an important part of my hauntological method to engage with the digital archive's potential of interweaving the past and the present, and of reanimating latent connections among archived objects.

2-2-2. Attuning to Gaps, Erasures and Absences

In relation to the traceability of information afforded by digital technologies, the digital archive's flexibility brings to the fore the production of gaps and absences. Indeed, they come in different forms – for instance, expired or "dead" links on the networked archive are suggestive of such disappearance, while there may only be subtle traces of information, or archival categories that are left blank. They entail the ephemerality of archival objects that can be erased at any time, but I argue for the significance of involving them, rather than excluding them, as the signs of haunting that thread through the practices of digital archiving.

Feminist cultural studies scholar Maryanne Dever (2010) maintains that "[w]hat we have in this [sic] 'archive story' is the absence of something frequently represented as core to the archival experience," and that the representation of absence "becomes – in the telling – evidence of another sort: evidence of the thing which does not exist," which constitute the absence as evidence in itself that shapes the archive (Denver, 2010: 164). This "archival story" that falls into the margins of archiving practices becomes a site of projection, where one contemplates the record-that-never-was, and the existing milieu of

interpretation that is applicable for reading the stories imbricated by gaps and absences. Although the assumption that something might have been lost "can inspire all sorts of narratives, suppositions, aspirations, longings, fears" that become "forces that shape archives," I argue that the focus on archival absence does not inevitably allow the "readers" of archival stories to see or project *what they want to see* in the ruptures of the archive (*Ibid.*, 164).

Grace M. Cho's (2008) approach to telling stories about gaps and absences not as a negative space, but as a potential presence is worth revisiting in that it critically engages with the epistemological limitations of attending to the absences in historical records. In her attempt to write an uncertain history of yanggongju, she maintains that telling their stories may be a failure because of too many uncertainties, and because "the very act of telling them in a way that makes sense would involve smoothing over the gaps" (Cho, 2008: 17). In other words, her practice of telling ghost stories is the refusal to resort to the dominant narrative of progress and resolution, which is simultaneously put under scrutiny because of contradictions and uncertainties intrinsic to the process of summoning those stories.

While gaps, absences and erasures are a constitutive part of the stories that the digital archive produces, it is important to address that they are not "blank spaces" or complete voids. Rather, what is identified as "missing" in digital archives does not itself represent a dead end, but it is also a site that generates the webs of connection in relation to other archival fragments. Those approaches to archival gaps and absences I introduced here inexorably demonstrate the importance of making connections and juxtapositions in the liminal space, in an unusual and unexpected manner. Such practices make visible what could have otherwise been dismissed and disavowed, including latent and semi-latent

historical trajectories that emerge in digital archives I analyse in the following chapters. On returning to the fact that the Fukushima nuclear disaster itself is delineated by uncertainties and contradictions, I claim that these archival ruptures bring forth what can (not) be remembered in the constant negotiations with the ongoing disaster, as well as the dense historicities it bears.

2-2-3. Archival Imaginaries

In order to take into account the production of data as haunted entities, their traceability and archival ruptures, I suggest that one of the most significant practices in reading the digital archive hauntologically is the construction of archival imaginaries. Having indicated that the digital archives I analyse throughout the thesis create different temporal and discursive registers, I argue for the significance of creating archival imaginaries to attend to "ghost stories" in the digital archive, as a way of making submerged and displaced narratives emerge.

To give a few examples from my empirical materials, what triggers my employment of archival imaginaries include: a missing introductory video to TEPCO's moving timeline; the porous and discontinuous structure of personal mini-archives on the JDA; "blank" categories on SimplyInfo.org and the archived objects that can no longer be retrieved on the web on Nukewatch.org and Teach311.org. They often appear to be the result of the digital archive's incapacity or "failure" of recording and articulating specific information, but they simultaneously become a haunting/haunted site of critical inquiry because of the contradictions, ambivalences and uncertainties they entail. This is also because the Fukushima nuclear disaster is an archival object that keeps being scrutinised by both official and independent bodies of investigation, as I indicated in the introduction of this

thesis.

Archival studies scholars Anne J. Gilliland and Michelle Caswell (2016) introduce the concepts of (impossible) archival imaginaries and imagined records as a way of analysing the absences in the archive and how they could function in ways similar to actual records. They maintain that the formation of archival imaginaries takes "various media forms, including fiction, film and performance," because it "can provide a trajectory to the future out of a particular perspective" (Gilliland and Caswell, 2016: 61). Gilliland and Caswell also claim that implicit models of classification, indexing and appraisal all play a part in enticing aspiration for non-dominant epistemologies along with the constitutive limits of the archive that constrain future possibilities. In this regard, the lack of records does not only bring about archival imaginaries, but it also accommodates "the unattainable" or the impossible something to long for. In other words, not unlike the production of the archive itself, the employment of archival imaginaries cannot be completely free from socially and culturally-inscribed anticipation for possible futures, since they are also bound by particular perspectives on the past.

Therefore, it is important to acknowledge that there are limitations in employing these imaginaries as a hauntological method of reading archival stories. Indeed, the empirical focus on the production of informational traces as well as gaps and erasures in the digital archive requires critical intervention to what can (not) be told in the purported ruptures. But, it does not mean a practice of "making ends meet," or that these latent traces and archival ruptures can be fully accounted for. These limitations become most apparent in the conflation of fact and fiction in archival objects, such that describes the Fukushima disaster as an event that took thousands of lives in one of the collections on the JDA. In addition, the recurrence of historical trajectories between the Fukushima disaster and

other events triggers specific imaginaries, as demonstrated in Nukewatch.org and Teach311.org, in the way that makes possible unexpected juxtapositions and repetitions (see Cho, 2008) to tell the story about the disaster differently.

Significantly, feminist scholar Anjali Arondekar (2009) calls for the "new reading" of the archive, which takes into account "the archive's fiction-effects (the archive as material with 'real' consequences)" (Arondekar, 2009: 4). Arondekar's focus on the archive's capacity to produce fiction-effects derives from her criticism of the "recovery model" in contemporary archival studies, which is based on the desire to fill in the gaps of unvoiced violence and oppression in the past. The impossibility of recovery and recuperation does not necessarily indicate the limitations of approaching absences and ruptures in the archive. Rather, it helps generate unexpected connections among archival objects, in the way that contests the dominant discourse and narrative closure. For this reason, Arondekar asserts that "[t]he archive still promises," despite irreconcilable gaps and absences (Arondekar, 2009: 1). Her argument provides crucial insight into my structuring of hauntological methods for the analysis of the digital archive, because contradictions and uncertainties are intrinsic to the making of the archive in motion, with the potential of re-moving its objects at any time.

As I will discuss throughout the thesis, the different structures and technological affordances of digital archives make it difficult to develop an all-encompassing mode of analysis to examine their temporal and storytelling modalities. The uncertainties surrounding the Fukushima nuclear disaster itself collide with the digital archive's transformative capacity that enables the constant rewriting and revision of records. I thus argue for the importance of attending to the ephemeral features of digital archiving with a specific focus on the "haunted" aspects of archival data, digital traces and the

production of gaps and absences, which engender creative ways of reading through archival imaginaries. This is also to defy the construction of a generalising narrative out of the making of the digital archive, and to shed light on the complexities of the unravelling disaster that have come to engulf the intricate web of connections across time and space. The hauntological method I have developed in relation to several concepts that are characteristic to digital archiving, therefore, is aimed at interrogating a multiplicity of haunting that affects both the archive and the archived, and their evolving and contingent relations.

3. Conclusion

In this chapter, I have outlined the methodological challenges and implications of analysing a range of digital archives that record the consequences of the Fukushima nuclear disaster, and how I met these challenges through the structuring of my research design and method. My main argument throughout the thesis is that the digital archives I explored represent the potential for engaging divergent modalities of storytelling about the unravelling disaster, from the perspectives of hauntology. I have drawn on a number of conceptual and methodological principles in order to develop hauntological methods within the digital environment, which include: different affordances of a digital repository that keep reconfiguring our relations with the past; the ephemerality and ambiguity of data production and their traceability; the construction of archival imaginaries to attend to archival storytelling, woven together with gaps, absences and erasures. I have also argued that "reading" the ghost stories these archives produce is central to my research practice to engage with temporal and narrative valences in the transformative archive in motion. Hauntology has directed my attention to the temporal

and thematic multivalence of digital archiving, and thus allowed me to interrogate different "versions" of the Fukushima disaster being told by a myriad of actors. The implication of this is that the digital archive functions as a storytelling device that brings together fact and fiction, official and personal recollections of the disaster across time and space, which is subject to further mediation and interpretation.

In the next chapter, I begin my empirical analysis through these methodological scopes in order to explore TEPCO's archival repositories, and how the "official" storage of information discloses different plotlines about the unfolding of the Fukushima disaster, which is open to hauntological analysis.

Chapter Three

TEPCO's Digital Archives

0. Introduction

In this chapter, I am going to explore the digital repositories of the Tokyo Electric Power Company (TEPCO) that owns the Fukushima Daiichi Nuclear Power Plant. Their archival repositories are unique and even exceptional in that they implement several archival schemes, ranging from an interactive timeline to the digital library of videos and images. TEPCO is one of the most controversial actors being held accountable for the occurrence and consequences of the Fukushima nuclear disaster, and is the agency that is at the forefront of the continuing battle with radioactive leaks in dismantling the damaged plant. Since the wake of the incident, the company has faced a number of lawsuits that involve: previous on-site recovery workers; the U.S. navy sailors who participated in a rescue mission off the coast of North-east Japan; suicide cases of Fukushima residents who killed themselves after compulsory evacuation; more than 10,000 plaintiffs who claim to have been affected by the disaster.

The outbreak of scepticism about the company was first triggered when it turned out that the government and TEPCO had hidden the fact that three reactor units reached the state of meltdown within the first few days after the earthquake hit the plant. After the disaster, TEPCO has struggled to solve a number of disaster-related issues, especially with regard to the concerns about radiation leaks and potential health effects. In addition, their views are often considered to correspond to the government's, because the nuclear industry had been promoted by the pro-nuclear policies of the government

since the introduction of the Atomic Energy Basic Act in 1955, which helped Japan's post-war economic growth. The Fukushima Daiichi Nuclear Power Plant is one of the oldest nuclear power plants established in the 1970s, and TEPCO has played a significant part in providing electricity to the metropolitan area. Yet the corporate losses after the disaster forced the company to be part-nationalised.

The website that TEPCO launched in 2011 consists of several different elements: a moving "timeline" that marks significant events after the disaster; "Photo & Video Library" that include selected images and videos that update news of the damaged reactors, along with 24/7 live streaming of the videos taken by on-site cameras; the repository of official statements and announcements from the company. While it covers a wide range of subjects including the technical details of decontamination processes divided into a number of subcategories, it functions as a gateway for concerned citizens to access official updates of the disaster. Of all the digital archives I draw on in this thesis, TEPCO's online repositories are the most intriguing and revealing ones in disclosing multiple modes of archiving by the agency that is accountable for the unravelling disaster. As I am more interested in what is archived as a part of official story of the Fukushima nuclear disaster than the detailed content of the company's database, I will start by analysing the criteria and measures, whereby a specific entity is archived and registers certain realms of visibility. The analytical focus is on how the company has set up the regimes of remembering the ongoing event as an "official" repository of disaster-related data and information, and nevertheless disclosed ambiguities, ruptures and contradictions in the processes of archiving. The description of these archiving practices will also highlight the difficulties of bringing them to the foreground and what this presents for the hauntological orientation developed throughout the thesis.

1. The Structure of TEPCO's "Fukushima Daiichi Decommissioning Project"

In order to analyse the archival repositories of TEPCO, I will first explore the structure and specific affordances of the database "Fukushima Daiichi Decommissioning Project <http://www.tepco.co.jp/en/decommision/index-e.html>," a special web portal dedicated to recording the consequences of the Fukushima nuclear disaster. There are a number of topic-related sections and categories, and archival objects are often connected by interlinks, which makes it difficult to conduct a systematic search within the database. It is also important to note that TEPCO initially failed to offer constant and seamless updates about the on-site situation. Japanese computer engineer Haruhiko Okumura (2014) points out TEPCO's confusion and struggles to disseminate and store data about the dispersal of radioactive materials in the aftermath of the Fukushima disaster. While the Japanese public experienced a severe breakdown of informational infrastructures after the earthquake and tsunami struck, including the dysfunction of landlines and the subsequent overload of Internet-based systems, Okumura argues that TEPCO too failed to release announcements about the areas that might suffer from possible blackouts, and those regarding the early readings of radiation after initial explosions. Another problem was that the radiation data in the immediate aftermath of the disaster were not entirely stored in a readable and convertible format for further analysis, after the company's core Web-based monitoring system was deactivated. This was due to the aftershocks of the earthquake, which made it difficult to access and compare the information regarding the initial impact of the incident.

In addition, the information offered by the company has not always proven accurate. Sociolinguist Barbara Pizziconi (2015) argues that many of TEPCO's early statements

later turned out to be false, and that the company performs "semantic exercises" or arbitrary fluctuations in order to communicate with the public. In contrast with "dry" and fact-based press releases, Pizziconi insists, "conceivably in order to deflect accusations of cynicism and self-interest, the website begins to include interactional texts such as apologies or condolences" (Pizziconi, 2015: 171). In other words, the way in which the disaster is told, and the company "speaks to" the public drastically changes the meaning and perception of the ongoing event. I thus suggest that the organisation of TEPCO's online repository enacts a specific form of storytelling by means of arbitrary inclusion and exclusion. The company's approach of providing people with publically "comprehensible explanations" can be equally problematic, because the simplification of information will lead to the unaccounted erasure of raw data such as radiation readings, and to obscuring where responsibility lies.

The "Fukushima Daiichi Decommissioning Project" as a gateway for disaster-related information went through a few significant changes in terms of the layout and topics it covers. One of these included the displacement of a "moving timeline," which caught my attention when I first looked at the company's website dedicated to recording and updating disaster-related information – because it was then displayed at the top of the page as a key feature. However, as of August 2018, the feature was removed from its original place and what now (at the time of writing) appears at the top is TEPCO's mission statement and the figures that allegedly show the company's achievements in the decommissioning of the power plant over the past 6 years (see, Figure. 1).

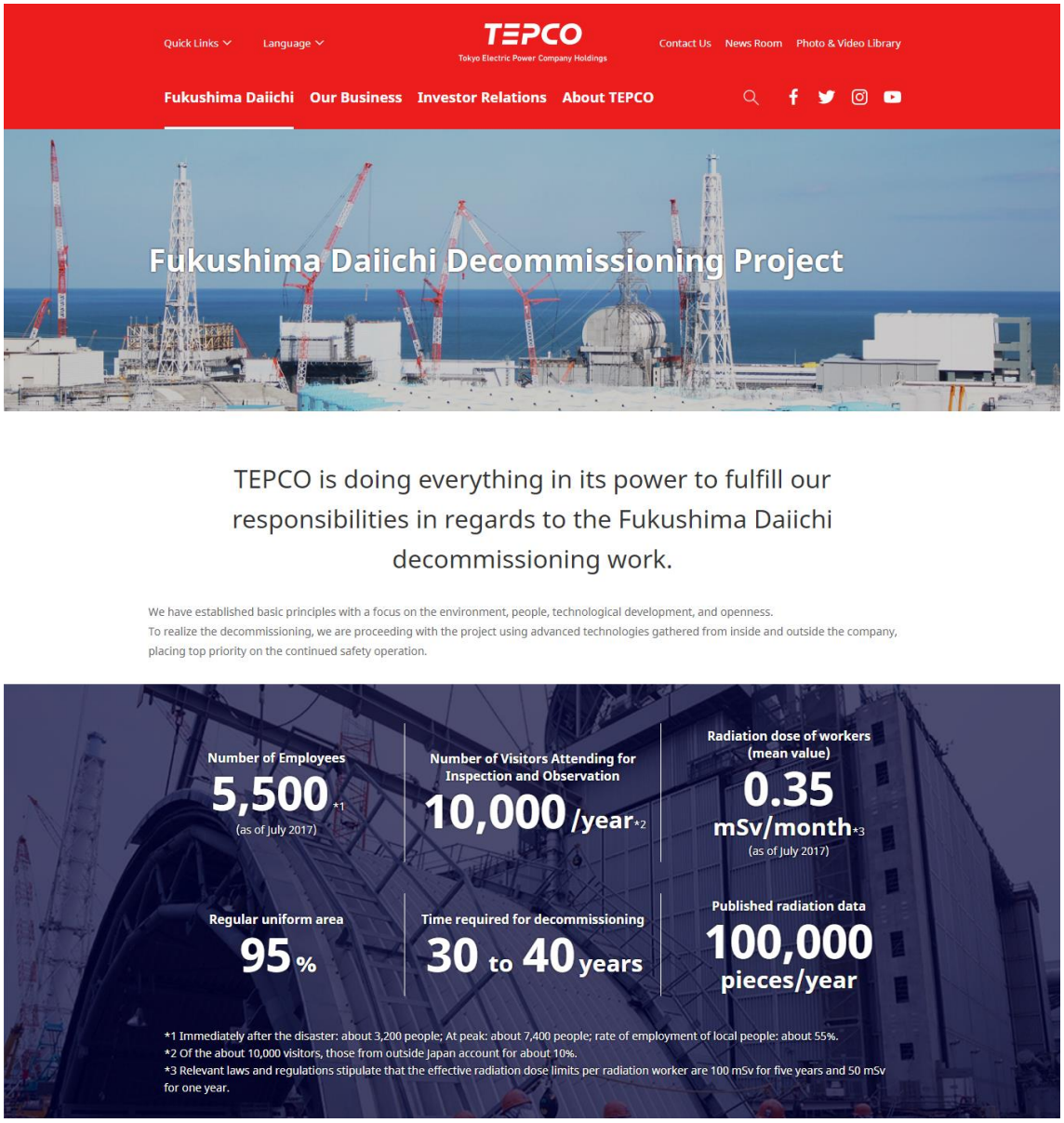

Figure. 1. TEPCO's special web portal "Fukushima Daiichi Decommissioning Project."

I could not identify when this change was made. The new design looks refined and completely different from the rather monotonic display of the previous version. I attempted to retrieve the original image when I started to examine TEPCO's archiving projects. I looked up the URL of this index page on the Internet Archive (IA), a non-profit digital library founded in 1996 to provide "universal access to all knowledge." The IA is

so widely used to retrieve digital data that the Japan Disasters Digital Archive (JDA) relies on the platform for accessing materials that have been deleted (discussed in more detail in Chapter Four). The Wayback Machine is a function that the IA invented to allow people to retrieve a wide range of digitised materials including caches and screenshots of webpages that no longer exist. There are 108 captures of the same URL between 15 February, 2014 and 3 September, 2018, and most of them are voluntarily created. The last cache with the previous layout was made on 3 May, 2018 (see Figure. 2), which indicates the change was made between the date and the next upload on 3 July, 2018.

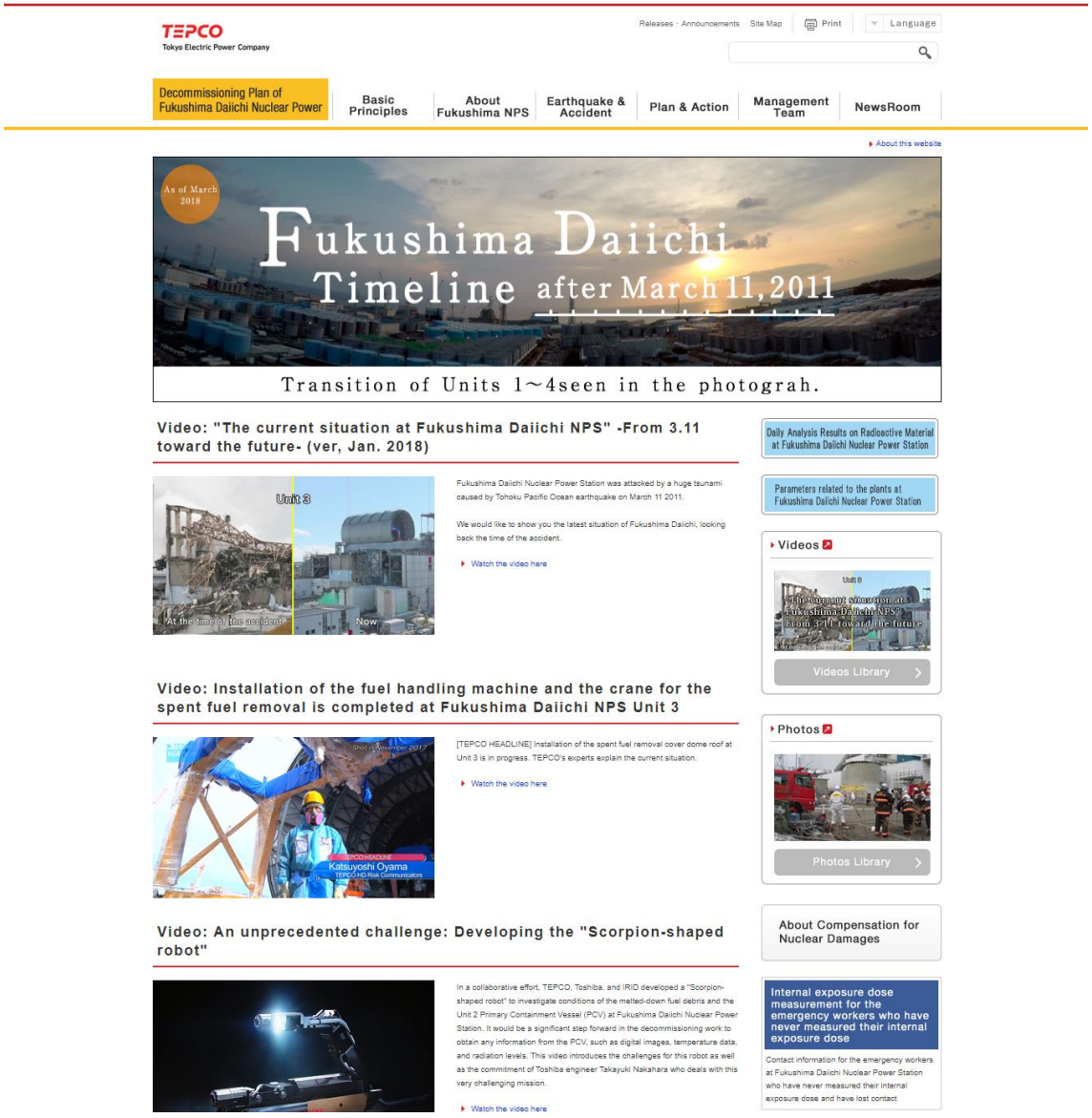

Figure. 2. Part of the cache of the previous version of the "Fukushima Daiichi Decommissioning Project," retrieved via the Wayback Machine.

What triggered the change is unclear, but given that the format had remained the same since early 2014, when the first snapshots of the webpage became available on the Internet Archive, the restructuring of the webpage signifies a radical shift in what the company attempts to highlight: the disaster is now defined by the list of solid facts rather

than a "moving" timeline. This being said, my exploration of TEPCO's archival repositories is inspired by the removal of the object that cannot be fully recovered. Arguably, the previous features of the "Fukushima Daiichi Decommissioning Project" had already become a haunting entity that collides with the platform's latest design. This has less emphasis on the timeframe of the unfolding disaster, replaced by a mission statement which designates ideal progress of the decommissioning process.

There are also ruptures and absences when looking into the dis/continuity of informational traces over time, and what information belongs to one archival feature and not others. In contrast with other online archives that I will analyse in chapters Four, Five and Six, the empirical accounts of TEPCO's digital repositories are based mostly upon detailed observation of each chosen repository in terms of how they organise archival objects by means of disparate thematic categories. The primary question about the organisation of their archival repositories does not always have clear answers, and I had particular difficulty in identifying structural and thematic arrangements in relation to: What is the difference between "Trouble" and ""Fatal Accident?"; Why are the documents in a particular year completely missing, or linked to irrelevant entries?; What are the purposes of using multimedia resources? The informational excess on TEPCO's archival repositories does not only suggest a myriad of technical difficulties to resolve the issues regarding the control over radiation leaks, but it also expresses a greater sense of confusion and the impossibility of creating a consistent, organised archive. In the sections that follow, I examine two archival features that the company keeps updating since the Fukushima nuclear disaster in 2011, and analyse what their differences might signify.

In my practices of reading this vast archive, I aim to interrogate the latent modes of

inclusion and occlusion, erasures and revisions that delineate and haunt the biggest constellation of archival projects run by the principal actor of the Fukushima nuclear disaster. I particularly focus on how the two repositories enact different temporalities and narrative modalities, in terms of their engagement with a linear narrative of progress and the intrinsic invisibility of the effects of radiation. Specifically, I argue that TEPCO's deployment of robot technologies overshadows the conditions of human workers in an attempt to mediate the views inside the damaged reactors, and complicates our understandings of what is at stake. As the structural change in the main portal I indicated above demonstrates the shifting focus on the "frozen" numbers and figures that represent the status of decommissioning work instead of the moving timeline previously featured, the entire platform's transformative or transitory aspect becomes less apparent. Nevertheless, the way in which TEPCO records the consequences of the disaster proliferate archival imaginaries as to how specific entities are brought together, given meanings over time.

2. A "Living" Timeline of the Fukushima Nuclear Disaster

What users were expected to see first when they accessed TEPCO's portal dedicated to the decommissioning project of the Fukushima Daiichi NPS was "Fukushima Daiichi Timeline after March 11, 2011 (see Figure. 3)."

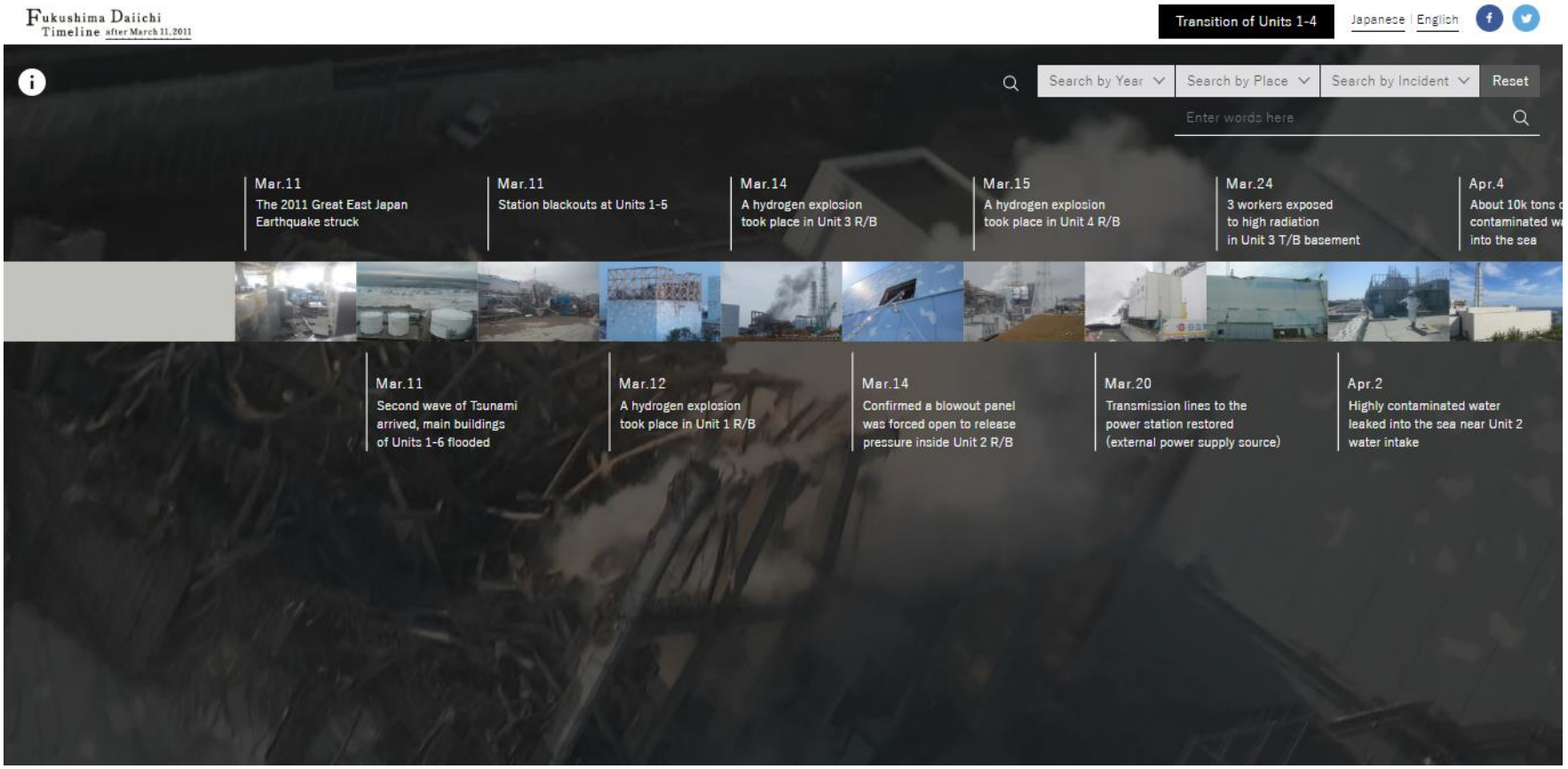

Figure. 3. Screenshot of "Fukushima Daiichi Timeline after March 11, 2011."

The interactive timeline offers the blueprint of decommissioning plans, which appears to reflect the "Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4[26]" that the company issued in association with the Ministry of Economy, Trade and Industry (METI) in December 2011. This has since been revised and updated repeatedly. The timeline allows users to see the development of decommissioning plans based on the roadmap, with moving images from right to left. It also includes images before the roadmap was published, which supposedly mark crucial moments after the disaster. Each image captures a significant event that occurred on the date stated, and the detailed accounts of the event are available by opening another window from the "details" section that navigates users to related materials on TEPCO's entire website. For example, the image of a hydrogen explosion that took place in the reactor Unit 3 (see Figure.4) has interlinks to "Photo & Video Library" along with official documents with more detailed pictures and explanations (see Figure.5). That is, the events listed on the timeline share interlinks with other repositories on the company's database, which makes this archival repository an assemblage of fragmented entities that belong elsewhere.

[26] <http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/>

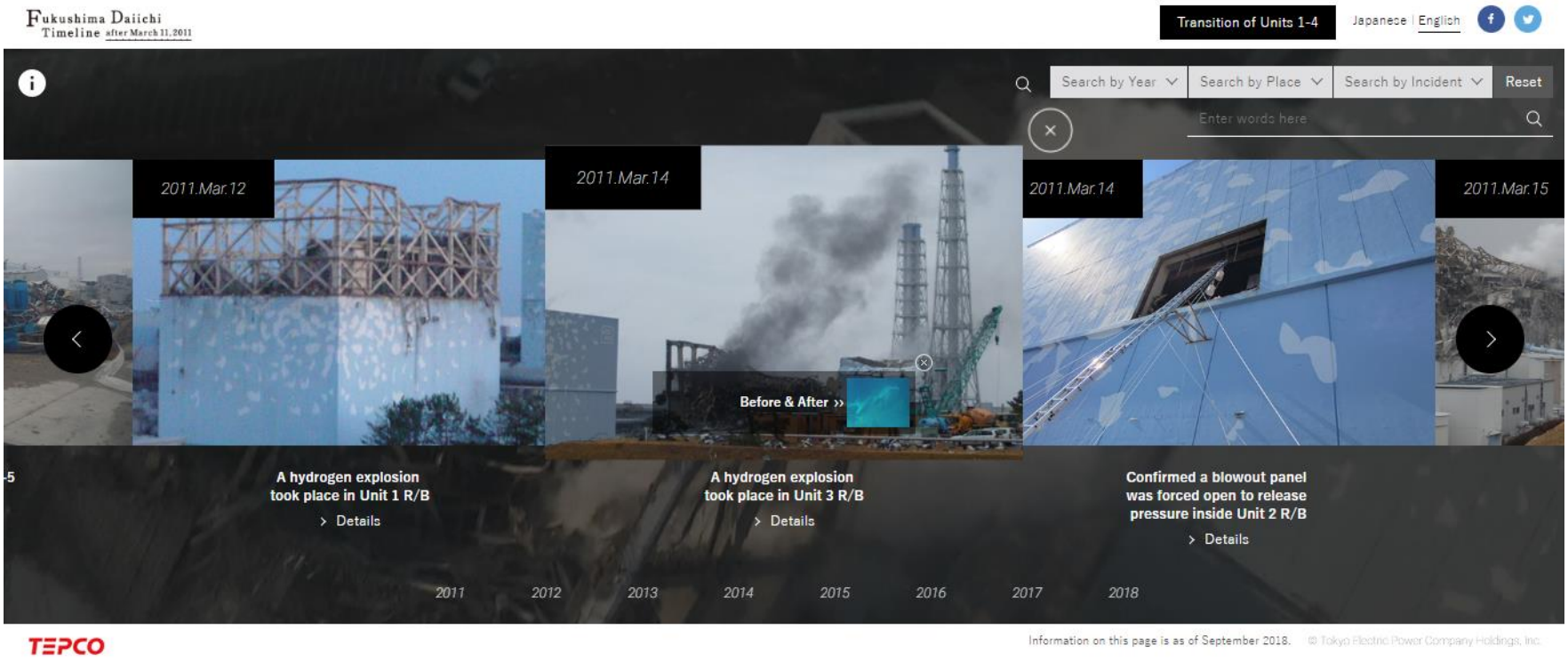

Figure. 4. The image of a hydrogen explosion on 14 March, 2011 on the Fukushima Daiichi Timeline after March 11, 2011.

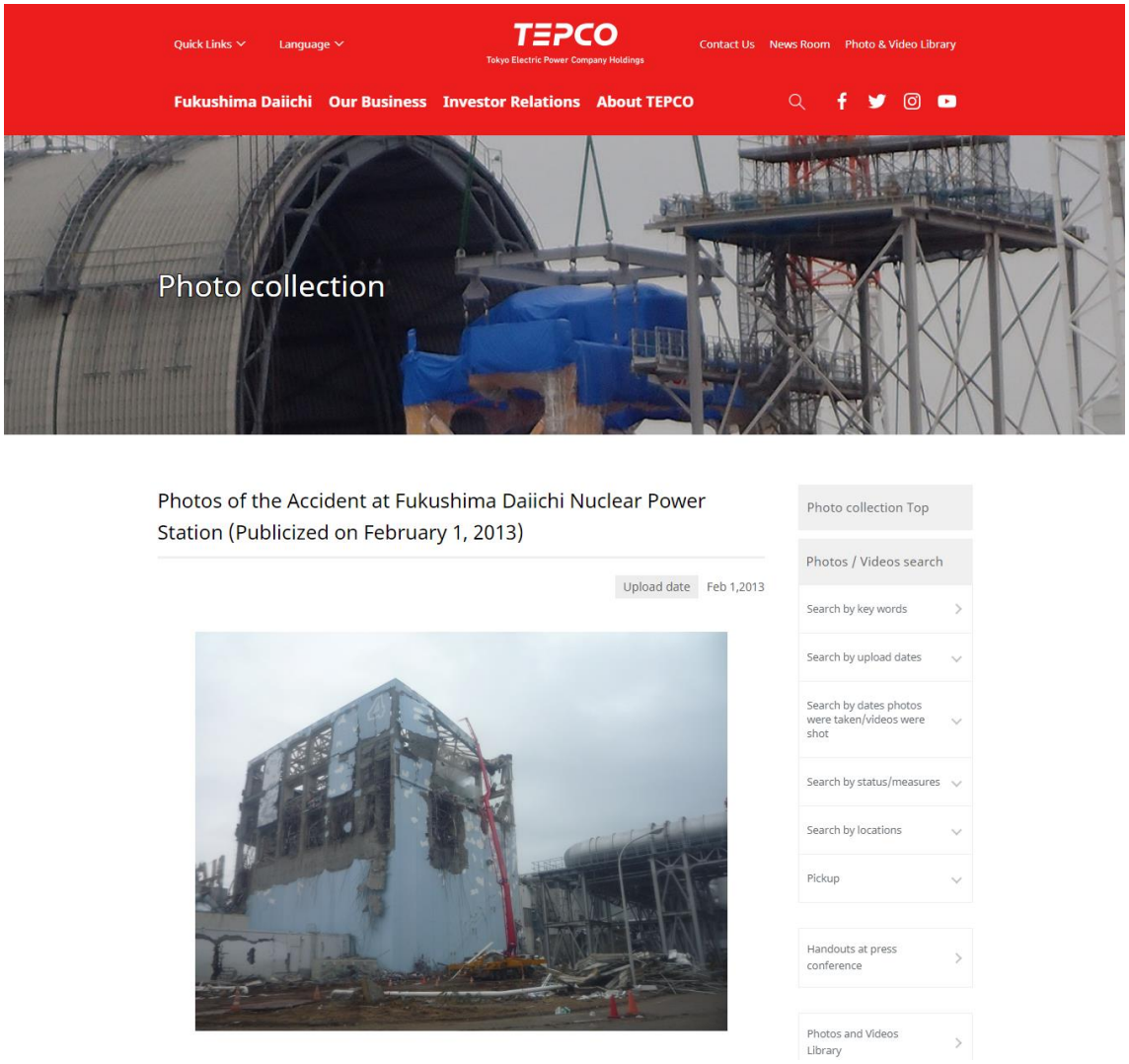

Figure. 5. Part of screenshot of an entry in TEPCO's "Photo & Video Library," interlinked with the event on the interactive timeline in Figure. 4.

Although the Photo & Video Library is accessible on its own, the interactive timeline offers a seemingly independent guideline for users to examine how the disaster has unfolded over time. The moving timeline also extends archival functions with its original search engine that enables a search "by year," "by place" and "by incident."

I argued in the previous chapter on research methodologies that classification systems

are indicative of an underlying mode of inclusion and exclusion, of the processes of decision-making and the workings of archival imaginaries. All of these constitute thematic and temporal dynamics of the digital archive. Visual materials on the timeline are categorised by the type of incidents, including "At the Time of the Accident," "Prevention of Radioactive Dispersion," "Port Area Management," "Spent Fuel Removal," "Investigation for Fuel Debris Removal," "Improvement of Working Environment," "Fatal Accident," "Trouble," "Announcements" and "Water Management." While the "search by incident" is divided into 10 categories with 9 subsections related to water management, the "search by place" demarcates the incidents that happened to individual reactor units 1-4. These filters appear to make it easier to search for more specific information about the damages to each reactor. It is clear that "Water Management" has become the central topic on the whole timeline, for 36 out of 107 images are tagged with this label. However, given that the purpose of this timeline is to index key events after the disaster in a chronological order, how these thematic categories are used to "sum up" the consequences of the Fukushima disaster points towards the archival gesture and narrative closure that TEPCO employs. I thus further my argument about topical and temporal fluctuations of the timeline, which reveals ruptures and overlaps in recording selected moments after the disaster.

2-1. Who Was Involved in Trouble and/or an Accident?

Although the timeline appears to be intended for the public to understand crucial incidents that took place at the plant, the topical breakdown in the search option is too comprehensive when looking at what each category include. These topical categories function as tags to classify the archived artefacts on the timeline, but the number of

entities that they include varies. For instance, “Announcements” include only 4 entries from 2011 to 2014, with the government’s declaration of the cold shutdown state of all reactors at the end of 2011, followed by the termination of Units 1-4 and 5-6 respectively in 2012 and 2014. The category has not been updated since they posted an announcement about the launch of a special company branch of TEPCO to efficiently speed up the decision-making processes for decommissioning. In using the search option on the timeline, it was the definitional problems that perplexed me. Specifically, the two ambiguous categories “Fatal Accident” and “Trouble” led to speculation as to what they signify in the first place, and whether they include different events. There is little clarity in what “At the Time of Accident” refers to, in terms of the length of time it covers.

There is an appalling association when looking into the category “Trouble,” where most of the events are related to the leakage of highly contaminated water. This category also includes four incidents that involve human casualties involving two deaths of on-site workers: a worker who died from falling off the top plate of a water storage tank; the other in the middle of cleaning a construction vehicle in 2015, neither of which was regarded as a result of radiation exposure. Another two incidents are about the workers’ exposure to high radiation in 2011 and 2013. There are five incidents included in “Fatal Accident,” which involve four events of human casualties covered in the “Trouble” category, with the exception of an accident at a solid waste storage facility where a worker died in a mudslide in 2014. Not only does distinction between “trouble” and “fatal accident” blur in this archival repository, it is notable that radiation leaks and human deaths are made equivalent as if the damage to the environment and tragic accidents were compatible. Why one incident involving a worker’s death is excluded from “Trouble” is uncertain, but it makes the distinction between the two all the more convoluted.

Given that the archival timeline aims to record and sort out "memorable" moments that took place at the plant after the disaster, the conflation of human and nonhuman actors in these categories has uncanny repercussions in terms of the treatment of pivotal "workers" at the site, whether human or nonhuman. It is unclear whether the company is incapable of, or indifferent to drawing a line between those events that generally belong to the "Trouble" section except for one, but the flaw in description indicates how TEPCO uses a particular language to tell stories about the consequences of the Fukushima nuclear disaster. Although the topical categories in the search option is generic, I argue that this fissure I found in the coverage of unexpected events has come to have a haunting resonance with TEPCO's attentiveness to robot technologies I discuss in the section 3 of the chapter.

2-2. How They Divided and Unified Time

Although the interactive timeline appears to delineate a linear movement towards the future, it is important to argue that it employs multiple timeframes to differently situate and identify archived materials. By the end of September 2018, the number of annual uploads is as follows: 2011 (22); 2012 (9); 2013 (10); 2014 (13); 2015 (21); 2016 (13); 2017 (12); 2018 (6). Apart from the number of entries in 2011 and 2015 just over 20, it oscillates between 6 and 13 in the other years. As I have indicated that the malleability of the digital archive contributes to redefining the temporality of the archives as opposed to the traditional material archive, the different indexes on the moving timeline are the significant precursor to examine multiple temporal registers attributed to the unfolding of the Fukushima nuclear disaster, along with the gradual loss of intensity in archiving.

One such example includes the list of images tagged with "At the Time of the Accident,"

which is indicative of how TEPCO defines the beginning and the end of the immediate post-disaster period. It is rather startling that only 11 incidents from 11 March, 2011 to 9 March, 2012 were contained in this category even though there are a number of operations and plans mentioned on the timeline during the same period. The latest entry is about the instalment of a switching facility that improved power supply to decommissioning operations. The first 8 entries describe the events that occurred in March 2011. These vary from the collapse of the main office building when the earthquake struck, to the restoration of transmission lines to the power stations on 20 March, 2011. The temporal framework of this archive is extended as one scrolls to the right – there is a blank space with letters "30-40 years later (see Figure. 6)," which visually contrasts with the constellation of information during the first six years of the disaster.

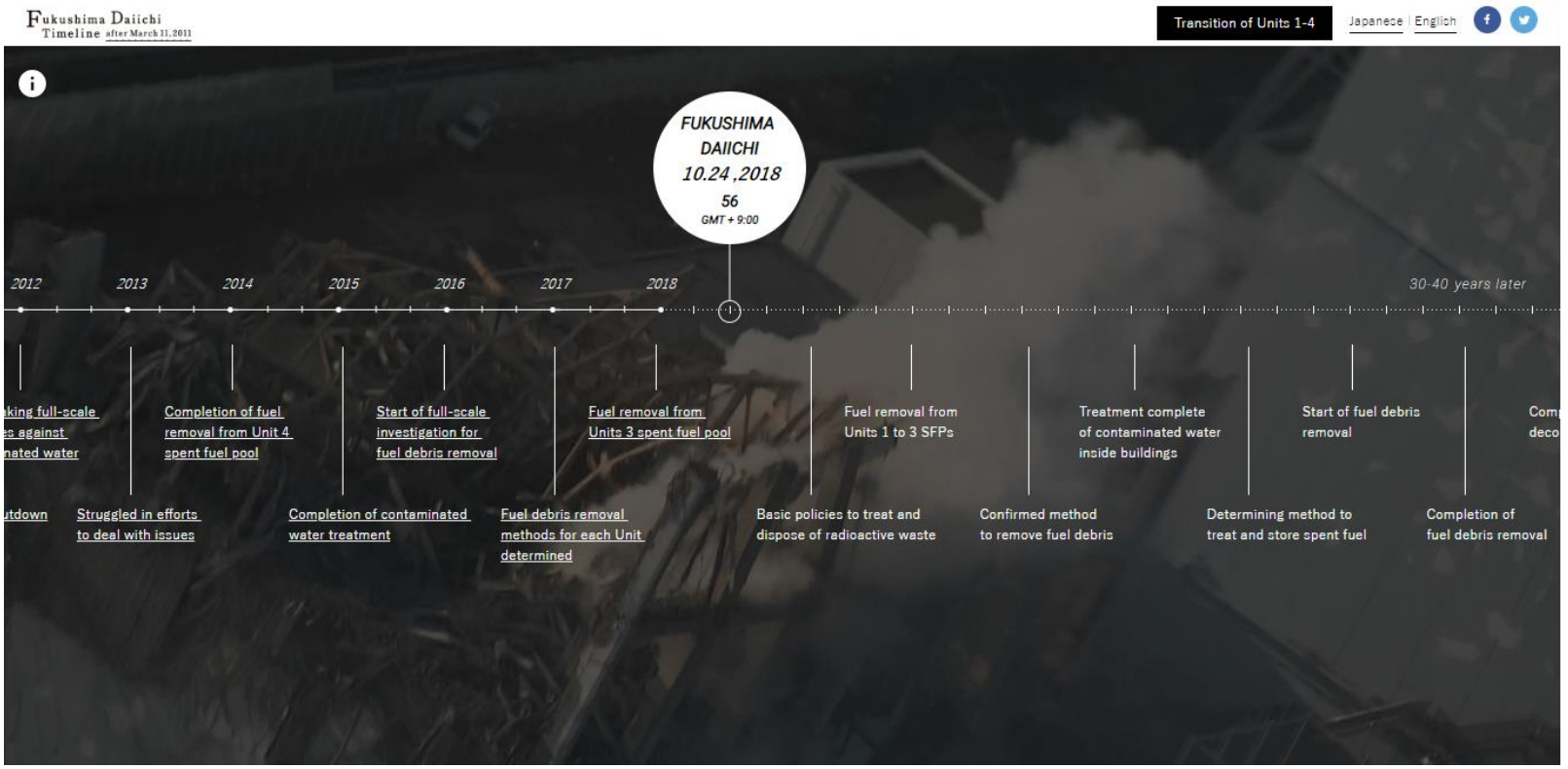

Fig. 6. Future plans for decommissioning on the Fukushima Daiichi Timeline after March 11, 2011.

However difficult the temporal indexing of an ongoing disaster might be, it is also vital in analysing how digital archives function to process and create its own notion of time. Below the horizontal scale of the timeline, TEPCO issues a short description for each year from 2011 to 2017 accordingly:

2011: All reactors in cold shutdown

2012: Start making full-scale measures against contaminated water

2013: Struggled in efforts to deal with issues

2014: Completion of fuel removal from Unit 4 spent fuel pool

2015: Completion of contaminated water treatment

2016: Start of full-scale investigation for fuel debris removal

2017: Fuel debris removal methods for each Unit determined

Although the company's attempt to present a sense of progress and achievement is obvious, the annual accounting merely describes what is still taking place at the plant, except for the 2014 operation at the reactor Unit 4[27]. The remaining signs of "struggle" are prevalent throughout the timeline after a number of trials and errors to prevent radioactive leaks, which do not seem to propose a single solution to radioactive waste produced and stored in thousands of tanks around the plant, to name an example.

Regardless of TEPCO's intention of marking each year after the disaster with a plain headline, this "moving" timeline leaves a massive void for future uncertainty that lies ostensibly visible with the list of achievements to be made in the next 30-40 years

[27] However, the reactor in Unit 4 had not gone through a meltdown in the wake of the disaster, because it was inactive and undergoing regular maintenance at that time. In addition, its fuel rods were securely kept underwater despite the explosion of the reactor building.

described on the same timescale. The “to-do” list includes fuel and fuel debris removal, and the decision-making relating to the storage of contaminated water and spent fuel, which are part of the inevitable process for “the completion of decommissioning”, the letters weirdly cut off from the end of the timeline.

2-3. Another Hidden Story

In the course of this research, I have encountered a number of alleged loss and erasure of archived materials, as much as the sudden return of objects that previously existed. It involves both drastic changes in the structure of a digital archive and the ephemeral traces of dis/appearance of “what might have been there.” These signs are elusive and not always retrievable, but simultaneously become a starting point to intervene to narrative modalities of the digital archive. TEPCO’s moving timeline is not exceptional in this regard, because at the point of my initial examination, it played a short introductory video (albeit skippable), with an arrow that departs from the letters “March 11, 2011” moving towards the end point represented by the image of a cherry tree in full bloom. The image below is a screenshot I took of the video in early 2017 (see Figure. 7).

Figure. 7. Screenshot of the introductory video shown on opening the Fukushima Daiichi Timeline after March 11, 2011.

While the ten-second video signifies how time flies like an arrow with hardly recognisable pictures and terms quickly fading into the background, the flickering and semi-transparent background image on the timeline might suggest otherwise: there are six stored pictures used as the background, which change every few seconds. These images include those of on-site workers in a protective suit, a fuel pool and one of the reactor buildings after an explosion in the first phase of the incident. They represent specific moments crystallised or frozen in the past, and remind viewers of the fragmented scenes of the disaster, without a clear indication of why they chose these background images. However, the video was replaced when I accessed the timeline in early September 2018, with the one that shows the passing of years on the timeline (see Figure. 8).

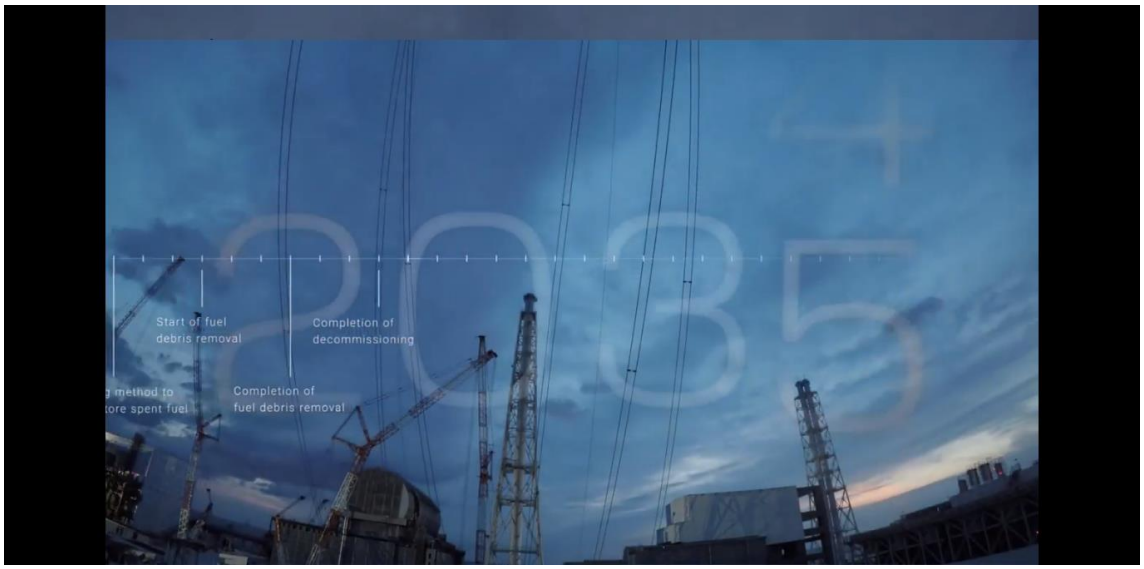

Figure. 8. Screenshot of the new introductory video installed in 2018.

The presentation of the timeline became less abstract, as the new video traces the linear movement of time described on it with the fast-forward video of on-site work from dusk till dawn. It appears that the linearity and flatness of time is emphasised in the new version, while viewers are navigated to the future represented by a blurry image of a cherry tree that seems so near, yet so far in the previous one. While the previous version represents the movement of time by using a pseudo-POV (point of view) shot as if the viewer "walks" the path towards the complete decommission, and it is the same timeline that is displayed in the background, instead of a cluster of unrecognisable words. I argue that the change I unexpectedly "bumped into" demonstrates the different perception of temporality that corresponds to the shift in focus on the entire website I discussed earlier in this chapter: the moving timeline as a key feature was replaced by the numbers and figures that indicate the progress in the decommissioning project. The difference tells another archival story about the displacement of objects and meanings, with "narratives edited, translated, framed, and distributed across travel routes and lines of demarcation"

(Cho, 2008: 119). The disappearance of a "travel route" also displaces the presence of the viewer, which offers no more than an overview of the decommissioning project.

I suggest that the visual impact of the moving timeline overwhelms the limited textual information available from each archival object inscribed on the timeline, obfuscating the arbitrary but unidentifiable measures of selection and classification. Although the "moving" repository is described as a "timeline" in the English version, the original name of the archival timeline translates as "the trajectory for decommissioning" in Japanese, as is apparent from its original URL. Since the word "trajectory" is less decisive than "timeline," I argue that the different framings of the moving records of on-site incidents after the Fukushima nuclear disaster disclose the traces of narrative displacement as well as the production of gaps in the margins of each event inscribed on the timeline. Furthermore, the replaced introductory video takes on what Ross Gibson (2015) calls "affective registers" of the digital archive's activeness, in that the deleted path of the decommissioning project whose future achievement is represented by the cherry blossom has broader cultural implications. The cherry blossom, or sakura has long been considered as Japan's de facto national flower, and its name was given to one of the robots operating at the plant for the survey of the inside of reactor buildings. The symbol of national identity and the hope for the future on the video had a mesmerising effect when it switches to the crystallised and unchanging image of a severely damaged reactor building in the background. Consequently, the informational traces of the Fukushima disaster on the archival timeline, including the video that disappeared, become a haunting reminder of TEPCO's engagement with visual records that multiply archival stories by means of media technologies, with meanings of each object being categorised, edited and overwritten with the potential of future openings.

3. TEPCO's Digital Library of Images

As a number of entries on the "Fukushima Daiichi Timeline after March 11, 2011" have embedded interlinks to the images and videos preserved in another archival repository called the "Photo & Video Library," I began to explore this multimedia archive that demonstrates different ways of archiving the consequences of the disaster, with its unique classificatory modes. The digital library is divided into three categories based on different media types: Video archives, Live camera of the Fukushima Daiichi Plant and Photo collection (see Figure. 9).

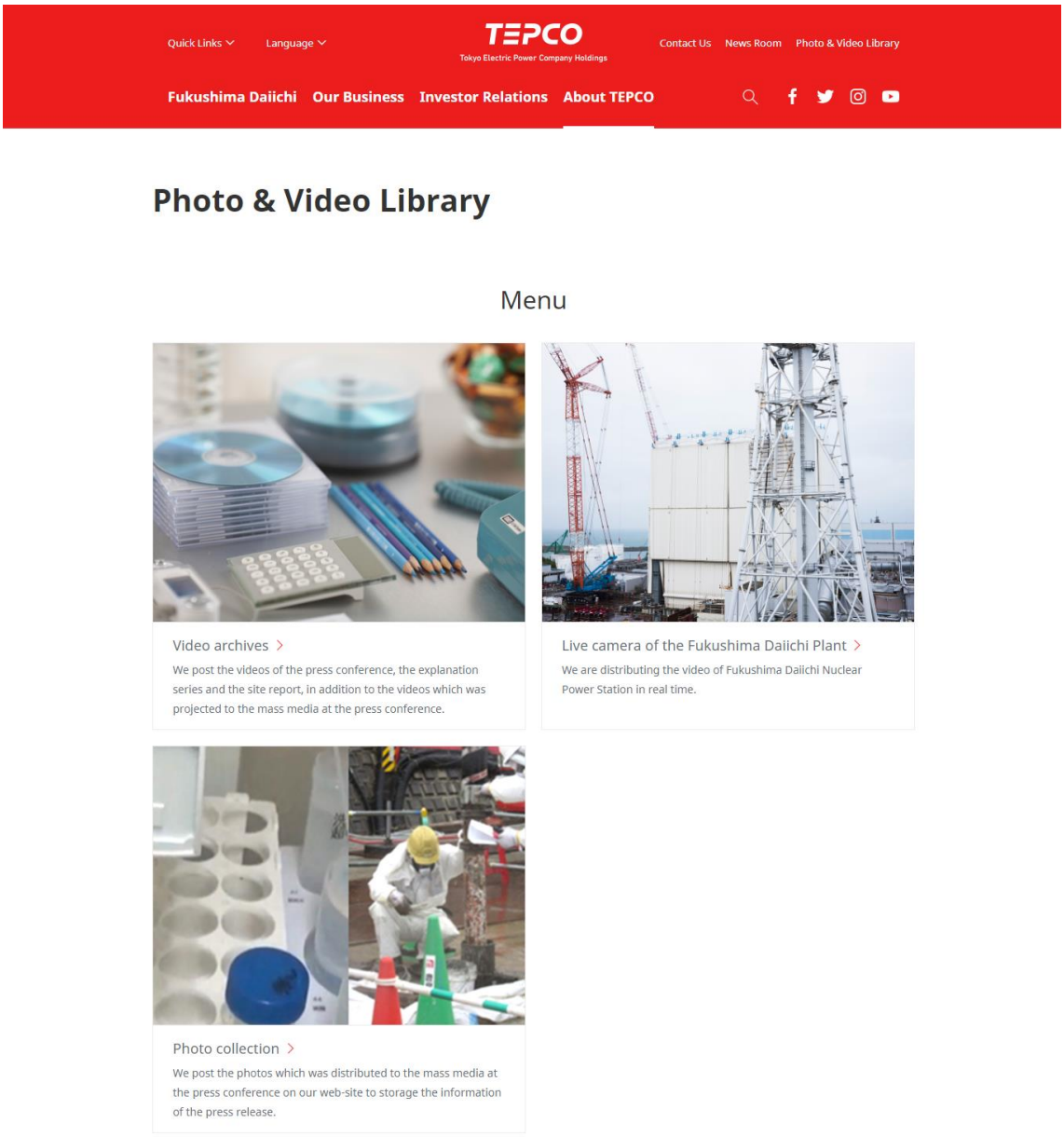

Figure. 9. The index of TEPCO's Photo & Video Library.

TEPCO launched this digital "library" in the immediate aftermath of the disaster with constant updates, providing the public with access to on-site cameras that provided a live-streaming of videos, with a link to the "Live camera of the Fukushima Daiichi Plant,"

previously known as the "Fukuichi (abbreviation for 'Fukushima Daiichi/No.1') live camera." Since TEPCO started real-time streaming on 31 May, 2011, the previous videos can only be found in still images taken by every hour from 5:00AM on 11 March, 2011, available only on TEPCO's Japanese website[28]. It is impossible to "rewind" the video, which eventually led citizen-led non-profit groups to automatically record and upload the whole streaming online[29]. Another feature of this library, the "Video archives" covers six topic-related categories, three of which ("Thermal Power Station," "Power Transmission/Distribution" and "Daily living-related video") is in the status of "being prepared" as of October 2018 (see Figure. 10). The absence of relevant materials in these categories gestures towards the future-oriented-ness and uncertainty of this archive, marked by archival voids to be filled. The sense of anticipation is also prevalent in other practices of making the digital archive on the Fukushima disaster, as will be discussed in more detail in Chapter Five and Six. However, that this "official" archive creates empty categories produces the potential counter-narratives that could overwrite existing artefacts and/or retell the stories about the disaster differently. This strange absence implicates that the virtuality of these archival categories is also a constitutive part of TEPCO's digital repositories and their storytelling capacity based on a potential of future actualisation.

[28] <http://www.tepco.co.jp/nu/f1-np/camera/still-j.html>
[29] <https://www.youtube.com/user/fuku1live/search?query=2011>

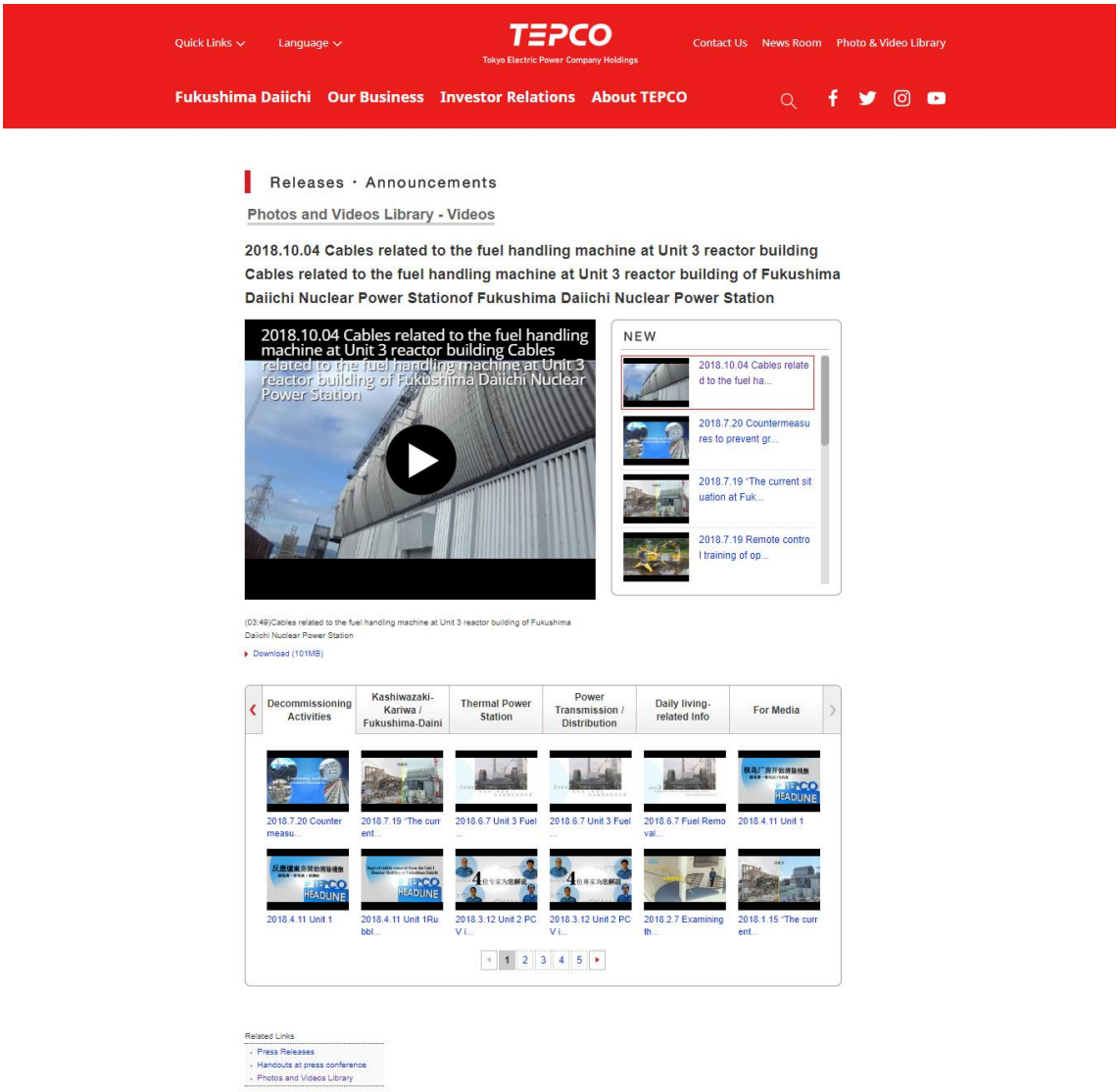

Figure. 10. Video archives in the Photo & Video Library.

In contrast with these two repositories of audiovisual data, the "Photo collection" sets up a more detailed search engine based on keywords, upload dates, status/measures, locations and other individually categorised topics (see Figure. 11).

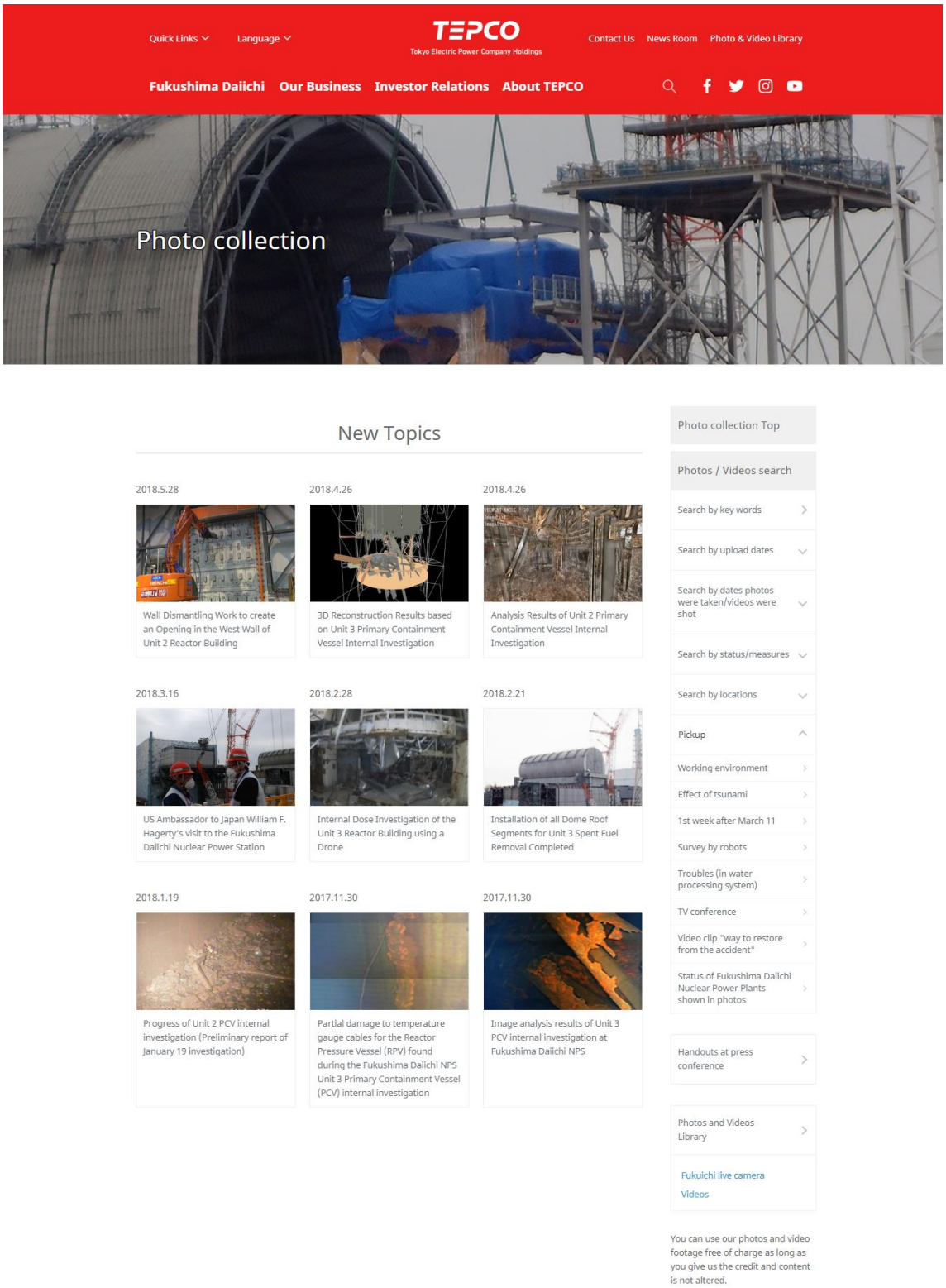

Figure. 11. Photo collection in the Photo & Video Library.

This archival repository of visual images has been constantly updated and classified by tags to provide the latest information about recovery and decommissioning operations. In addition, a variety of search options in Photo collection demonstrates its thematic organisation to classify archived objects. Specifically, the Photo collection accommodates a category "Pickup," where users can search through selected subjects that include: working environment; effects of tsunami; 1st week after March 11; survey by robots; troubles (in water processing system); TV conference; video clip ("way to restore from the accident"); status of Fukushima Daiichi Nuclear Power Plants shown in photos. These classifications specifically indicate thematic clusters that the digital repository puts an emphasis on, and give access to the places (i.e. inside the containment vessels) where human workers are unable to enter due to extremely high radiation levels.

The temporal layers of this audio-visual archive are also distinctive in terms of the peculiar division between "search by dates" and "search by upload dates," which allows users to examine the non-linear timeframe in the construction of this archive: that is, certain incidents are not necessarily added to the library as they happen, and the information about them may be either "discovered" or "excavated" long after they had actually occurred. I argue that the technological affordances of the multimedia repository that shares a number of interlinks with the moving timeline open up differential thematic and temporal registers to the recording of the consequences of the Fukushima disaster. I examine how it enacts what Grace M. Cho (2008) calls "a distributed perception" in demarcating the visible and the invisible, which also challenges the conflation of human and nonhuman agencies in the process of assembling archival fragments.

3-1. Traces of Disclosure

The aforementioned category “Pickup” in the Photo collection involves specific issues that describe and categorise the aftermath of the Fukushima nuclear disaster. For instance, in examining what is included in the category “1st week after March 11,” I found images and videos with the latest entry on 29 March, 2013 even though it is purported to record events that occurred during the first week after the disaster (see Figure. 12).

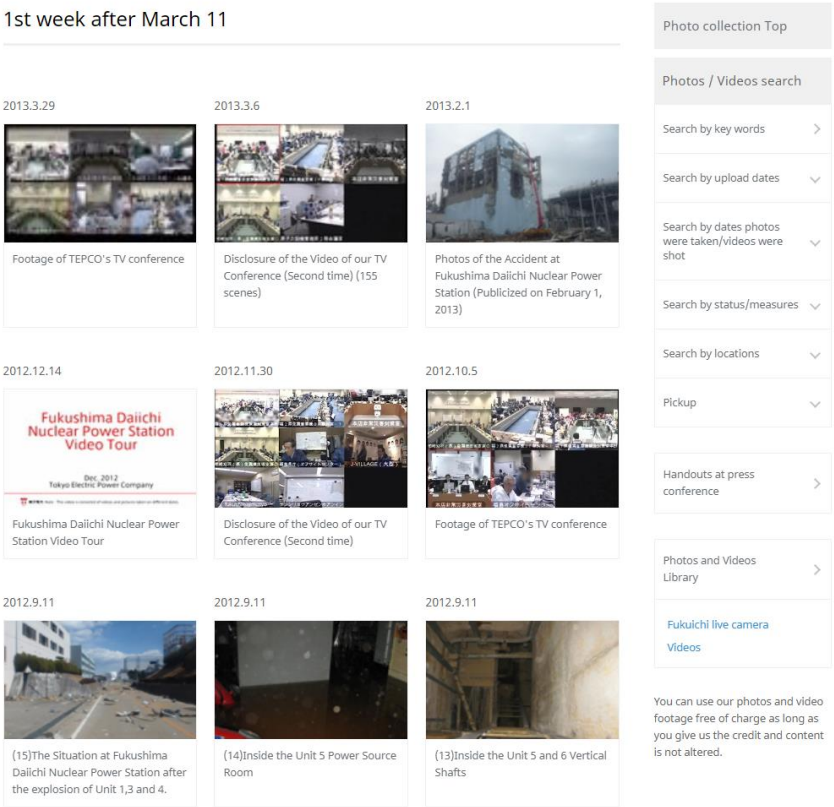

Figure. 12. Latest entries of “1st week after March 11” in Photo collection.

Although the materials uploaded in the year 2013 provide a comprehensive visual representation of what happened to the reactor buildings and surrounding areas after explosions, a video posted in the same year is labelled as the "disclosure" of a TV conference that took place from 16 March to 11 April, 2011. Put differently, users are introduced to a sudden disclosure of the past after almost two years of secrecy when they intend to explore the first week after the incident. Out of 35 entries found in this repository, only the first three were uploaded real-time during this period, and the rest of the posts have been added retrospectively over the following two years. The entries marked with "disclosure" in 2012 and 2013 are related to the footage of TV conferences divided into more than 150 clips each. This is another example of the making of an extended timeframe that defines the time of the disaster, which is unstable and fluctuating as in the description "At the Time of the Accident" on the "Fukushima Daiichi Timeline after March 11, 2011." These records of temporal ruptures are a reminder of TEPCO's alleged attempts to hide significant information about the disaster's unfolding, which has particularly fuelled public disbelief when TEPCO's president admitted nearly five years after the incident that they had intentionally avoided using the term "meltdown" due to pressure from the government[30]. Consequently, the uploading of events that took place during the first week of the disaster does not simply offer a summary of a series of incidents that the company overlooked. It also stages a sense of unexpected encounters with the past, which, however, eloquently addresses the archive's dynamics of malleability and flexibility.

[30] <http://www.japantimes.co.jp/news/2016/06/16/national/tepco-chief-likely-banned-use- meltdown-government-pressure-report/#.WLBE82-LTIV>>

I argue that the rupture in the temporal registers of the Fukushima nuclear disaster is pertinent to other archival repositories such as small collections on the Japan Disasters Digital Archive (see Chapter Four) and SimplyInfo.org's constant negotiations with the past (see Chapter Five). In other words, the difficulty in pinpointing the time of the disaster entails that the Fukushima disaster is haunted by its own undisclosed past that keeps coming back to reconfigure its "here and now." At the same time, the random return of older materials in this category only provides the dissected and fractured snapshots of the memory of the disaster. The fragmentation of the time of the incident in this category in particular, contrasts with the digital library's another feature, a 24/7 video streaming by the live camera installed at the Fukushima Daiichi NPS.

The two search modes in the Photo Collection "Search by upload dates" and "Search by dates photos were taken/videos were shot" also show a radical difference in the number of materials that come up after a search for the same period. For instance, the visual records uploaded in March 2011 merely contain 11 items, while the latter search option retrieves 70 photos and videos taken during the period. The temporal gaps between the moment of creating the records and that of archiving appear at least throughout the year 2011. I argue that the temporal tensions within the visual repository keep rewriting the stories of the ongoing disaster, by extending and suspending the moment of the event. This is another example of temporal indexing that distinguishes itself from arbitrary demarcations on the archival timeline, as these objects signal the constant negotiations and reworkings of temporality in the official archive. These traces of disclosure animated by an archival function multiply haunting forces that underscore the making of the visible, whereby they add meaning to "what is nonetheless already there" (Gordon, 2008: 108). Consequently, the contingent return of the images of the

disaster gestures towards a further fragmentation of the border between the remembered and the forgotten, which is amplified by this dynamics of disclosure.

3-2. The Views inside the Damaged Facilities

In addition to the disruption of linear time, I argue for the importance of the technologies used to articulate and mediate what would otherwise remain in the realm of the invisible in the making of visual repositories. In the previous chapters, I have signposted that the issues of invisibility have threaded through the discourses surrounding the Fukushima nuclear disaster, because of the impossibility of "sensing" the effects of radiation. Other digital archives I analyse throughout the thesis engage with the problems of invisibility to a certain extent, in terms of the impossibility of making visible both material effects and possible realities of the nuclear disaster. It creates the conflation of fact and fiction, as well as the collision of different temporalities in the practices of archiving. TEPCO's exclusive access to the material records of inside views of the damaged reactors also generates haunting effects of technological mediation, especially in relation to the other archival category in the visual repository. I argue that this is a form of "distributed perception" that constitutes "an assemblage of eyes distributed and working in concert with heterogeneous terms in an environment" both literally and figuratively (Cho, 2008: 174).

In "Pickup," another subcategory "survey by robots" available from the collection, along with live-streaming by on-site cameras is a significant indicator of the roles that nonhuman actors play in communicating information about the processes of dismantling the plant. Apocalyptic images inside the containment vessels where melted nuclear fuel rods are stored are intended for helping users "make sense of" the imperceptible abyss

of the contaminated facilities (see Figure. 13).

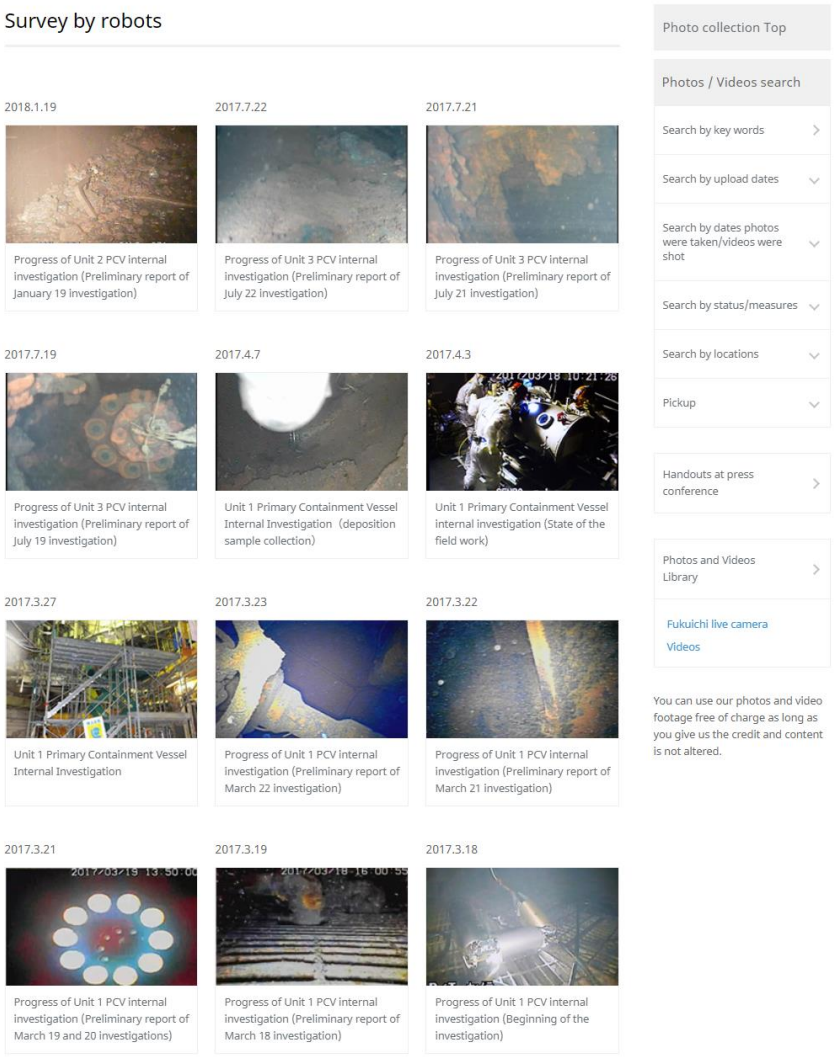

Figure. 13. “Survey by robots” in Photo collection.

TEPCO’s installation of robot technologies has also provided artistic inspiration[31] for

[31] It is also significant to relate the images sent by robots to what Joanna Zylinska (2017) calls “nonhuman vision” that points to the processes of perception “in which the very act of seeing something, and its subsequent temporary fixing into an image, are performed by a nonhuman agent, even if their addressee is determinedly human” (Zylinska, 2017: 13). The vision provided by a nonhuman agent simultaneously “returns to life,” becoming intertwined with human perception as a life-giving force.

French filmmaker Philippe Rouy to create a short film *Machine to Machine*[32] in 2013 by assembling videos taken by drones and robots. The work suggests that human vision is inevitably mediated and supplemented by technologies in the face of a nuclear disaster, which echoes with John Johnston's (1999) notion of "machinic vision[33]" that presupposes "not only an environment of interacting machines and human-machine systems but a field of decoded perceptions that […] assume their full intelligibility only in relation to them (machines)" (Johnston, 1999: 27). Rouy's film opens with a drone's bird's eye view of the skeletons of the damaged reactor buildings, which is followed by the sequences of videos taken by robots TEPCO installed deep in the fuel pool. The videos show the results of the investigation of highly radioactive containment vessels, but do not provide clear explanations of the situation without prior technical knowledge. In addition, the extreme calmness of the videos, unaccompanied by the graveness of what is taking place: the "life" of those remotely-controlled devices is surprisingly short, and a number of them have been abandoned and destroyed due to dysfunctions or the high levels of radiation. Even though they sent out valuable materials for further investigation, they usually did not "survive" the harsh environment after transmitting moving images that may only last for a few hours.

Since TEPCO's implementation of these technologies, a number of articles have focused on the "survival" of robots. While the working machines are featured

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[32] An excerpt of the film is available on <https://vimeo.com/111631442>.

[33] Here the term "machinic" refers to the Deleuzian concept of "machinic assemblage," in which mechanical machines and organic bodies together produce movements of change and becoming. The notion engulfs the condition of "signifying totality, or determination attributable to the subject" as well as "a body without organs, which is continually dismantling the organism, causing asignifying practices or pure intensities to circulate, and attributing to itself subjects that it leaves with nothing more than a name as the trace of an intensity [emphasis in original]" (Deleuze and Guattari, 2004: 4).

independently “Application of Robot Technology” on the main website of TEPCO’s decommissioning project, it is important to argue that “dying” robots exposed to high radiation is often paralleled with diminishing hope[34] for recovery work. They are regarded as the vanguard to determine future protocols for removing fuel debris by inspecting the most dangerous part of damaged facilities. For instance, an article strangely titled “Fukushima fuel-removal quest leaves trail of dead robots” discusses how valuable their sacrifice is, and that they will find a “final resting place” inside a reactor[35] (*The Japan Times*, 17 February, 2017). The implication is that the reactor becomes a graveyard for these dead machines that have done their job.

Significantly, the machinic vision that enables the uncanny experience of diving into the most radioactive site on earth creates a form of power that breaks down “the distinctions between visibility and invisibility, certainty and doubt, life and death that we normally use to sustain an ongoing and more or less dependable existence” (Gordon, 2008: 126). The archival records created by technological mediation to articulate the images of the impossibly contaminated environment also entails the impossibility of distinguishing human and nonhuman agencies. The technologically-mediated images appear on TEPCO’s another archival feature “INSIDE Fukushima Daiichi,” a “virtual tour” inside the plant. Newly introduced to the English platform in 2018, it “allows anyone anywhere to experience what it’s like to be on the front lines of decommissioning work” (INSIDE Fukushima Daiichi, ‘About’). It even shows the increase in radiation levels as the camera gets closer to the plant. The range of images offered by the company radically displaces the experience of the disaster, by creating what Johnston (1998) calls

[34] <https://www.theguardian.com/world/2017/mar/09/fukushima-nuclear-cleanup-falters-six-years-after-tsunami>
[35] <https://www.japantimes.co.jp/news/2017/02/17/national/fukushima-fuel-removal-quest-leaves-trail-dead-robots/#.WcOtgOnavIU>

"a schizophrenic multiplicity of views" instead of a totalising vision (Johnston, 1998: 230). As who holds the camera (whether an on-site worker or a robot) is erased in communicating these images, a multiplicity of views transmitted from a technological device exemplifies "the incompatibility between information and experience," creating "a vision of that which is not available to direct experience" (Cho, 2008: 194). Indeed, "direct experience" is impossible for human inside the reactor, but those still and moving images nevertheless open up new sensory experiences at the expense of "dead robots" and workers who are "out of the frame" in transmission.

3-3. Archiving the Mundane

The subsection "Working environment" in "Pickup," devoted to the illustration of human activities includes a wide range of topics, with the pictures and videos of medical facilities, protective equipment, a temporary residence for workers and flu vaccination. Allegedly, the category attempts to deliver a convincing account of welfare and wellbeing of on-site workers, with a few exceptions that describe routine operations inside the plant, with workers wearing protective suits and masks to avoid internal exposure. Most uploads in this subsection engage with the attempts to mitigate the effects of high radiation dose and the improvement of working conditions. The latest update in the "Working environment" category on 1 March, 2016 is about the opening of a convenience store LAWSON, one of the biggest franchises in Japan, with an interlink to a document-based repository called the "Fukushima Daiichi NPS Prompt Report." The event is also covered in the Fukushima Daiichi Timeline after March, 11, 2011 I discussed earlier. This awkwardly mundane topic is featured as "a welcome sign from home" that now "greets Fukushima workers," which might be considered as a symbol of progress or a

"milestone" of their achievement by giving "a familiar touch of home[36]." The portrayal of mundane activities of recovery workers strangely gestures towards the normalisation of disaster experiences, which would simultaneously alienate the daily practices at the damaged plant from the rest of the society – and the world. Where is their "home" when the arrival of a convenience store has an archival value to be included in several repositories? My unexpected finding of this single image's pertinence across TEPCO's online archives triggers an unnerving and ghostly premonition of the conflation of the mundane and the exceptional in the post-disaster landscape.

There are remarkable fissures and ruptures in the archived objects in this thematic category within the section "Pickup," in which the introduction of new APDs (Alarm Personal Dosimeters) in 2012 after several incidents of the loss of the dosimetry device is displayed alongside the description of everyday operations and living conditions. The former engages with a temporary solution to prevent fatal accidents that might have been caused by the failure to record the accurate radiation doses. As such, the trivial "Working environment" section in the visual library appears to indicate a serious disjuncture of the mundane and the exceptional (such as the robots' operation inside the highly radioactive fuel pools).

The Photo & Video Library aggregates diverse materials including the videos and footages "found" and uploaded after their original moments, the images sent by robots from within the damaged reactors, the records of daily activities of recovery workers, and a live-streaming by on-site cameras, which hardly shows intelligible progress years after the Fukushima disaster, since what the viewers can now see is a long shot of reactor buildings. As they represent a multiplicity of views in recording post-disaster moments,

[36] <http://www.tepco.co.jp/en/press/corp-com/release/2016/1268295_7763.html>

the archival stories they tell vary, depending on their coverage of specific topical issues and a means of recording. I argue that the multimedia archive demonstrates the company's decision to make visible certain aspects of the decommissioning work, in the way that engulfs the notion of "double invisibility" (see Kuchinskaya, 2012), the invisibility of operations inside the damaged reactors and that of information as seen in the videos categorised as "disclosure." The archived objects simultaneously show the limits of what people could know about the experiences at the site. In this regard, the conflation of images taken at different time and place exemplify that "apparatuses are discursive practices […] through which 'objects' and 'subjects' are produced" (Barad, 2007: 148). While other online archives I analyse consist of the collection of external data, TEPCO's repositories of primary sources appear to have become self-contained and point to a closure. Nevertheless, they simultaneously open up curious spaces between different archives in terms of thematic inconsistencies and the overlapping of information, as well as several modes of temporal punctuation afforded by media technologies.

4. Strange Sightings

TEPCO's "Fukushima Daiichi Decommissioning Project" was the first online archival portal I began to examine when I set out this research. Although I specifically focused on two repositories featured on it, they demonstrate different orientations to recording the fragmented information about the Fukushima nuclear disaster, which is brought together across different repositories. The first thing that came into view was the Fukushima Daiichi Timeline after March 11, 2011, which is now replaced in the "Menu" section along with other features such as "Earthquake and Accident," "Plan & Action" and "Application of Robot Technology." Interlinks on the timeline guided me to another

repository “Photo & Video Library,” where the company uploads the views inside the damaged facilities and the working environment. There are a number of issues I have not covered in this chapter, including a link on the top page to the Kashiwazaki-Kariwa Nuclear Power Plant, the world’s largest nuclear generating station also owned by TEPCO, which has been offline since the disaster. As their online repositories are one of the gateways that aim to provide the latest information to the general public, its representation of a timeline and the collection of visual images came to my attention, and drove me to look into the classification systems they employ, in the form of search options and keywords.

The narratives that these archival repositories enact may be translated as “official” and “hegemonic” views on the Fukushima nuclear disaster, because of the company’s close relationship with the government that had long supported and invested in the nuclear industry in Japan. Yet, differential modes of collecting and organising information among them make it difficult to identify how they interact with one another, or why certain topics become foregrounded. The limited features I examined, with a specific focus on the interactive timeline and visual representations of the on-site operations reflect a number of thematic orientations to the event through the act of archiving multimedia materials, which would simultaneously produce ruptures in both archival form and content. Consequently, the structure of individual archives indicates some gaps and fissures that constitute disparate approaches to recording the unfolding of the Fukushima disaster.

In the following sections, I discuss the minute, fractured traces of incongruence and disruption I have identified in TEPCO’s archival repositories in relation to their thematic formations and employment of different temporal frameworks. I limit my analysis to the

aforementioned archival features and their interaction, in order to examine how they bring to the fore the notions of the malleable and flexible archive in order to proliferate plotlines to frame what the Fukushima disaster is. For instance, the moving timeline offers a bigger scope to comprehend the flow of time, punctuated by key events and a sense of progress, whereas the Photo & Video Library tells different stories about the progress of decommissioning work. To begin my exploration of the digital archive on the Fukushima nuclear disaster with the only "official" creation in this study, I address the narrative fluctuations they produce, and the way in which the time of the disaster is defined from divergent perspectives by one of the most important actors that has been involved in the post-disaster disarray and controversy.

4-1. Narrative and Temporal Crossings of TEPCO's Archival Repositories

Both the moving timeline and the Photo & Video Library demonstrate various modalities of temporality, thematic organisations and the implementation of multimedia materials, even though they serve different purposes from communicating up-to-date information to providing long-term visions of recovery. The differences among TEPCO's archives highlight what Andrew Hoskins (2011) calls "a multimodal hypernarrative." With an example of the coverage of the 2005 London bombings on the BBC website, which created a "dense, multi-modal archival 'timeline'" from both amateur (witnesses') and official sources, Hoskins argues that "hypernarratives" that thread through the real-time construction of the archival timeline conflate "the (paradoxical) immediacy of the online environment (instantly accessible and navigable) and the residual power of the assemblage of the digital archive" (Hoskins, 2011: 28). The "residual power" of the archive refers to the governmentality and institutional power intrinsic to the formation

of the archive, while a digital means of recording an ongoing incident would create a shifting timeline consisting of multimedia content by bringing together "disparate simultaneities." I argue that this residual power of online archiving is highlighted in the crystallisation of events on the Fukushima Daiichi Timeline after March 11, 2011, along with other archival features with more frequent updates.

Hoskins further discusses that the website has become a site of archaeological compression that puts together previously scattered information, because "digital databases re-spatialize and re-temporize events through their interactive assembling and mapping of disparate simultaneities, which effect a multimodal hypernarrative" that "acts as a comprehensive 'monumentalization' of memory, powerfully fixing events in their multiple iterations within a single perspective of 'timeline'" (*Ibid.*, 28). Even though Hoskins' notion of a "multi-modal archival timeline" involves the participation of diverse actors who provide multi-faceted views and opinions, the modalities of TEPCO's archival intervention foreground both hyper-immediacy and connectivity afforded by digital technologies, in the way that might result in what Hoskins calls "the fragmentation of everything, including our attention span to zoom in and out of the fragments of past incidents. The overlapping of events archived in several repositories of TEPCO, such as those entries marked as both "Trouble" and "Fatal Accident" as well as a recurrent reference to an image in the Photo & Video Library not only indicates the acts of re-spatialisation and re-temporalisation, but it "moves" these objects by means of different affordances of digital archiving. Consequently, they produce the web of connections to reiterate the repercussions of the disaster, whereby these archival objects become haunting entities in circulation.

I argue that the Fukushima Daiichi Timeline after March 11, 2011 is exemplary of this

"comprehensive monumentalisation" of memory, fixing and *fixating* events on a single "timeline." It functions as the amalgamation of multimedia objects dispersed across the company's database, by re-contextualising and setting them in motion in a linear narrative structure that seamlessly connects the past, present and future. As the moving timeline marks monumental moments after the Fukushima disaster, archived objects distributed across the entire disaster-related portal are "summoned," and then re-assembled, re-contextualised and re-activated in the all-encompassing timeframe that constructs a linear narrative about the unfolding of the disaster. However, although the list of incidents on the timeline is regarded as "icons" that remind users of the significance of each occurrence, they are also sustained by what took place between those recorded moments.

Furthermore, the collection of audiovisual materials on TEPCO's disaster-related repository may be described as what Martin Pogačar (2018) calls "audiovisual exoskeleton of memory and corresponding practices of storytelling," which "demonstrate that different competing and complementing micro-histories can co-exist and challenge both grand histories and each another" (Pogačar, 2018: 40). Even though the company's continuous efforts to create several online repositories to keep the records of the disaster accessible to the public are meant to be consistent, or at least reflexive of the company's views, it could be argued that the discrepancies in their archiving practices happen to produce fragmented, "micro-histories" of the unfolding of the disaster. As those images carry the subtle traces of histories – the histories of technological mediation as well as those that capture embodied experiences in the decommissioning work, they too convey the storytelling capacity to negotiate with, and unsettle the dominant discourse about the unravelling disaster.

Given the sudden “disclosure” of events and discrepancies as to the description of the immediate aftermath of the disaster, I argue that temporal fluctuations in each repository testify to the creation of narrative modalities that articulate the “disparate simultaneities” of the disaster. Specifically, the company’s engagement with passing time is reliant on the idea of recurrence and the unexpected “bumping into” past events, afforded by the distinctive ways of archiving on each repository. Thus, the differential features of those archival repositories designate a multiplicity of timeframes to define the consequences of the Fukushima disaster, which is porous and open for future reworkings. These layers of temporality are often represented by the void on the archival timeline to be filled in the future, as well as live streaming in the Photo & Video Library that will be the longest documentary film to date, even though one cannot rewind the video to the point when s/he could observe any kind of movement at the site, such as the explosion of reactor buildings. That is, these archival features constructed from diverse multimedia materials illustrate the constant regeneration of timeframes, which destabilises and threatens a linear narrative of progress that threads through the overall composition of TEPCO’s online portal dedicated to the Fukushima disaster reflected in its latest design with the company’s “mission statement.”

4-2. What Records Records?: The Implementation of Multimedia Archiving

I argue that TEPCO’s online repositories deliver what the company wants to deliver by putting into play different interpretive frameworks to articulate similar topics, the dispersal of information across various media archives also gestures towards redesigning the Fukushima disaster and how it is to be remembered from the company’s point of view. As Joanne Garde-Hansen puts it, the convergence of old and new media as a means of

memory-making, storage and archiving has provided "a multimedia landscape of differentiation, randomness, spontaneity and variation" rather than creating a homogenous discourse, which in turn expects users to participate in "historical reprocessing" of shared knowledge and memory (Garde-Hansen, 2009: 9). TEPCO's institutional and authoritative power of archiving the disaster raises questions about how the company accommodates multiple ways of recording the disaster. In particular, I suggest that TEPCO's implementation of different media technologies has multiplied possible stories about the consequences of the Fukushima nuclear disaster, in communicating the realm of the invisible and the imperceptible. I suggest that the different means of recording events at the plant decentralises the experiences of the disaster, and is simultaneously evocative of archival imaginaries to attend to the gaps and ruptures it produces. The use of robot technologies and on-site cameras specifically calls to attention the agency of archiving, and how the information obtained by nonhuman technologies plays a significant role in the production of knowledge, which allows users to remotely access the site where things unfold.

On the assumption that what can (not) be archived and remembered is manipulated and afforded by the form of technological mediation, with the potential to create a "distributed perception" or a multiplicity of views, I would like to highlight that TEPCO's archiving projects demonstrates the conflation of human and nonhuman actors as both agencies and objects of archiving. Taking into account the multimedia means used to archive the events after the disaster, both human and nonhuman are deployed as archiving agencies to process up-to-date information about the decommissioning work. Technological apparatuses and devices, including the Fukuichi live camera and remote-controlled robots are significant conveyers of information about the fields that are

ostensibly invisible or inaccessible. At the same time, human activities are also constitutive of archival entities, deemed worthy of recording both on the extensive timeline and other digital repositories.

However, the purported incapacity of differentiating human casualties and/or activities and the dysfunction of machines as "accidents" that inflicted the aftermath of the Fukushima disaster further confounds the relationship between media devices and their referents. It is crucial to mention that "dying" robots exposed to high radiation is often paralleled with diminishing hope for the recovery work[37], since they have been implemented to determine the methods for removing fuel debris by inspecting the most dangerous part of the damaged facilities. "Seeing" the impact of the disaster is enabled by these technological apparatuses that communicate information according to the company's archival decisions. The mobilisation of these technologies calls into question the relation between the technical structure of the archive and what is archivable (see Derrida, 1995), and how they intervene to knowledge and memory production.

In referring back to Ruppert et al.'s (2013) argument that the specificities of digital devices are to be taken into careful consideration because data generated by those apparatuses might influence our understanding of social and other relations, as the entanglement of archiving machines and the archived content becomes problematic. In other words, just as the Fukushima nuclear disaster itself is a product of technological breakdown, digital technologies that help circulate the information about the incident are intertwined to establish particular narrative framings as to how the disaster is being mediated. I argue that the workings of technological device in recording and uncovering

[37] <https://www.theguardian.com/world/2017/mar/09/fukushima-nuclear-cleanup-falters-six-years-after-tsunami>

what is taking place inside the damaged reactors contrast with the company's engagement with human casualties that goes foreshadowed in the coverage of "Trouble," "Fatal Accidents" or the conflation of mundane activities and operations at the plant in the subsection "Working environment" of the Photo & Video Library.

While the instalment of visual technologies has provided unique views of the current status of the damaged facilities, it called my attention to the distinction between human and nonhuman "workers." My encounter with the vague and limited accounts of the working conditions of on-site workers in the comprehensive timeline suggests that the implementation of survey robots has further taken on metaphorical registers. That is, the "life" of remotely-controlled robots significantly comes to the fore. Their lifespan is surprisingly short, and most of them have been abandoned and destroyed, because of the exposure to high levels of radiation. In addition to the murky boundaries between "Trouble" and "Fatal accidents," the purported incapacity of differentiating human casualties and/or activities and the dysfunction of machines as "accidents" that inflicted the aftermath of the Fukushima disaster further confounds the relationship between archiving practices and the archived. At the same time, the archival value of a trivial entry in the Photo & Video Library about the opening of a convenience store remains uncertain, even though it is featured on the Fukushima Daiichi Timeline after March 11, 2011 and the company's other archival features. I thereby claim that the crossings and openings are intrinsic to the company's attempt to communicate with the public, and yet the consequences of the disaster are further fragmented, dissected and distributed differently in the processes of archiving. What I have identified as ruptures in TEPCO's repositories of disaster-related data and information, therefore, point towards thematic and temporal vacillations that underscore the official practices of archiving the

Fukushima nuclear disaster, which eventually feeds into my critical intervention to the construction of other digital archives.

5. Conclusion

The analysis of TEPCO's archival repositories is a key starting point to further engage with the differences among the various practices of archiving the Fukushima nuclear disaster, based on the emergence of diverse temporalities and narrative modalities observable through a myriad of measures of collecting, classifying and indexing archival content. The discussion above is a result of unexpected encounters with the production of thematic ambiguities and non-linear temporalities in the official repository, which required me to employ archival imaginaries to understand latent and semi-latent connections among them. In examining the less "messy" version of their website aimed at international customers and concerned individuals, the organisation of data is complex and the selection of topics lead them from one repository to another, which reanimates archived objects in different contexts. For instance, the moving timeline is hardly a summary of the unravelling events at the plant despite its annual indexation, as each incident is categorised and mediated differently in other repositories.

In other words, regardless of a number of interlinks and search options that "navigate" users to other repositories, how TEPCO attempts to interact with users remain uncertain. Although the company provides various "pathways" to the records of the unfolding disaster with these archival functions, the roles of these repositories as the interface between the company and the public call into question the parameters of interaction, "not least because a large number of users are unfamiliar with the ways in which archives function and have expectations of expert knowledge and assistance"

(Ramsay, 2018: 297). Looking into different archival repositories on TEPCO's website, therefore, also led me to speculate upon what users could expect from them and how they could possibly "move" the fragmented archival objects so that they users sense of the unravelling disaster. Consequently, the "miscellanizing of information" across the company's archival repositories by means of different media technologies demonstrates the plural singularities that "mix a kind of indiscriminate existence and an accumulative digital potential to return (and also transform) past personal, semi-public and public relations through the unforeseeable re-activation of latent and semi-latent connections of shadow archives," the archives of their own informational traces (Hoskins, 2018: 92).

On the other hand, the layout of the Japanese version of the portal "Fukushima Daiichi Decommissioning Project" appears much simpler, compared to the first image I introduced at the beginning of this chapter (see Figure. 14).

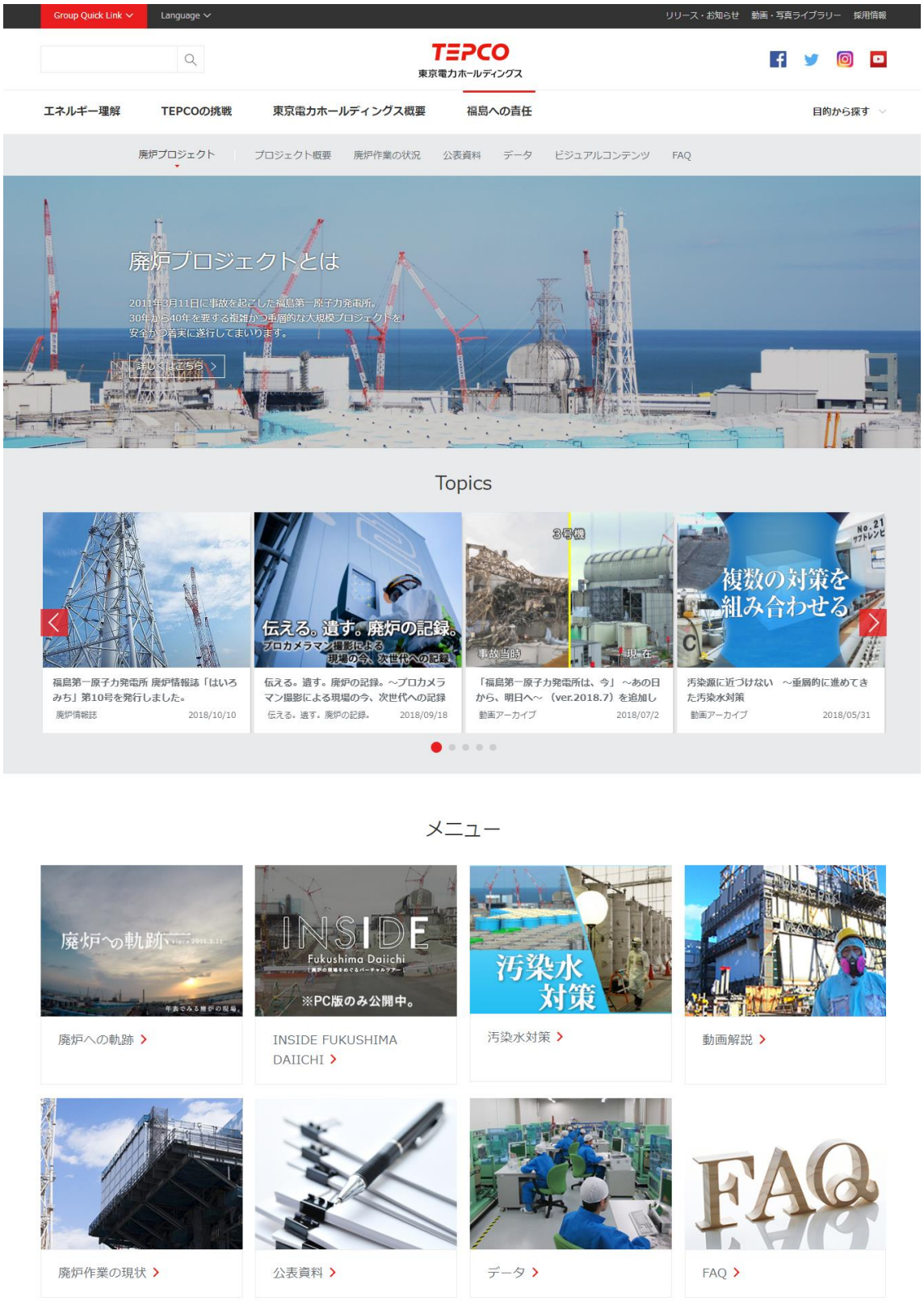

Figure. 14. The Japanese version of the “Fukushima Daiichi Decommissioning Project.”

However, it includes more options such as another photo gallery that collects the pictures taken by professional photographers since 2014. The caption to the visual archive reads "To tell. To bequeath. The records of decommissioning (伝える。遺す。廃炉の記録。)." "To bequeath" reads "noko-su" in Japanese, which is a homonym of "残す (noko-su)" that means "to leave something behind." TEPCO asserts that the aim of this Japanese-only database is to sincerely tell what is happening at the plant or the "genba (現場)," the idea of the "here and now" that a co-founder of Teach311.org also uses to describe their archiving project (see Chapter Six). To bequeath the records for future generations is noted as another purpose of the visual archive, for the company to advance long-term decommissioning work "together with everyone." It testifies to the company's various approaches to producing memory and knowledge of the disaster: the collection of images that capture on-site workers, reactor buildings and other facilities outside the plant constitutes another archival story as *a will* for the future. The letter "遺" is generally used to describe those that are forgotten, or left behind by the dead. Passing on a story about the unfolding of the disaster thus becomes an imperative for the transgenerational act of remembering, which accompanies an unsettling form of interpellation for "everyone." That is, it is the predicament of transgenerational haunting that interpellates the collective agency of remembering as "everyone" to be called upon. Here, the question of *who* tells and bequeaths the stories about the Fukushima disaster becomes ambiguous, now that the responsibility of recovery work rests on this all-encompassing "everyone" – not just TEPCO in this context, but also those who will be endowed with the memory of the disaster as a will of the dead. It adds another layer to TEPCO's archival storytelling that is not available on its English

platform.

However subtle they may be, both thematic and temporal vacillations testify to the visitors' engagement with discontinuities and ambiguities in the production of these archives, since they do not always provide sufficient grounds to identify substantive modes of archiving. Yet, the signs of informational disappearance and the implications of the murky categorisation of archival content both point towards the way in which the company that owns the damaged plant regards the disaster as a contested site of memory and knowledge production. Specifically, the organisation of archival objects across the disaster-related portal reveals fluctuations in the "official" narrative framings – especially in terms of what is made visible and invisible, both literally and figuratively. The repositories I examined illustrate the stories that could be told in the margins.

It is important to reiterate that those ruptures in TEPCO's digital archives emerged from my own intervention to, and exploration of a few archival features on the company's portal dedicated to the recording and updating of disaster-related information. But these findings above leave haunting repercussions as to the underlying force to establish a single narrative of progress, which contrasts with the gaps and discontinuities in each repository. That the Fukushima Daiichi Timeline after March 11, 2011 that draws a number of materials from the Photo & Video Library is no longer featured as a main component of the portal indicates the shift in focus from evolving situations to the stability of the damaged facilities "under control," a trope frequently used by government officials and the company itself. TEPCO's institutional power of archiving is nevertheless challenged by the multi-layered structure of its online repositories of information. I argue that TEPCO's multi-faceted approach to archive the events after the Fukushima disaster offers a significant counterpoint to interrogate other digital archives, where the

patterns of collecting, mediating and classifying the memory and knowledge about the disaster would further proliferate and diverge. Despite the wide distribution of disaster-related content, TEPCO's archival repositories as a source of official information designate the possibilities of reworking on, and renegotiating with the ongoing present as well as the recent past that could be "excavated" all of a sudden.

In the next chapter, I will analyse the Japan Disasters Digital Archive (JDA), one of the biggest digital archives on the triple disaster run by Harvard University's Reischauer Institute of Japan. As I have argued that archived objects are contextualised by means of the archive's technological affordances (such as the introduction of robot technologies to mediate data, and of a moving timeline to generate a sense of linear progress), I will further my argument about how specific functions of archiving, including participatory aspects of the digital archive contribute to creating ghost stories about the ongoing disaster.

Chapter Four

The Japan Disasters Digital Archive

0. Introduction

"Every burial ground needs to be cared for continuously if it is to endure."

"Buried (and) Alive" by Jeffrey T. Schnapp (2016)

In this chapter, I examine one of the biggest digital archives on the triple disaster, The Japan Disasters Digital Archive (the JDA). The chapter will explore the extent to which participatory archiving practices on the digital archive shape how the Fukushima nuclear disaster is understood, constituted and framed. My interest throughout the chapter is in the possibilities that the archive opens for the circulation of multiple narrative modalities and temporalities that its participatory functions engender. I specifically focus on how anonymous users create their own archives by bringing together, and reanimating archival objects. Unlike TEPCO's comprehensive repositories I discuss in the previous chapter, I argue that the archive's user-oriented features make intelligible the dis/appearance of digital traces as exemplary of how the disaster is being remembered and retold. What characterises this institutional archive is the capacity to re-organise and re-tell the stories about archived objects that attribute different meanings to the unravelling disaster. As the contingent and multifaceted modes of return permeate through the making of the JDA, I will further my argument with regard to the way in which the digital archive facilitates the act of summoning the submerged

and hidden narratives within the archive, which simultaneously leads to the conflation of fact and fiction in archiving practices.

This interest and approach specifically builds on an article by Jeffrey T. Schnapp (2016), the founder and director of metaLAB at Harvard University, a hub for innovation in arts, media and humanities, which played a central role in the development of the JDA since its inception. The article is titled "Buried (and) Alive[38]," as a part of a research project "Decolonising Practices" by *L'internationale*, an academic portal that offers critical perspectives at the intersection of arts and politics. In describing the JDA as an animated archive, he argues that contemporary archiving on the web takes place within a web of relation, and that the digitisation of data does not necessarily indicate the "activation" of archived materials as to whether they would "live on." More importantly, he insists that "[a]rchives live or die, are remembered or forgotten as a function of being sustained by living communities, and it is those communities themselves that must be brought into the picture in order to reduce the loss of the living knowledge" (Schnapp, 2016). The implication is that the living communities involve all participants in the making of the archive, or are the communities that are in effect animated by archiving praxes. How the digital archive remains "alive" is the key question I raised in Chapter Two on research methodologies, and I intervene to the hauntological implications of the lives of archived objects that keep being reconfigured in the digital transaction of data.

What foregrounds Schnapp's account of keeping information "alive" in the JDA will be the distinctive function of "Collections" I extensively examine in this chapter. It is a feature that directly asks for user participation in archiving, which contrasts with the

[38]<http://www.internationaleonline.org/research/decolonising_practices/52_buried_and_alive>

making of TEPCO's top-down, comprehensive repositories. That users are enabled to access, organise and rearticulate archival materials testifies to another significant aspect of the archive "set in motion (see Chapter One)," in addition to the digital archive's intrinsic ephemerality that archived object could disappear at any time. While my analysis of TEPCO's archival repositories primarily revolved around the company's engagement with multiple temporal registers and discrepancies in the archival coverage of the working conditions of human and nonhuman, the JDA's participatory aspects further open up narrative modalities that emerge from users' diverse framing of the Fukushima disaster.

In this chapter, I explore haunting resonances of how archived artefacts are contingently revisited and "dragged out" of the archive years after they were "buried," in relation to the technological affordances of the JDA that allow users, including myself as a particular kind of "interested user" to tell disparate stories of the disaster by means of distinctive temporal and topical measures of archiving. That the digital archive's future survival rests upon active intervention is also pertinent to the contingent production of haunted data (see Blackman, 2015; 2019) that have the potential to divulge the traces of erasure and divergent temporalities at work. I suggest that user-oriented archival praxis on the JDA shows the processes of enacting the regime of remembering and forgetting in terms of how users share and project their own archives in order to convey memories of the ongoing disaster.

1. The Structure of the JDA

1-1. Networking Archives

The JDA was launched by Harvard University's Reischauer Institute of Japanese

Studies in July of 2012, which is one of the biggest to store and communicate the information about the Great East Japan Earthquake and its consequences. With its aim to "provide a public space of information exchange, establish innovative means of organization, access, and integration of materials, and to contribute to teaching, research, and policy analysis both near term and in the future" (Reischauer Institute of Japan Studies, 'Initiatives and Projects'). The project has since broadened its horizons not only because of the archive's huge collection of multimedia materials collected all across the web, but also because a number of academic institutes started to look at the archive for educational purposes[39]. In order to aggregate the disaster-related articles, documents, SNS feeds, audio-visual materials, testimonials, etc., the JDA employs a multi-directional, interactive structure as seen in the diagram below (Figure. 15).

[39] One may access precedent research using the JDA on <http://jdarchive.org/en/about/projects-and-articles>

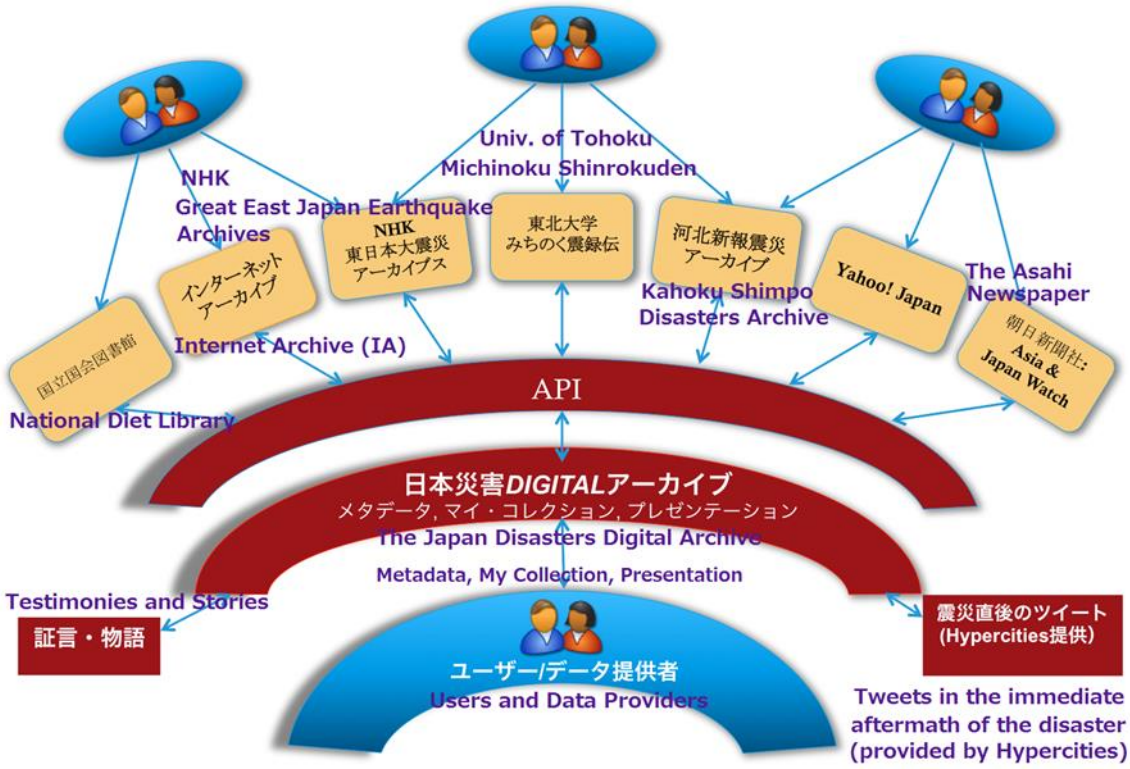

Figure. 15. "Conceptual Diagram of the Japan Disasters Digital Archive Project[40]," English translation by the author.

It is worth noting that users and other online archives are equally depicted as pivotal actors in disseminating and collecting disaster-related data, with users appearing to participate in providing data directly to the archive. For instance, two distinctive sections "Stories and Testimonials" on the left of the diagram and "Tweets immediately after the Disaster (offered by Hypercities[41])" on the right, directly associated with

[40] Although the digital archive is bilingual (English and Japanese) and the layout remains the same when the user switches a language option, it does not mean that all information and data are equally accessible in both languages.

[41] Hypercities is an online platform built on Google Map and Google Earth APIs created as part of the UCLA Digital Humanities collaborative. One of its projects, "Hypercities Sendai: Voices from Sendai through social media" has been embedded to the JDA, which collected geographically-tagged tweets between 9th March and 13th April, 2011. It enables users to search tweets by date and time, with the "Go back in time" function.

bidirectional blue arrows indicate the importance of user participation.

Kyle Perry (2013), a digital media researcher argues that "the archive invites a range of participatory responses, allowing users to annotate and expand the evolving index of records, and, most suggestively, to use those records as the basis for community storytelling" (Perry, 2013). In other words, the continuous development of this archive depends upon dual dynamics of data accumulation: upon registration, users are granted permission to upload their own materials, while the administrators of the JDA constantly retrieve data from partnership websites. The diagram above shows that users (or "data providers" as mentioned in the figure) can either offer information to the JDA directly or through other online archives illustrated in orange squares, which include the national library, academic institutions and Japanese news agencies such as NHK, Japan's only national broadcasting organisation, *the Asahi Shimbun AJW* (Asia and Japan Watch), and *Kahoku Shimpo Disaster Archive*, a database created by a local newspaper in the disaster-stricken area with the aim to record and pass down "all the 'millennial-scale' disaster for future generations" (*Kahoku Shimpo*, 2013). These external websites are listed as the JDA's partnership websites, since they systematically feed news headlines and articles to the digital archive. The affiliation with these websites results in the limitation as to the range of content that users can expect to find in the digital archive. However, the criteria for choosing international partners and projects remain unclear. Additionally, the overall structure of the JDA is "messy" in the way that it "seamlessly links to digital materials archived by partner projects, allowing you [sic] to search, view, and sort items across separate archives" (The Japan Disasters Digital Archive, 'About JDA').

The "How to Use" section of the introductory page illustrates different ways of

accommodating the JDA's functions. It suggests three different forms of exploration: search by keyword, discovering items with the map and accessing and creating collections. The embedded search engine returns the search result by title, description and tags attributed to archived objects by the JDA staff and volunteers, except for testimonials and tweets. There are a number of built-in filters by media types, language, partners (fetching results from a specific partner website) and publication date (see Figure. 16), which may also be narrowed down by several options including "Date Published" and "Date Archived."

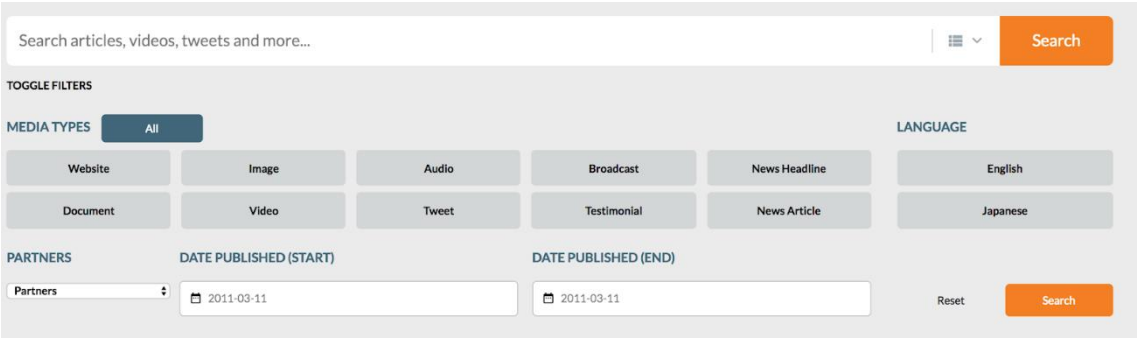

Figure. 16. Search engine of the Japan Disasters Digital Archive (JDA)

1-2. "Unexpected Encounters"

In an email exchange with the administrators of the JDA that took place in late 2017, I asked questions regarding the processes of data collection using APIs (Application Programming Interface[42]), funding, the choice of partner websites, the notable changes they have made to the archive and whether they are traceable, and whether they monitor user activities when users upload materials to the archive. I formulated these questions

[42] API refers to "a set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service" (OED).

to clarify the overall structure of the JDA. The affiliation websites I listed above are major liberal media outlets in Japan, which infers the potential exclusion of others. If this is the case, how does the choice of external websites affect the practices of archiving on the JDA? The question of traceability is also pertinent in that the archive is highly dependent on users' active participation and contribution as a constitutive part of its development. As it is clear that the resources the archive has drawn on are limited by the range of partnership websites, what kind of archival classification or interrogation does the JDA enable in order to engage with the rapid accumulation of data? These questions were partly answered during the exchange, and they gave me significant insight into the flexibility of archiving practices that evolve from the mutual interaction between users and administrators.

In terms of these important inquiries, I discovered that the making of the archive itself is a result of unexpected encounters, rather than elaborate planning, when it comes to their initial choice of partnership websites. In other words, the development of the JDA depended on the willingness of external sources to share information with the archive. What is striking is that they "chose [their] partners based on their willingness to share (including whether or not their archives are equipped with an API that enables sharing data)," and that "initially many organizations in Japan were hesitant to the idea of sharing their data, but after 7 [sic] years from the disasters, they now see more value of distributing their contents as widely as they could (also internationally [sic] collaboration is important for them to maintain their funding sources)." That is, apart from technological requirements to embed links to the archive, the selection of archival materials has already been restricted to the supply from dozens of partner websites that initially complied with the JDA's use of data. While curators manually collect and

preserve the caches of websites and PDF documents that would otherwise disappear in a chronological order, they cannot fully monitor or control what items individual users would upload.

Tagging is one of the challenges that the digital archive has been facing, as tags are also reliant on the participation of users, and they work with Tohoku University in Japan to develop an AI-based tagging technology in order to avoid "scandalizing" or further confounding metadata. In the "How to Contribute" section, the JDA explains that metadata (e.g. tag, geolocation and description) refers to "a set of data that describes and gives information about other data," so that existing contents, especially visual and audio materials without text description in the archive become easily discoverable (The Japan Disasters Digital Archive, "How to Contribute"). Tagging of archived materials also relies on user participation, as users can add and remove tags they have created. In exploring the collections related to the Fukushima disaster, I performed a simple query based on the tag "Fukushima," which may have dismissed other entries on the disaster because of this arbitrary and user-oriented system of tagging.

In terms of systematic data collection, the JDA was partly reliant on the Internet Archive, which I discussed in relation to the retrieving of an archive's previous design in Chapter Three. The Wayback Machine, a digital archive launched by the Internet Archive (IA) allows the administrators of the JDA to collect caches of webpages that "would otherwise have been lost," via Virginia Tech: Crisis, Tragedy, and Recovery Network[43], a repository built on the Internet Archive by Virginia Tech, with funding from the US National Science Foundation. They further added that their collaboration with

[43] The network is an "international consortia" to support "ongoing recovery of communities that have faced a crisis or tragedy" ('Virginia Tech: Crisis, Tragedy, and Recovery Network'). Yet the range of events collected in this archive is broad, from school shootings to man-made or natural disasters.

Virginia Tech came by a pure accident as they simply "piggy backed" their IA account, albeit no direct relationship with its operators until 2015, when the JDA team created their own account on the IA. This kind of unexpectedness lurks underneath the construction of the JDA, not only in terms of their association and cooperation with other websites, but also of user activities on the archive. In describing himself as a "user-curator," Eric G. Dinmore (2015), who has been in charge of the curation of Collections indicates that user-curators "could forge serendipitous links among records and enrich understandings of 3-11 [sic] in unexpected ways" (Dinmore, 2015: 50). The example of serendipitous links include a collection that aggregate articles, images and tweets related to "the language of flowers," I will discuss in detail in the section 2 of this chapter. The making of such connections helps tell disparate stories about the disaster, based on "the constellation of connections that charges any 'time of the now'" that haunting best captures, because such a story "mediates between institution and person, creating the possibility of making a life, or becoming something else, in the present and for the future" (Gordon, 2008: 142). As the storytelling capacity that the JDA endows is fundamentally a capacity to retell already-existing materials, I argue that the constellation of connections afforded by the JDA's archival functions as the practices of "making life" or "re-animating" archival objects in alternative, unexpected ways.

Furthermore, the participatory aspects of the JDA distinguishe the archive from other digital repositories in the way that allows users to play an active role in excavating, editing and stitching together available information, while a large number of these user-contributors remain anonymous. In addition to the semi-automatic data collection from its partnership websites, the active involvement of users on the JDA extends the practices of sharing in the making of an archive, which Eivind Røssaak (2016) describes

as “sharing across (having on-experts comment and intervene in their practices)” (Røssaak, 2016: 192). These activities are exemplary of “bringing to life” archival objects that could otherwise have been “buried” in the rapid transaction of digital data, as Schnapp (2016) indicated. That is, the idea of temporal rupture is thus always already imbricated in such an archival process that relies on the contingency of users’ intervention and the flow of information.

The mutual form of contribution calls into question multiple forms of temporality and subjectivity in the way that contests the idea of the “afterlives” of data – how they are revisited, revitalised and brought into life after the original moment of creation (see Blackman, 2015a; Fuller, 2009). Given that the JDA is designed on the predicament that all entities are subject to re-articulation, a multiplicity of the agency at work in its making prevents the archive from arresting the time of the disaster. Consequently, the digital archive loses “its exclusivity as a space remote from the immediate present” as Wolfgang Ernst (2016) indicates, which opens up for the hauntological imaginary that fails to distinguish between the past, present and future (Ernst, 2016: 14).

1-3. JDA’s Aims and Scopes: “Helping People Remember”

In the aforementioned conversation with the administrators of the Japan Disasters Digital Archive, one of the most important remarks is their comment on a specific feature of the JDA: “[t]he purpose of [C]ollection[s] is to encourage [their] users [sic] act of remembering, that is, to encourage interaction between records and memory of the event,” and they “consider user-generated collections as additional data, *traces* of people’s efforts to remember the events [emphasis added].” They concluded that “*JDA’s goal is to record how and what people try to remember a past disaster, which is different from other*

disaster archives that often focus only on what happened in the year x [emphasis added]." Here, the act of remembering engulfs decision-making procedures to select what (not) to remember in a continuous negotiation with fragmented records of the disaster, dispersed across the archive. The way in which the JDA distinguishes itself from other online archives is a significant precursor in investigating the users' unique experiences that mutually construct the archive itself, and simultaneously become archived as "additional data." The emphasis is placed upon the processes of remembering rather than the content of the digital archive, which requires constant re-workings on the memories of the disaster, and calls into question the position of those anonymous user-archivists with regard to their archival measures.

In other words, the JDA proves to be a storytelling device by which people tell and construct their versions of the disaster, an informational hub that provides the opportunities of re-versioning the events. While the JDA keeps the anonymity of collection builders, and most of the collections remain private unless the administrators individually contact them. Avery F. Gordon (2008) argues that it is important to be attentive to the act of remembering as a way of "following the ghosts," or "putting life back in where only a vague memory or a bare trace was visible to those who bothered to look" (Gordon, 2008: 22). In relation to this quote, I argue that most of users' collections are accompanied by descriptions that indicate why they would make the effort to shed light on, or "bothered to look" at specific objects they have found in the entire repository. Although users' archival measures and purposes are not always intelligible, their active participation in reorganising archived objects testifies to the processes of "following the ghosts" that the JDA engenders. In other words, users' engagement with the act of remembering is not just a constitutive element of the archive's development, but it also

brings to the fore their contributions to telling ghost stories about the disaster – the stories that reflect "the conditions under which a memory was produced in the first place, toward a countermemory, for the future" by assembling archival fragments stored in the archive (*Ibid.*, 22).

In order to "follow the ghosts" and stage ghost stories in the JDA, the "Collections" feature becomes a crucial site that foregrounds the processual aspect of memory-making, instead of the crystallisation of disaster-related information. The processes in which users "remember" the consequences of the disaster are afforded by, and intertwined with the digital archive's organisational structure. I argue that the interaction between the JDA and its users thus simultaneously calls into question the agency of the digital archive – while the JDA works as a vehicle of data, some functions it offers navigate users to tell their own stories about the disaster – so that they can be fed back to the construction of the archive. This interactive form of digital archiving has allowed me to "bump into" the production of data traces and the connections among disparate objects. Henceforth, I specifically focus on the return to, and the reappearance of archived objects through collection-building as to how the fragmented remnants of the past come back to proliferate myriad versions of the Fukushima nuclear disaster.

1-4. Following the Traces of User Intervention

Ryo Morimoto (2017)[44], the manager of the JDA argues that the biggest drawback of digital disaster archives is that "making disaster archives digital often, ironically and despite best intentions, involves removing traces of subjectivity and therefore risks the

[44] <http://seaa.americananthro.org/2017/08/disasters-digitized-participatory-archiving-and-collaborative-commemoration/>

potential *forgetting* of the individuals involved [emphasis in original]" (Morimoto, 2017). Put differently, the digital archive might also be complicit in obscuring the agencies of its creation, just like the traditional material archive is purported to deliver "official" and transparent records of an event. In discussing that the role of archiving is more than making records of the disaster – as the proliferation of digital disaster archives has come to represent the responsibility and ability of survivors to mourn and commemorate the dead, which would lead to the reconstruction from the disaster, and of the nation[45] – Morimoto warns that the archivists' attempt to historicise the past for a common cause of reconstruction may end up erasing the subjectivities of people whose lives were touched or destroyed.

The pitfall of digital archiving therefore relates to the reduction of archival objects to the grand narrative of recovery and progress, through the elimination of diverse agencies that are difficult to identify in the first place. His comments are pertinent to my research questions regarding the emergence of different temporalities and narrative modalities in digital archiving praxes. For instance, four collections I examine in the next section create their own timelines of the Fukushima disaster by assembling multimedia objects.

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[45] Here, Morimoto refers to a report "Towards Reconstruction: 'Hope beyond the Disaster'" published by the Reconstruction Design Council, a short-lived committee established by the Japanese government to provide guidelines for post-disaster reconstruction. The document names seven "principles" for the reconstruction framework, and Principle One stresses that "[f]or us, the surviving, there is no other starting point for the path to recovery than to remember and honor the many lives that have been lost," and that "we shall record the disaster for eternity" by means of the creation of memorials and monuments (The Reconstruction Design Council, 2011). Above all other principles that specifically illustrate the importance of solidarity and mutual understanding to achieve the post-disaster recovery and prosperity of the nation, "memory work" has been thought of as an important task of those who survived the disaster to remember the dead. That "there is no other starting point" than remembering lost lives is a stark reminder of the lure of creating origin stories (see Haraway, 1991; Nora, 1989), which would consolidate dominant narratives and undermine alternative practices of remembrance.

How they define the time of the disaster by collecting archived materials on the JDA radically varies, which demonstrates arbitrary measures of inclusion and exclusion to delineate the chronological unfolding of the disaster. In contrast, such collections as "The Language of Flowers" designate the new and contingent relations between the living and the dead, while topic-oriented collections like "Secrecy Law" predicate the repercussions of the Fukushima disaster in the future. They testify to the divergent stories that the digital archive's participatory function affords users to tell.

It is also worth noting that Morimoto has repeatedly raised questions about the process in which memory objects (or lack thereof) are believed to preserve the "reality" of disasters. From his own experience of working for two archival projects to restore photographic records of 3.11 disasters, he asserts that "[t]he construction of a database is one illustration of how digitalized data are never an aggregation of pure denotative information but a rather a set of connoted/mediated information," and that "detective work" of recovering memory objects would always generate a story of tracing that "emerges as the second-order testimony that validates the factuality of a trace in the present" (Morimoto, 2014: 296-297). Such "detective work" takes place within and outside the digital archive, involving an open-ended exploration of archival stories in relation to the sudden and contingent re/surfacing of the traces of the past. As I have discussed in Chapter Two, the digital archive's capacity is highlighted in such a manner that the archive does not only force us to engage with the act of interpretation, but it also gestures towards the proliferation of realities, or "the deep sense of multiple realities" (see Morita et al., 2013). More to the point, Morimoto adds that digital repositories cannot do away with "constraining semiotics" at the core of the confusion between memory and record grounded upon "particular understandings of the pre-supposed

object-subject relationship" (*Ibid.*, 207). The "constraining semiotics" refers to the power dynamics that determines what can (not) be remembered in the existing milieu of interpretation. The idea points towards the inextricability of archival imaginaries in construing archived objects in the flexible making of the digital archive, in order to attend to gaps, erasures and absences as I have argued in Chapter Two.

Undoubtedly, Morimoto's prospect for the development of the JDA is based specifically on the collection-building feature, because it allows the repository to preserve "traces of user participation and interaction, while creating records of the user-oriented reconstruction of past events, and of the collaborative construction of cultural memories in the present" (Morimoto, 2017). I suggest that this archival feature produces the traces of users' intervention to existing archived objects, which emerge as the sign of archival decision-making that has taken place, generating what Andrew Hoskins (2016; 2018) calls "a shadow archive," an archive of one's digital traces. As will be seen in the following sections, a number of entries uploaded and edited by users on the JDA are partial and fragmented assemblages of available artefacts in the entire archive, which in turn reconfigure the body of the archive itself. With a specific focus on this "second-order" archiving, I argue that user-oriented activities on the JDA help explore hidden and submerged narratives that would have been buried and "dead" in the archive, by means of the power of making unexpected connections. Such connections required me to employ hauntological imagination to intervene to the production of the regimes of remembering and forgetting in the margins of digital traces.

2. Collections on the JDA

2-1. Archiving the Archived Objects

Of many features that the Japan Disasters Digital Archive encourages users to contribute to, the "Collections" section displayed at the top of the webpage along with such tabs as "Search," "Contribute" and "About" is clearly differentiated from the other categories that explain the basic structure of the digital archive (see Figure. 17).

Figure. 17. Top page of the Japan Disasters Digital Archive.

From "Contribute," a registered user can upload materials that do not yet exist in the archive by different media types including website, document, audio, image, testimonial, tweet and video. Despite the limited number of artefacts stored in "Collections," slightly less than 400, the JDA claims that "[c]ollections and presentations can be shared publicly and *enhance the value of the various items accessible through the archive* [emphasis added]" (The Japan Disasters Digital Archive, 'About JDA'). Again, the facilitators of the JDA expect that the users' activities of reorganising already-existing materials in the archive will turn into the JDA's extended resources. Furthermore, it also helps them

evaluate particular archived artefacts over others by a number of (repetitive) references to one item. These collections or personalised mini-archives engage with a number of topics, from the impact of 3.11 disasters on sports to disaster and gender equality.

Consequently, the JDA's emphasis on Collections is based on the premise that users' engagement with archived objects discloses how they attempt to remember and re-member the disaster. Here, I use the hyphenated word "re-member[46]," since users often reflect on their own lived experiences in the making of a collection. That is, assembling the archival fragments dispersed across the digital repository should be regarded as an act of both recollection and re-collection to make sense of the unravelling disaster that has drastically transformed their living conditions. Additionally, the term also registers a form of temporal and discursive punctuation[47] in that they "cut out" specific entities on the archive to be featured in a collection, and such practices of disconnection and reconnection pervade the making of these personalised repositories. In other words, each

[46] For the use of "re-member," notable examples include postcolonial theorist Homi K. Bhabha's (1987) essay on Franz Fanon, in which he maintains that "[r]emembering is never a quiet act of introspection or retrospection," and is "a painful re-membering, a putting together of the dismembered past to make sense of the trauma of the present" (Bhabha, 1987: 123).

[47] Not unlike TEPOC's repositories, the notion of punctuation is significant in considering the making of collections on the JDA, based on users' "cherry-picking" of information. According to Deborah Bird Rose (2004), whose work focuses on environmental humanities, punctuation is the tool of Western modernity to validate linear temporality, in which moments of time are differentiated from each other in a future-oriented timeframe. She argues that the term refers to closure and the attempts to "define a break which determines that the past is finished" by dissociating present consequences from past action (Rose, 2004: 58). The idea of punctuation echoes with Rey Chow's (2012) notion of capture and captivation. With regard to the trap as a means of capture in artistic and literary endeavour, Chow argues that it is a boundary-making apparatus that is "[e]ntangled, vulnerable, and delirious" because "the trap snaps shut, yet has the potential of tilting the trap toward a radically heteronomous affective assemblage, one in which a reactive relation to the world […], which is situationally entwined with but also phenomenologically disjointed and discontinuous from an active relation […] is a primary, rather than simply derivative, sensation" (Chow, 2012: 47). From these views about the dis/continuity of boundaries, temporal demarcations could be thought of as a performative act of differentiation, or making differences with regard to the reification of narrative dis/closure.

collection brings about tentative closure to its narrative framework within the inconspicuous processes of setting archival objects in motion by means of arbitrary inclusion and exclusion. As my thesis argument revolves around the modes of storytelling that the digital archive enables and fabricates, the differentiation and/or foregrounding of specific post-disaster moments is a key constitutive element of the way in which the Fukushima disaster is being told and understood in divergent narrative modalities.

Below is the example of a collection created by the JDA's curator Eric G. Dinmore as one of the earliest collections uploaded with the tag "Fukushima (see Figure. 18)."

Figure. 18. A collection “Fukushima and the Food Supply,” one of the first collections tagged with “Fukushima” created on 12 Jan, 2012 by the JDA’s curator Eric G. Dinmore.

A collection generally includes the author's annotation or description of the personal archive on the left column. The screenshot of the first few objects in the collection shows that it draws from tweets and website caches stored on the JDA. The date the collection was made does not necessarily correspond to the date when the latest change was made to the collection, which means that the user can keep editing and adding materials to the repository, and thus the objects might not be organised in a chronological order. For instance, the collection above includes tweets, images and articles between 2011 and 2012, some of which have already been deleted from the original source. The aggregation of these archival objects thus indicates the traces of user interaction with the entire archive, which cannot always be retrievable.

This interactive nature of the JDA's collection-building feature has allowed me to see how objects in the bigger archive travel through the making of those mini-archives, setting archived materials "in motion," and remediating between personal experiences of the disaster and already-archived materials. By "personal," I suggest not only the collection-builder's own experience, but the echoes of personal recollection and memory represented in each entity. I thus argue that "Collections" of the JDA is an ever-shifting repository that discloses the processes in which the disaster is being remembered across different domains. In addition, that a collection does not differentiate media types and upload dates, as well as the agency of archival objects (i.e. those who created the original entity) opens up for alternative ways of archiving the Fukushima nuclear disaster. This also provides conditions for data to take on afterlives. The afterlives of data can stay within the systems that originate them, and "[p]asts and presents, and hence possible futures can be flattened out into a record which may trap or shape the people and things that the data tags along with" (Fuller, 2009). In the context of collection-making,

archived objects become "reanimated" and thus acquire afterlives in the distant future, when users attribute value to existing materials in this second-order archiving.

Indeed, there remains a question as to why users chose particular topics and materials, and what their motivations were. These actions or decisions have haunting implications: that the digital archive encourages users to assemble memories of the disaster inevitably creates an oscillation between the spaces of remembering and forgetting. It is also important to address the users' capacity to edit, remove and delete these collections, which makes invisible the traces of their archival intervention. These key aspects of "Collections" will be approached hauntologically, in relation to how individual archiving practices constitute different modes of storytelling about the Fukushima nuclear disaster. Here, hauntological analysis extends to the multi-layered practices of archiving that emerge from the digital archive's immense disaster-related data drawn from a number of online resources, and the "second-order" archiving that rearticulates and then gives alternative meanings to these objects. This unique function constitutes the dynamic aspects of the JDA, in that "[w]ith the aid of agents and filters, the object-oriented archive thus takes shape cumulatively, entailing a shift from read-only paradigms to a generative, participative form of archival reading" (Ernst, 2013: 81-82). Therefore, the implementation of the archives-within-the-archive testify to the possibility of open-ended archiving that the same story is told differently each time (see Cho, 2008). As the making of collections is inevitably intertwined with the idea of repetition and return, it transforms archived objects into ghostly matter that makes an unexpected appearance, and could only become part of a story once assembled with other archival fragments.

With a specific focus on the complex amalgamation of archived objects in these collections, I ask what kind of ghost stories the Japan Disasters Digital Archive allows

users to tell, read and interpret, by offering a place for multiple pasts to meet. For the analysis of individual entries below, I will first show the visual presentation of a variety of media materials that constitute these collections in relation to the original sources of information, which is followed by the exploration of their thematic organisation.

2-2. Creating Personal Footprints within the Archive

The overall number of collections made public was slightly less than 400 at the end of 2017, though the number fluctuates depending on users' activities. When filtering the search for collections tagged with, or containing the word "Fukushima" in the title, there were only 68 results in total by the end of February, 2018 (see Table 1-3 in the appendix[48]). None of these collections has more than 265 items within, and the one titled "製薬会社 (pharmaceutical companies in Japanese)" contains the largest number of archived objects, which is a collection of selected tweets and news releases by pharmaceutical companies. Most of the archives-within-the-archive carry less than 20 items, which seems hardly sufficient to summarise the event described in each title. Furthermore, several authors edit more than one collections, and since the JDA's official launch in 2012, the user Koko Howell, a digital content leader of the JDA has been most active in updating multiple collections. Although the username does not necessarily suggest the involvement of one or the same person, there are only 14 contributors in the creation of collections regarding the Fukushima nuclear disaster over the six years after the disaster.

While the collections bear little similarity in terms of the topics they cover, such entries

[48] The attached tables illustrate the features of all 68 collections tagged with "Fukushima" on the JDA, with regard to: the date a collection was made, the dates of the oldest and the latest entries in the collection, the number of archived items, and whether the collection includes a description (see Table 1); the contributor's username and the collection's major source of information (see Table 2); additional notes (see Table 3).

as “5 Years after Fukushima Disaster” and “Fukushima, Three Years Later” are dedicated to illustrate the unfolding of events since the wake of the disaster. However, most of the small collections are dedicated to archiving blog entries on a single website. I have thus categorised collections by their thematic focus, according to the title and description of each collection: timelines of the Fukushima nuclear disaster; everyday lives of Fukushima; those that does not fit into any of these two distinctions, but with a strong focus on one topic such as the passing of the State Secrecy Law in 2013. For the analysis of these collections, I have ruled out entries without a description so that the intention of collection-building is at least discernible. Then, I moved on to explore where the collected items come from, in terms of original sources of information and when the item was added to the JDA.

One of the challenges in choosing specific collections for my analysis is that, while the number of materials in one collection is small, they could cover several years. I grouped four collections that illustrate the flow of time after the Fukushima disaster with plain titles, all of which were created in 2017 under the same username Nature and Culture in Japan, whose identity remains unknown. While the description attributed to each collection also became the object of scrutiny, it does not always account for the consistency among archived objects, or the validity of information. The description of the Fukushima disaster could be inaccurate (“Everlasting Consequences from Fukushima disaster”), or dependent on a user’s imagination as to what will unfold in the future as a consequence of the implementation of a new law (“秘密保護法 / Secrecy Law”). The fragmented nature of collection-building led me to employ archival imaginaries to attend to disparate ways of putting dispersed objects together. Therefore, I argue that these personal mini-archives are intrinsically porous and partial entities, and so the gaps and

ruptures within them are a contested field of inquiry. In the following sections, I analyse the implications of the patchworked aspect of digital archiving that generates multiple iterations of the Fukushima nuclear disaster.

2-2-1. Customised Timelines of the Disaster

In contrast with topic-oriented collections, some users employ the "Collections" function to draw a comprehensive picture of the chronological unfolding of the Fukushima nuclear disaster. Their unofficial and personal timeline of the disaster challenges the dominant narrative such as TEPCO's explanation of the consequences of the incident. However, the length of time they cover varies radically: some focus on a specific year ("5 Years after Fukushima Disaster"), while others appear to feature articles over several years. Yet, the number of items in these collection remains between 8 and 17, which entails that there are inexorable gaps and ruptures among the archived materials. The sense of inconsistency pertains to my analysis of the four collections in terms of their (in)capacity of telling intelligible stories. However, the lack of a coherent narrative is also an opportunity to excavate and reanimate ghost stories that emerge from gaps and the conflation of fact and fiction in their false accounts of the Fukushima disaster. The differential framing of the disaster significantly reveals the impossibility of piecing together "a history that is always rendered incoherent by what is missing and unknowable" (Cho, 2008: 63). Therefore, I argue that the porous assemblage of articles and documents in these small archives particularly creates dissonance in the linear storytelling of the ongoing disaster, bringing together disparate entities across the JDA. I suggest what appears "missing" or "unknowable" too constitutes storytelling modalities of these archival collections, whether it is the disappearance of the original object of

reference or the confusion of fact and fiction about the Fukushima disaster.

The description of “Fukushima Dai-chi [sic] After the Disaster (see Figure. 19)” uploaded on 1 May, 2017 illustrates the Fukushima disaster as “one of the most dangerous moments of crises during the 3/11 [sic] Earthquake” by posing a question “What is the current situation surrounding the Fukushima Dai-chi?”

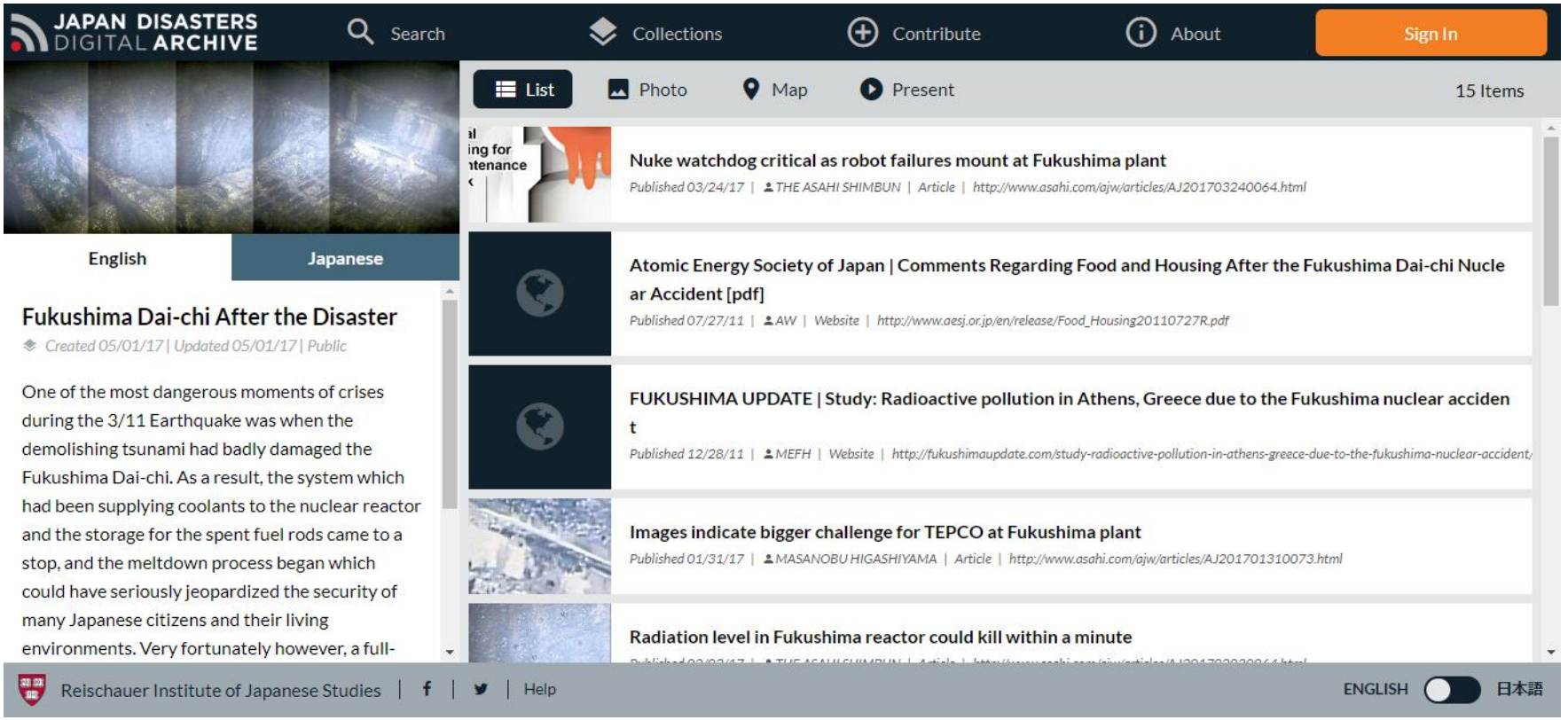

Figure. 19. “Fukushima Dai-chi After the Disaster.”

The 15 items contained in the collection cover articles from a Japanese newspaper *The Asahi Shimbun*, with the exception of two: one is titled "Study: Radioactive pollution in Athens, Greece due to the Fukushima nuclear accident" originally published on Fukushima Update on 28 December, 2011, a news website edited by an independent journalist, which "aims to be a one-stop source for reliable, fact-based reporting about the Fukushima situation" (Fukushima Update, 'About'[49]); the other is a pdf document regarding food and housing issues published on 27 July, 2011 by the Atomic Energy Society of Japan. The rest of the items were first published in either 2016 or 2017, with no article retrieved during the four-year period from 2012 to 2015. Despite the comprehensive title, the archived documents seem to have neither thematic nor temporal relevance: they differ from the process of dismantling the damaged reactors, failures of robot operations and local students' concerns to a short-lived project to implement an ice wall to prevent water leaks. A similar problem can be seen in almost every collection I will discuss throughout this chapter, which indicates that the collections' scope could be reduced to a rather limited timeframe. In part because of the small number of items in each collection and the insufficiency of an accompanying description, it is often difficult to identify the connections among collected entities.

"5 Years After Fukushima Disaster (see Figure. 20)" appears to be a more organised set of archived items, which claims to highlight "very recent features of Fukushima, the region itself and the victims of Fukushima" because "as time passes it is natural for people and the media to forget about it, particularly the victims of the disaster."

[49] <http://fukushimaupdate.com/about/>

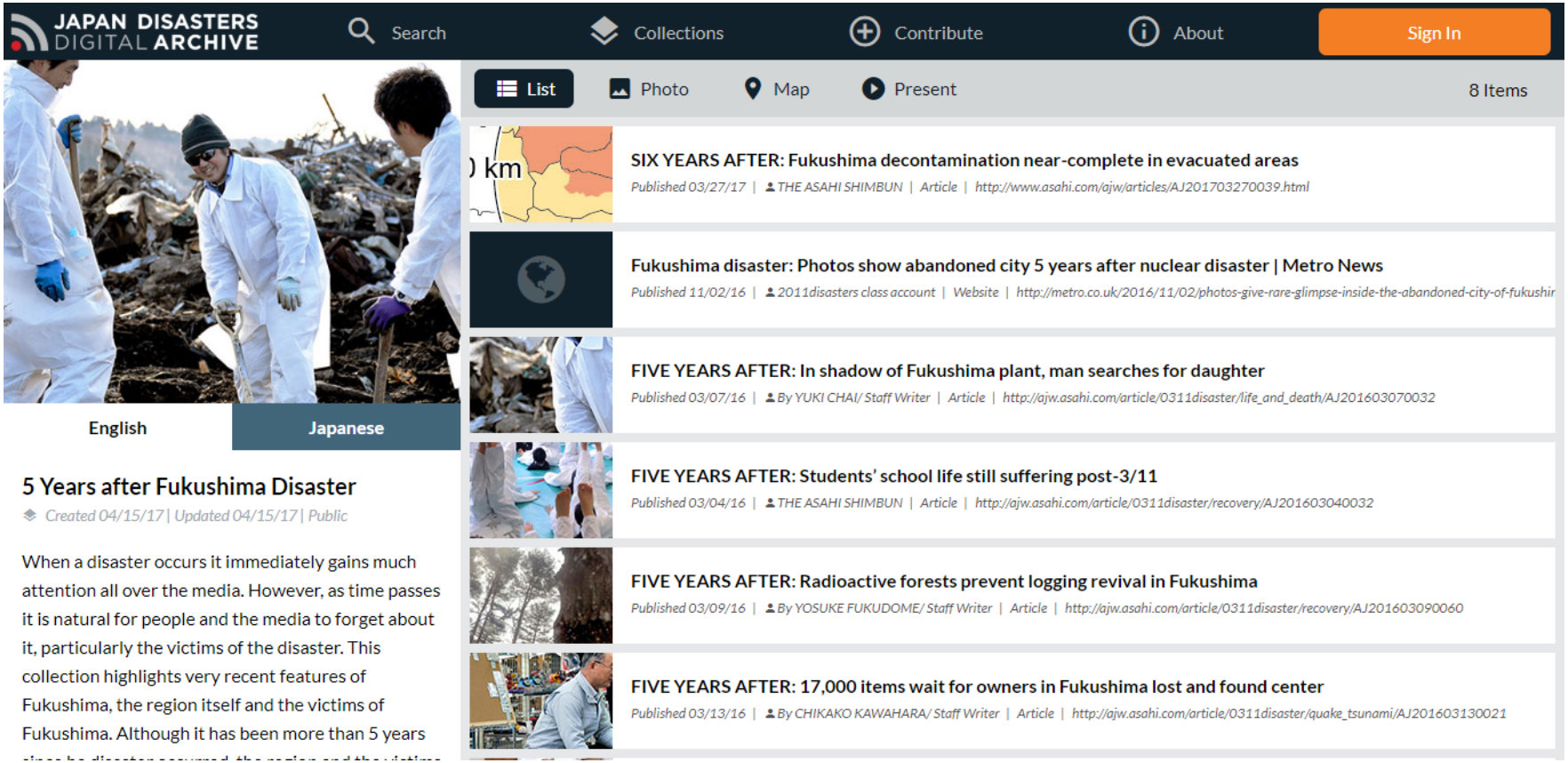

Figure. 20. “5 Years after Fukushima Disaster”

The provocative statement represents the selection of merely 8 items in the collection, all of which are retrieved from the articles of *The Asahi Shimbun* published in 2016 and 2017, except for one by a British online newspaper *Metro* that features photos that "show abandoned city 5 years after nuclear disaster." A series of articles from *The Asahi Shimbun* with a headline "FIVE YEARS AFTER" is no longer available on the outlet's website, but the text is preserved on the JDA via the Internet Archive, which makes it impossible to see whether the collection simply covers all the article series. The collection thus registers itself as a conveyor of the "afterlives" of these articles, reanimating them by putting them together in a collection. The selected articles from the series illustrate remaining concerns and struggles of disaster victims, including thyroid cancer patients diagnosed after the disaster and a father looking for his missing daughter "in the shadow of Fukushima plant." Unlike the previous collection I looked at, the selection of articles delineates the moments of suspension, rather than progress, with a specific focus on the suffering of victims. I argue that the pain is suspended and remembered in the archive through collection-building, as a critical reminder that "5 years" after the Fukushima disaster does not mean the end of a period. The collection also refuses the disappearance of the original articles as a form of archival defiance to preserve the ghostly haunt of what has been erased from the original sources of information.

Similarly, another collection "Japan after Nuclear Reactor Explosion (see Figure. 21)" aims to "give more details about Japan after the explosion of nuclear reactor, including how the government try [sic] to deal with the environmental pollution, how species look like under the impact of radiation, and how people live now." This repository has a more detailed and thematic description of selected materials compared to other collections discussed earlier.

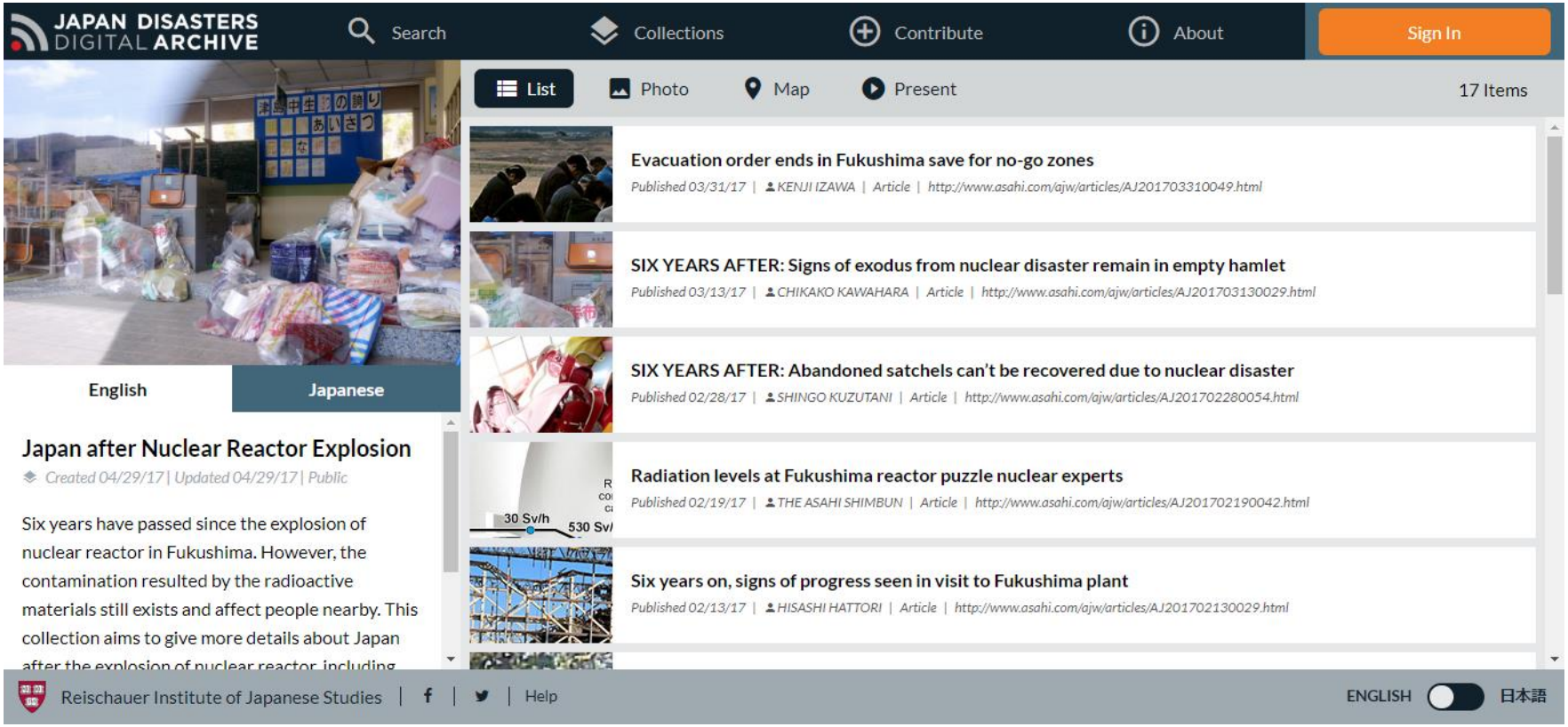

Figure. 21. “Japan after Nuclear Reactor Explosion.”

All 17 articles in the collection are also retrieved from *The Asahi Shimbun*, three of which are included in a feature series "SIX YEARS AFTER," an article series that follow up "FIVE YEARS AFTER." The collection contains materials from 2016 to 2017, which concern mostly with clean-up operations and the living conditions of evacuees. What is striking about this collection is the use of negative expressions in the headline of each item. There are such words as "higher (radiation level)," "limited (effects of a new leak-proof technology)," "untrained (on-site workers)," "puzzle," "delay," and "hidden (costs for damaged households)." It is clear that this repository is organised around the unforeseen consequences of the Fukushima disaster, which indicates how the unexpectedness is a part of the post-disaster landscape. Significantly, although the collection's description begins as "[s]ix years have passed since the explosion," it is difficult to tell a difference from the previous collection that depicts the events five years after the Fukushima disaster. I argue that a sense of suspension and betrayal imbues the collection, as the "new" findings archived in this repository still reconstitute the gravity of the incident six years after the disaster.

However, another collection made by the same user, "Everlasting Consequences from Fukushima disaster (see Figure. 22)" is more problematic compared to other collections describing the unravelling of the event, in terms of the validity of claims made in its description.

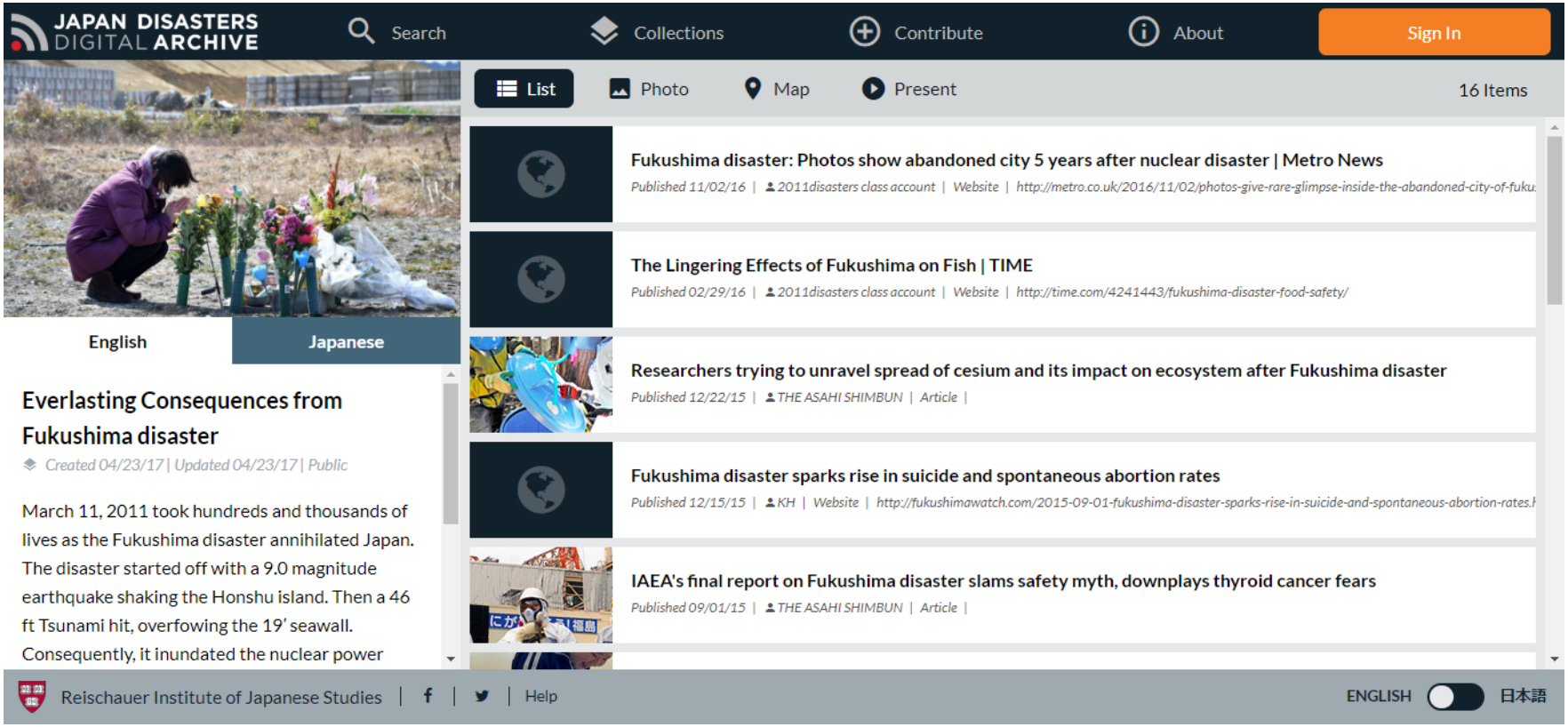

Figure. 22. “Everlasting Consequences from Fukushima Disaster.”

It reads: “March 11, 2011 took hundreds and thousands of lives as the Fukushima disaster annihilated Japan,” and “it inundated the nuclear power plant, disabling all but one generator. […] People were asked to evacuate as Techno [sic] was forced to release some radiation into the air as the pressure build up.” None of the events described here are remotely true: according to the Cabinet Office of the Japanese Government, the number of disaster-related deaths was 15,270 and that of the missing was 8,499 by the end of May, 2011[50]. They refer to the report by the National Police Agency, and concludes that more than 90% of deaths were caused by the tsunami, not by the “annihilation” resulting from the nuclear disaster. In addition, the reactors 4, 5 and 6 were not operating at the time of the disaster although the Unit 4 building was damaged by hydrogen explosion, and the first order of evacuation was issued by the government, not TEPCO, on the same evening when they declared a nuclear emergency to evacuate residents within the radius of 3km from the plant.

However, it is impossible to judge where this misunderstanding came from, but this “version” of the Fukushima disaster opens up the hauntological imaginary as to how the inaccurate accounts of multiple events affects the way in which the user made the archival collection. The user draws articles and websites from a range of sources from 2014 to 2017, including *The Asahi Shimbun*, *TIME*, *Metro* and Fukushima Watch[51], a self-claimed scientific website that maintains “a clear public record of the emergence of truth about the Fukushima disaster,” even though the administrators’ identity is unknown. Yet, there is little coherence among the materials apart from three entities on the effects of radiation on the ecosystem. The visible signs of death are only seen in an

[50]<http://www.bousai.go.jp/kaigirep/hakusho/h23/bousai2011/html/honbun/1b_1h_1s_2.htm>

[51] <https://www.facebook.com/FukushimaWatch/>

independent article "Fukushima disaster sparks rise in suicide and spontaneous abortion rates[52]" on Fukushima Watch, which insists that "radiation claims lives of the unborn," despite the lack of evidence that the increased mortality rates of infants are the result of internal exposure to radiation. There is another story of an evacuee looking for his missing son, published on 7 March, 2017 on *The Asahi Shimbun*, which no longer exists on the newspaper's website. Although this resonates with the case of a father looking for his missing daughter in "5 Years after Fukushima Disaster," they are separate incidents that disclose painful realities after the disaster. Except for these two entries, the grave tone in the description filled with erroneous comments on the Fukushima disaster, along with a similarly gloomy term "everlasting" in the title does not correspond to what has been archived in the collection.

However, encountering an untitled .jpg image (see Figure. 23) in this collection would come as a surprise that entails the eventfulness of archiving.

[52] <http://fukushimawatch.com/2015-09-01-fukushima-disaster-sparks-rise-in-suicide-and-spontaneous-abortion-rates.html>

Figure. 23. The original source of an untitled .jpg image in “Everlasting Consequences from Fukushima Disaster.”

The image has an embedded link to the Great East Japan Earthquake Archives Fukushima, a Japanese digital archive established by the Ministry of Internal Affairs and Communications, operated by the Fukushima prefecture and Fukushima city, as well as external institutions. The unsettling picture of an unidentified building has no information except that it was taken in the Soma city in Fukushima on 25 September, 2011 and posted on the archive by a local government. In other words, the image makes an untimely return from oblivion by the act of archiving, which, however, fails to offer further meaning to the collection.

As the imagined disaster that killed "hundreds and thousands of people" expands to engulf trivial fragments of the incident, the collection reveals the limitation of differentiating fact and fiction. I argue that the conflation of the factual and the fictive is the condition of haunting that disturbs the boundaries between the remembered and the forgotten. While there is no description of death in any of the items in the collection, the description still haunts my understanding of this archival repository. At the same time, there is no knowing that "hundreds of thousands of lives" *will have been taken* as a result of the Fukushima nuclear disaster. This sense of haunting demonstrates what Patricia T. Clough (1992) calls a ghosted or haunted realism, in which "the indefinite mix-up of fact and fiction, fantasy and experience" is restored (Clough, 1992: 114). The events archived in the collection are re-contextualised by the anonymous user's claim that creates ghostly effects that stretch towards the unknown future. The confusion between fact and fiction that makes an uncanny appearance in this specific collection is a significant precursor of submerged narratives that cannot be conveyed in the official discourse, which disturb what has already been known about the unfolding disaster.

These collections give little clue about archival measures and intentions as to how and

why the anonymous user created the archive-within-the-archive. In addition, the description of each collection does not always represent what it contains: it may be too general, or could also be based on inaccurate accounts of the disaster. However, under the same username, the stories they tell would multiply rather than aggregate into a larger mass. Although the identity of the user Nature and Culture in Japan may not be disclosed, the stark differences in their temporal and thematic orientations suggest that they were individually forged by different persons, or groups. Consequently, their archiving practices blur the boundaries between "rational and irrational, fact and fiction, subjectivity and objectivity, person and system, force and effect, conscious and unconscious, knowing and not knowing," as they invite further interrogation as to the subjectivity of the archive as well as "what might have been there" (Gordon, 2008: 97). I argue that these collections that illustrate the chronological unfolding of the Fukushima disaster gesture towards the im/possibilities and gaps predicated in archiving the recent past of the disaster. Moreover, the absence or the ghostly presence of the archiving subject contrasts with what the JDA allows to flourish from its random, contingent accumulation of data. Instead, these collections defy the formation of a coherent narrative by an informed individual, and it is the unexpectedness in the making of an archival constellation that proliferates alternative understandings of the Fukushima disaster. I suggest that their "general" title betrays the expectation that they would offer a comprehensive plotline about the unfolding of events, but disparate objects in these collections become "set in motion" out of bounds, enabling the contingent return of the pasts distributed across the entire archive.

2-2-2. Archiving the Mundane

In contrast with the collections that illustrate the overall unfolding of the disaster, some entities in the Collection centre on assembling topic-based materials. For instance, one collection titled "Revival of Farming in Fukushima" made on 28 April, 2017 revolves around the impact of the disaster on agriculture, especially on rice farming. Another entry "Students' Lives Post 3/11" portrays the daily lives of schoolchildren in relation to negative effects of the disaster that those students have suffered in the aftermath of the disaster, with signs of positive indications of their moving forward. Although the collections that fall into this category vary thematically, they demonstrate the enduring repercussions of the Fukushima nuclear disaster in everyday experiences, rather than giving the factual accounts of what exactly happened to the damaged power plant. These collections evoke the lingering effects of the incident that has come to shape everyday lives of those affected, however trivial they may be.

Of all the collections that describe the repercussions of the Fukushima nuclear disaster in the fabric of everyday life, I focus on "The Language of Flowers" as the most intriguing but powerful repository that aggregates multimedia materials to tell stories about the affective registers of the ongoing incident differently. The collection was created by a user Jasmine Rose on 6 November, 2014, which contains 27 items in both English and Japanese, yet the description of the collection is only available in English. Its description begins with a general remark that "flowers can play a powerful role in the emotional state of a person," and it associates flowers as the major product of Fukushima with the symbol of hope and rebirth. The collection is an assemblage of twitter feeds from anonymous users, articles of *The Asahi Shimbun* and Michinoku Shinrokuden, blog posts, and a testimonial uploaded on the JDA, most of which include written references to, and images of flowers. There are five tweets in Japanese archived

in the collection, two of which belong to anonymous users. Apart from one tweet that had already been deleted, other two tweets belong to a local florist and an information portal for sightseeing. 7 items containing the picture of flowers are retrieved from Michinoku Shinrokuden, another partnership website of the JDA. These entries are originally collected as a part of the activities of a working group on the website, but they do not have specific descriptions of an uploaded image (see Figure. 24).

Figure. 24. Example of archived images retrieved from Michinoku Shinrokuden in the collection “The Language of Flowers.”

For instance, the image merely indicates when it was submitted and then uploaded with a few tags that include “message,” “flower offering,” “Buddhist alter” and “flowers.”

The original upload dates of archived objects in the collection vary between 2010 and

2012, with the earliest material having an embedded link to a picture taken before the disaster, and they show different engagements with the representation of flowers: while one article in 2012 depicts a group of volunteers painting colourful flower graffiti in Fukushima including areas devastated by the tsunami, others celebrate blooming flowers in the post-disaster landscape. Although nearly a half of the archived materials in this collection are a random compilation of snapshots with Japanese titles from the JDA's partner websites that collect tens of thousands of photographs, they all convey the images of flowers in thumbnails. The only testimonial in this entry was uploaded on 8 August 2011 by a user Jun Shepard (see Figure. 25), a person seemingly allocated as part of his internship to a volunteer organisation Grace City Relief by the Reischauer Institute.

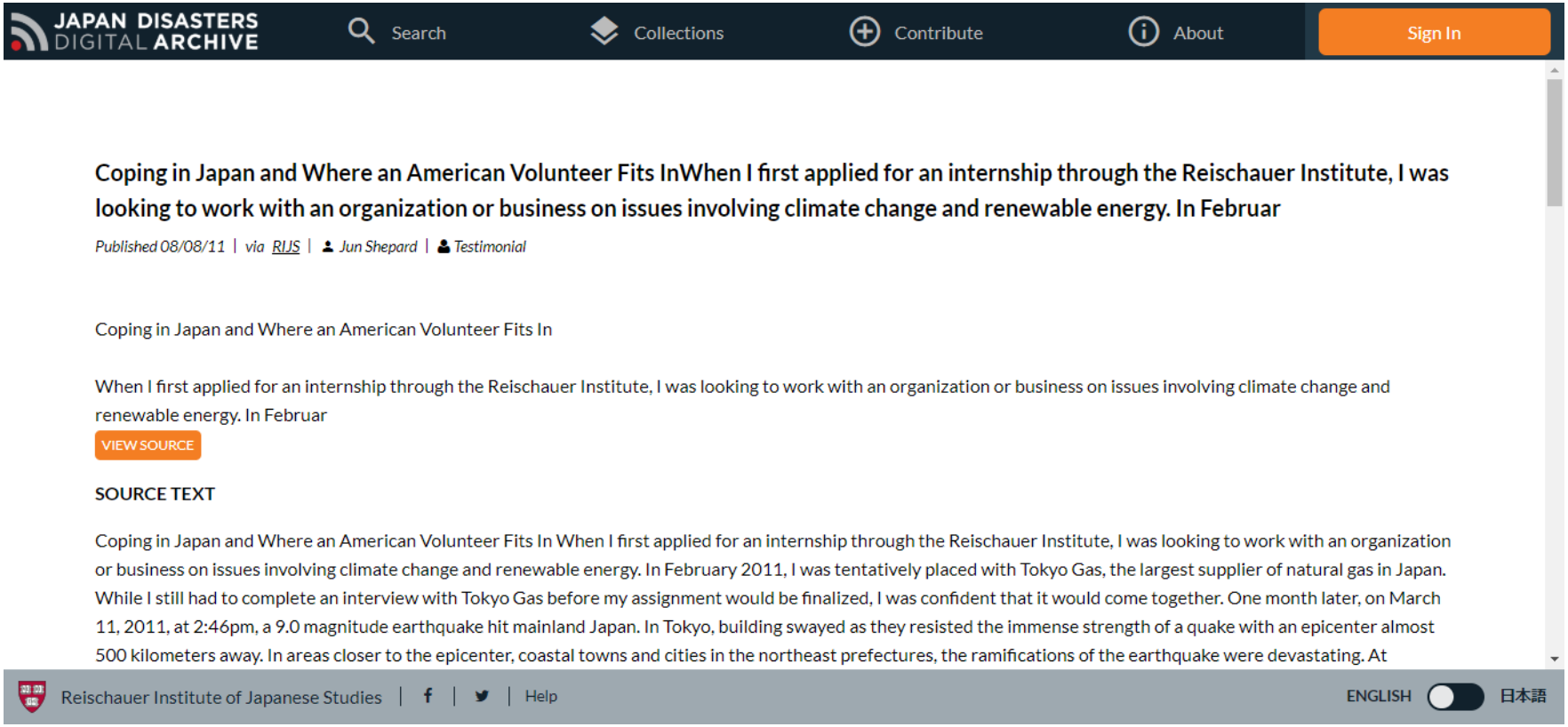

Figure. 25. A testimonial featured in “The Language of Flowers.”

He gives detailed accounts of the early days of the disaster, how he grew focused more on the emotional state of survivors rather than the material support the organisation was offering, and how he became involved in a flower-planting project called Flower Power in a temporary housing location. He notes that the project was intended to "bring life" to the temporary housing, and concludes his experience saying: "survivors do not need a counsellor or therapist. All they need are people who will quietly listen to them and the stories they tell" for the planting project allowed volunteers to closely work with survivors.

The way in which flowers are related to disaster victims' emotional recovery resonates with two distinctive entities in the collection, which do not seem to share the theme of flowers. The articles "National mourning in pictures" and "Many people, many ways to pray at 2:46pm" on *The Asahi Shimbun* portray the practice of mourning on the one-month and first-year anniversaries of the triple disaster. The only thing they have in common with the collection's theme is the image of people holding a bouquet, seen in the articles' small thumbnails. Here, the flowers' symbolic value is highlighted as people mourned the lives lost in the disaster. These entries that illustrate how people commemorated the victims of the triple disaster contrast with three other articles from the same media outlet about the blooming flowers in Fukushima, including the news of a new strain of flower named "Remake." It apparently refers to the hope for reconstruction of the region as well as the floral industry in Fukushima, since many florists had been forced to evacuate due to the implementation of "no-entry" zones.

Another two entries were written respectively on cherry blossoms and the miraculous blooming of endangered flowers in a former rice field abandoned after the Fukushima disaster. Throughout this collection, I have found different implications that the flowers

entail, as the symbol of collective mourning and that of hope and reconstruction. With these different media materials put together, I suggest that this archive delivers several representations of flowers – somehow torn between the signal of recovery and the symbol of mourning. In effect, what the flowers signify would diverge to engulf the feeling of loss and hope, the practice of mourning and reconstruction deep-rooted in the everyday activities of people in Fukushima.

I argue that the collection that features a very specific topic bring forward a number of submerged voices of those affected by the disaster. It mediates a recollection of an individual who participated in a volunteering project, and a sense of hope invested in the blooming flowers in Fukushima along with the flowers used to mourn the victims of the disaster. This is a poignant example of digital archiving that allows users to weave stories by making connections among disparate memory objects, by re-membering and re-animating those entries that capture certain post-disaster moments. In other words, the making of this collection is exemplary of what the JDA affords as a storytelling device and its integral role in enacting what digital media researcher Jenny Kidd (2009) calls "narrative remembering," in determining "what is remembered, the form in which it is stored, and later, how it will be retrieved" (Kidd, 2009: 167). Consequently, the archive's function that allows users to retrieve and reorganise multimedia materials helps generate new relations among entities distributed across time and space. Thus, this collection becomes a place where "unexpected juxtapositions (see Cho, 2008)" occur between the past and the future, the living and the dead.

Here, it is also important to reflect on the JDA's manager Morimoto's (2017) comments on the practice of mourning the dead through digital archiving. He warns that defining the digital archive as a means of mourning could undermine the ongoing-ness of the

disaster and the ongoing experiences of suffering, for the sake of reinstating the narrative of recovery and progress. It also disavows the persistence of the past in the present, which makes invisible the dynamics of exclusion at work, behind a linear configuration of time. He argues that the rapid historicisation of the disaster through archiving might produce an overarching narrative of collective mourning, in the way that ultimately blurs the boundaries between the dead and those who are still suffering, as though the event is disconnected from lived realities of the present. The violent "looking away" from ghostly figures (both dead and living) underscores his claim that the digital archive often fails to recognise them in creating a demarcation regarding who should count as the living, and should be considered capable of mourning for the dead.

Morimoto's concerns, however, are betrayed in a creative way in this collection – a collection that brings together what appear to be irrelevant, incoherent objects in terms of both media type and content. Instead of engaging with the language attributed to flowers, it shows how people speak *through* and *with* flowers at different occasions after the Fukushima disaster. I address that haunting forces multiply in the ruptured narrative of this archival collection, which does not differentiate the living and the dead, with the images of flowers as the only reference point in archiving. In the practice of archiving the mundane, "The Language of Flowers" simultaneously conveys the processes in which "the memories of a time and place are projected into the future and take up residence in the seeming here and now of the everyday," with lingering repercussions of the past (Cho, 2008: 180). I argue that this collection demonstrates how contradictions and ambivalences collide in the way that generate new trajectories between the past and the future. The cacophony of voices that the images of mundane objects carry gestures towards how the nuclear disaster has utterly transformed

everyday life. Yet, various moments depicted in these archived materials converge to tell stories about a strange intimacy between hope and devastation, loss and rebirth that threads through the post-disaster landscape.

2-2-3. Miscellaneous

A large number of collections, however, only draw from the single informational source such as an organisation's website or a personal blog, which makes it difficult to interrogate the purpose of using this function because of a lack of variety in the archived objects. For instance, of all entries in Collections, "秘密保護法 / Secrecy Law (76 items)," "documenting ian (58 items)" and ""Blog: The Union of Concerned Scientists (64 items)" are among the largest collections. I argue that these entries with a single source of information nevertheless provide insight into the thematic formation of the Fukushima disaster, specifically in relation to signposting of possible post-disaster futures and the importance of archiving on a specific topic.

A close look at the collection of "秘密保護法 / Secrecy Law" created on 6 December, 2012 shows that the archival materials are retrieved from 311 Memories, one of the partnership websites of the JDA (see Figure. 26), which makes this collection *the archive of the another archive*. 311 Memories is built on a passive visualisation interface that "allows you [users] to rely on the system's automatic navigation through characters flowing like a scroll of sutra" so that they "will happen to encounter unexpected keywords that trigger your memories after the event" through a chronology of serene motion (311 Memories, 2013). Although the articles appearing on the moving archive originally come from Analysis on Great East Japan Earthquake, an online repository for news articles on the triple disaster, 311 Memories aims to "reversion" those news stories with

ephemeral images consisting of keywords automatically retrieved from them (see Figure. 27).

Figure. 26. “秘密保護法 / Secrecy Law.”

Figure. 27. Screenshot of 311 Memories. The cluster of keywords and news articles are the result of the search for on the first anniversary of the triple disaster.

These onscreen keywords in the background keep floating from right to left, making it difficult for users to stop and point at relevant articles. In other words, the collection would not have been possible without mediation by the JDA's function to capture and store articles uploaded to 311Memories. This entails the traces of informational exchange in second-order archiving, in that the unique technological affordances of two different online archives collide in the collection. Yet, the short description of the collection merely indicates the law's potential repercussions that may have "implications for accessing information on the Fukushima nuclear crisis."

While I identified that the description in the collections that retrieve information from one website tends to be a summary of a particular online platform, some of them are written in the form of recommendation, with an emphasis on the archival value of a website. These examples include collections such as: "International Medical Corps" on the activities of medical care teams that provided psychosocial support for the survivors in Fukushima Prefecture; "Switchboard – NRDC Blog," a collection of blog entries of the Natural Resources Defence Council, an American environmental group, which focuses on the environmental implications of the Fukushima disaster as well as the improvement of safety regulations of nuclear plants in the United States; "Save Fukushima 50," a collection of articles on a website of Save Fukushima 50, a project for sharing information about the storage of blood stem cells for on-site worker in case of accidental radiation exposure (see Table 1-3).

These disparate collections can be seen as either self-reflexive or promoting a particular website, as opposed to the JDA's intention of helping users create mixed-media collections. However, they illustrate the way in which different actors engage with a number of issues surrounding the Fukushima disaster, at individual and transnational

levels. The single-source collections also include the list of personal blog entries such as "Anne Kaneko's Fukushima blog" uploaded on December 4, 2013, which illustrates how "'ordinary people' coped with the aftermath of the triple disaster" and "Blog: Return to Fukushima" created on 17 October, 2013 on an assistant language teacher's experiences of going back to Fukushima 6 months after the disaster might bear testimonial values. Although they do not create dynamic relations among archived objects, the practices of rearticulating the data in a mini-archive blur the distinction between a personal reminder and an archival entity that is open for interrogation by anonymous users, with such practices performatively creating archival values to these collections that also have the potential of future reworkings.

3. Patch-working the Traces of the Disaster in Collections

In this chapter, I have analysed the unique modes of user participation on the Japan Disasters Digital Archive, with a specific focus on "Collections," an archival function that allows users to create their own repositories on the archive. I have examined these personalised collections related to the Fukushima nuclear disaster as exemplary of the archival processes of re-mixing and re-versioning fragmented information dispersed across the JDA. Although it is difficult to pinpoint users' contribution to the archive due to the constant and semi-automatic uploads from a number of partnership websites, the "Collections" feature offers a significant space that articulates the traces of user intervention to the production of memory and knowledge about the Fukushima nuclear disaster. They are also a constitutive part of the whole archive, whose aim is to create a perpetual repository of disaster-related information. Accordingly, I have argued that user-oriented aspects of Collections raise several questions about the JDA's archival

purposes to remember specific moments of the disaster: What kind of role do the archives-within-the-archive play by re-processing and re-possessing already-archived materials in the digital archive?; What are their places in this institutional archive and why are they distinguished from other categories? ; How does this feature help achieve the project's aim of creating a public space to exchange information about the triple disaster in the future?; And ultimately, how does it show the *traces* of people's efforts to remember the ongoing incident?

Although my analysis of Collections does not cover all archival practices enabled by the JDA's feature function, a close examination of several uploads shows the patterns of how users assembled existing archival objects on the entire archive. While *The Asahi Shimbun* is the most popular news outlet among the JDA's partnership websites, the thematic and temporal structure of these collections strikingly varies. However, even though *The Asahi Shimbun* is the only national newspaper that agreed to share articles with the JDA as a reliable source of information, it is important to take into account that it is the act of archiving that gives meaning to the constellation of multimedia objects, not just the content of the original articles that could already have disappeared from their website. Those collections that illustrate the customised timelines of the Fukushima nuclear disaster are a good example of the way in which individual users have made an archival decision to accommodate *The Asahi Shimbun*'s article series to build specific temporal frameworks to delineate the unfolding of the disaster.

Another key finding shows that the description attributed to each collection does not necessarily demonstrate the legitimacy of its claim or the thematic consistency among archival entities. In other words, the description should not only be read as the summary of a collection, but as the manifestation of the user's point of view, or the rationale that

underlies the formation of a digital repository. Consequently, a short description to each collection shows ambiguities and contradictions in relation to the archived object it contains. At the same time, the assemblage of disparate materials distributed across the entire archive often tells a more compelling story than its description as in "The Language of Flowers." I argue that these small archival repositories are not only the result of making connections among objects distributed across a bigger archive, they *too* make unexpected connections in the way that creates "a palimpsest, a document that has been inscribed several times, where the remnants of earlier, imperfectly erased scripting is still detectable" (Gordon, 2008: 146). The act of re-processing, re-possessing and re-animating archived objects drags them out of the realm where things are left "buried alive" in Schnapp's (2016) terms. However, these traces of intervention remain hidden and "floating" in the archive unless they are accessed by other users.

Thus, how archived data on the JDA are mediated by collection-building contests what Morita (2014) calls "an aggregation of pure denotative information," in that the encounter with the user-oriented and second-order archives opens up the possibilities of alternative temporalities and narrative framings to define what the Fukushima disaster is. Despite critical flaws in its description, "Japan after Nuclear Reactor Explosion" delineates how a preconception of the user might affect the practice of archiving mixed-media materials, creating even a worse picture of the imagined incident. Additionally, when looking back at the JDA's mission statement that puts a specific emphasis on the interaction between memory and records of the triple disaster, I suggest that "Language of Flowers" is exceptional in the way in which it lucidly represents the JDA's substantive focus on "Collections" in contrast with other collections. That is, even though the topic-based bilingual repository does not offer structured ways of archiving, it entails how the

user is afforded to weave through various media materials based upon what *s/he recognises* is related to flowers and the Fukushima disaster, hence leaving traces of his/her pattern recognition.

Significantly, the user does not assume the potential readership that might be restricted to those who read both English and Japanese, which inadvertently makes the collection a fluid entity open for interpretation and imagination, a site where other users are invited to create their own versions of story. These fictive and open-ended aspects of making a personalised collection on the JDA in particular, as I will further discuss in the following sections, are an important precursor to the identification of the fragmented informational traces of the disaster, and the generation of multiple connections between entities that could have otherwise been buried. Consequently, that user-oriented collections with the potential of being reworked on demonstrates the way in which "[m]emory content has gone viral and is being mashed up in unexpected ways, particularly on family or local history platforms, resulting […] in the relinquishing of the privacy of the archive from public discourse" (Moss, 2018: 263)

This "patchworking" nature of Collections exemplifies that the participatory archive is dependent on users' disparate decision-making practices as to the selection of theme and archival materials, which, however, constrained by the JDA's choice of partnership websites. It also demonstrates the way in which users are given agency to tell their own versions of the disaster, which would then feed into the development of the entire archive. I argue that the contingent and arbitrary measures of assembling already-archived objects through collection-building designates the possibility of reworking on the "buried" fragments by setting them in motion, and ultimately, by keeping the archive alive by the stories these personal repositories tell. The reanimation of archival artefacts involves

the disruption of a linear narrative and temporal framework. At the same time, they challenge the integrity of the digital archive itself as an elusive, transformative entity that articulate haunting forces in its making.

3-1. Displacements of the Archival Body

In previous chapters, I have discussed that the digital archive in general is built on the premise that its flexible and dynamic aspects are open to future reconfiguration, and that it creates digital ephemera and traces that may dis/appear "out of time" (see Mussell, 2012). The JDA is not exceptional in the production of archival fragments that could easily break down, and simultaneously create new repositories of memory and knowledge. Here, I introduce the idea of the "archival body" to my hauntological analysis, in order to highlight the transformation of this institutional archive triggered by user participation that reorganises and haunts the entire archive from within. With regard to the body of the archive, digital culture scholar Jamie A. Lee (2016) argues that "the archival body as a collection of *stories so far* might create spaces for possible futures to emerge, something that is key to queer world-making efforts [emphasis in original]" (Lee, 2016: 41). According to Lee, the archive *has* and *is* a body, or multiple bodies of knowledge and lived experiences, which engenders multiple histories and timescapes. This perspectives resonates with Schnapp's remark on the JDA that the digital archive is animated and alive, yet its artefacts are always on the verge of being buried (alive) without communities and users' active intervention.

Even though the archive tends to sustain the tensions between the chronicling of the dominant discourse and the circulation of everyday experiences, Lee recognises lingering "hauntings" of this dynamics. Lee maintains that such hauntings "hold the strain

between chrononormativity – those temporal qualifications that regulate everyday lives through which one waits for the expected – and the reimagined temporalities through which we understand the messiness that can occur when past and future come together" (*Ibid.*, 39). I argue that Collections resides in the interstices of institutional and personal archiving that is inherently haunting in the processes of bringing the everyday and lived experiences of the disaster into the re-organisation of archived objects. Consequently, the archival *stories so far* in Lee's terms are transformed to something akin to numerous spin-offs or secondary plotlines of the same story being told and retold (see Cho, 2008), and our recognition of "so far" is also contested because those small users-oriented repositories are also a work of temporal punctuation open for revision and erasure.

What makes the participatory aspects of the JDA even more perplexing is, therefore, that these user-oriented archives should count as the bodies that constitute the body of a bigger archive. While this nested structure is regulated and constrained by the JDA's choice of partnership websites and algorithm to manage the inflow of data as well as linguistic barriers, those archives-within-the-archive should be seen as mutations that keep reconfiguring the meaning of original archived object (strictly speaking, however, they may not be "original" in that the digital archive retrieves information from partnership websites), or anomalies that threaten the bodily integrity of the JDA. Henceforth, the stories that collections articulate, albeit partial and fragmented, have the potential of rewriting the archive's premise through the power of unexpected connections.

From the perspective of storytelling, they testify that "narrativity and citationality cannot exist prior to categories of signification and representation," and that "by juxtaposing and piecing together unexpected stories and forms, memory work can create

gaps and slippages within the structural processes that ground an individual's historical positionality" (Yoneyama, 1999: 33). Apparently, citationality is a key form of mediation in the making of a collection in that users' activities are based on their individual engagement with archived objects. These practices of second-order archiving have come to entail what interdisciplinary artist and curator Lilly Koltun (1999) calls "re-positioning" of the archival record. According to Koltun, a "re-positioning" affects the integrity and history of the record in two different ways: it "fictionalizes" the original record as well as its intended meaning; at the same time, it "'realizes' the fiction, making the fictional appear real, authenticating the present meaning through a proposed resemblance to the past and rendering the commodification invisible" (Koltun, 1999: 128).

As I have discussed in relation to my bumping into the conflation of fact and fiction in "Everlasting Consequences from Fukushima Disaster," the process of re-positioning can be most clearly observed in the way in which anonymous users attribute a description to their collection, in order to account for the arbitrary choice of archived objects. Even the inaccurate or "fictional" aspects of description contribute to the re-contextualisation of original articles, documents and images as though the cluster of disparate objects should constitute a coherent story to be archived independently. Re-positioning or displacement of archival objects, however, does not signify that the archival body or its artefacts initially occupied a specific place. Instead, I argue that the modalities of storytelling afforded by the JDA generate multiple agencies that reconfigure the disaster in ways that are real and imagined. These archival pieces could thus be considered to threaten the temporal and spatial logic of the whole archive that they inhibit, *from inside*.

3-2. Successful Failures

In addition to the storytelling capacities of Collections in disrupting the undifferentiated accumulation of data in the digital archive, it needs to be addressed that the archival entries in Collections often fail to communicate the thematic significance and relevance of their contributions. I argue that what characterises Collections is the "*re*–" aspects in user-oriented archiving that encompasses unexpected encounters with the past, yet open to future revisions and erasures: that is, reflection, return and rewriting the story about the disaster would ostensibly underscore its formation. Thus, this archival feature takes into account backward- and forward movements in time, for it designates the places for contemplating users' own experiences of the disaster. Although the making of collections defies the grand narrative of the disaster, whether intentionally or not, the act of revisiting the past suspends the flow of time in the construction of the JDA, somehow submerged in the relentless uploads of new materials.

Furthermore, the porous aspects of the entries in Collections gesture towards latent modes of forgetting that Judith Halberstam (2011) defines as "a way of resisting the heroic and grand logics of recall and unleashes new forms of memory that relate more to *spectrality* than hard evidence, to lost genealogies than to inheritance, to erasure than to inscription [emphasis added]" (Halberstam, 2011: 15). In Halterstam's argumentation, forgetting generates the possibilities of alternative futures, along the avenues of failure against the logic of linear progress and success. I suggest that the conflation of fact and fiction, as well as blurry memories of the disaster could result from wilful forgetting, that which is imbricated in the act of finding and building connections between disparate topics and archival materials. In other words, what a collection fails to deliver – in terms of the accuracy of information and the lack of coherence among assembled objects – is a

constitutive element that keeps the JDA "moving" and "alive," by generating alternative imaginaries to envisage the haunting repercussions of the unravelling disaster.

The "failures" in these archiving praxes also include uncertainties, ambiguities and contradictions that bring about unlikely couplings among archived objects. The question about what becomes foregrounded or foreshadowed in those practices is intertwined with the contingent act of remembering. Even thematic entries in Collections such as "Students' Lives Post 3/11" and "Language of Flowers" is full of ruptures and contradictions, in delineating the mundane in the exceptional. Although the users' archival measures are unclear, these collections oscillate between hope and despair, mourning for the dead and a will for the future. Given that the JDA is an ever-expanding archive incorporating data across the web, such tiny traces of intervention disrupts the flow of time and the divisibility of the archive – the divisibility or disjointedness (see Derrida, 1995) that makes the archive appear like "an atomic fissure without end" (Mizuta-Lippit, 2005: 8). Therefore, no matter how trivial or ambiguous they seem, or without hard evidence, the myriad webs of connections in the making of collections challenges the structure of the digital archive itself that feeds upon the endless supply of information that could be taken down indefinitely.

4. Conclusion

In my discussion of the Japan Disasters Digital Archive, I have argued that the archive's open-handed approach to the collection of disaster-related data engenders a distinctive form of archiving, contingent upon users' individual engagement with the past. Their intervention produces divergent stories about the Fukushima nuclear disaster, in which lived realities and fiction collide. The unique affordances of the JDA

that allow user participation in uploading materials, tagging and collection-making demonstrate that "new technologies do not represent a dead repository or a neutral tool for memory," because they "are rather a living system where memory itself becomes a mode of action" (Røssaak, 2016: 203). Given the JDA's emphasis on user's practices of remembering and the re-animation of archival data "buried alive," the networked archive comes to signify a living field that is open to negotiations and connections. It is thus significant to argue that the traces of user intervention are not simply the marginal product of a variety of "options" the digital archive offers. On the contrary, the way in which the JDA allows users to tell their own versions of the disaster confuses official accounts of the incident with personal ones, which opens up lively spaces where users re-enact the moments of the unfolding event.

My arguments, therefore, centre on the re-articulation of archived objects, which contextualises the Fukushima disaster differently as a form of retelling the disaster. In claiming that the archive is both an instrument of power *and* subversion, simultaneously oppressive and liberating, Verne Harris (2014), Director of Research and Archive at the Nelson Mandela Foundation reflects on the archive's capacity of retelling stories, by drawing on Ann Cvetkovich's (2003) argument on primary attributes of the archive. He places an emphasis on "[r]etelling of story, as opposed to the one telling that brings closure," "[d]ocumenting of story by a character, or characters, in the story" and "[a]ctive engagement in the politics of now" (Harris, 2014: 223-224). I argue that the retelling of the disaster afforded by the JDA reanimates the submerged objects, rendering haunting forces of return to the entire archive in the way that refuses closure. The potential of re-animating archival objects thus reveals that they haunt the archive with an anticipation from the future, through the production of different imaginaries.

The archival features I have discussed in this chapter in relation to the JDA's aims as a perpetual storage of disaster-related information and collection-building make intelligible the ongoing-ness of archiving praxis, which also discloses how the power of the archive is negotiated and exercised. Regardless of the uncertainties as to the identity and archival measures of anonymous users, the in-built archival options help prolong the afterlives of data without a sign of closure. In other words, users register as both characters *of*, and *in* the stories that the digital archive carries. In going back to the JDA's original premise to "help people remember," the way users remember and re-member the Fukushima disaster engulfs the possibility of transforming the body of the archive, and therefore its survival.

It is the power of the story in "bits and pieces" that they convey, as Clough (1992) describes haunted realism by drawing on Toni Morrison's (1987) *Beloved* as does Gordon (2008). In this context, the story produced in the margins is "not a unifying memory, but the starts and stops of rememory, a reconstruction of a story that cannot be completely narrated, a story that instead makes visible the erasure, the forgetting, the disremembering" (Clough, 1992: 124). There is lingering resonance of this haunting narrativity in the practices of second-order archiving on the JDA, in that users simultaneously engage with the remembering, dismembering and re-membering of the fragments of the Fukushima disaster. Again, "Collections" in particular articulates the strange conflation of fiction and reality, misrecognition and affective attachments, awaiting further mediation. These acts of archiving performed in a bigger archive best serve the JDA's intention of keeping the archival records "alive," not through relentless data upload, but through reflexive excavation and resurrection of the past that does not claim a place to rest.

In the next chapter, I am going to analyse two digital repositories based in the United States: SimplyInfo.org, previously known as Fukuleaks, an online repository solely dedicated to the assessment and preservation of data about the Fukushima nuclear disaster, and Nukewatch.org that features a small archive consisting of online materials and annotations concerning the disaster, which is run by an organisation to promote denuclearisation.

Chapter Five

SimplyInfo.org and Nukewatch.org

"Promise, princess, you'll not forget what you feel in your heart for me at this moment. For what good's a memory's returning from the mist if it's only to push away another?"

The Buried Giant by Kazuo Ishiguro (2015)

0. Introduction

In this chapter, I will explore SimplyInfo.org and Nukewatch.org, U.S.-based archival repositories, both of which collect and disseminate information about the Fukushima nuclear disaster. The former is one of the independent digital archives dedicated solely to the Fukushima disaster, which is characterised by its commitment to the accuracy of data and up-to-date information. The rationale for analysing SimplyInfo.org was intertwined with my personal experiences of looking for English websites that kept recording the unfolding of the disaster in its immediate aftermath. It was when I was most confused by relentless and often contradictory accounts of media reports on TV and in Japanese newspapers. SimplyInfo.org, originally called Fukuleaks was one of my key sources of disaster-related information in the early days of the disaster, because of the frequency of updates and its claim on accurate data scrutinised by nuclear experts. The name change particularly caught my attention, because of the previous name that alludes to an infamous organisation that leaks classified information, as I will discuss later in the chapter. Yet, as I was uncertain about the inception and development of the project as well as its contributors, I attempted to interview its communication manager

Nancy Foust for further information.

One of the most significant features of SimplyInfo.org is that it refuses to "rewrite" archived posts, whereby the repository makes accessible the processes in which the disaster has been unfolding. Another key characteristic of this archival repository is that it aims to challenge the official data and discourse about the disaster, drawing on a wide range of international sources. Robert Jacobs, historian at the Hiroshima Peace Institute and Hiroshima City University is named by Foust as one of the prominent contributors to SimplyInfo.org. Together with Mick Broderick, media scholar known for his work on films that depict atomic bombings and nuclear culture, Jacobs (2015) discusses the importance of this project. They argue that SimplyInfo.org is one of the citizen networks that contest "the official narratives about the conditions at the Fukushima plant," and it has "documented many highly technical reports about conditions and possible steps to remediate the worst of the conditions confronting the ongoing effort to stabilise the site" (Broderick and Jacobs, 2015: 227). They maintain that SimplyInfo.org could be a model to counter hegemonic narratives in documenting the Fukushima disaster, since the official stories of "the safety myth" collapsed after a number of cover-ups by TEPCO and the government.

In contrast with frequent updates and numerous categories on SimplyInfo.org, Nukewatch.org's archive on the disaster contains a limited number of articles, videos and documents retrieved from external websites. Nukewatch.org is a non-profit organisation that promotes safety at nuclear facilities and non-proliferation of nuclear weapons. My encounter with Nukewatch.org was also accidental – when one looks up "Fukushima" and "Archive" in the Google Search Engine, "Nukewatch: Fukushima: Disaster Ongoing – news archive" comes up as the second result after the Japan

Disasters Digital Archive (JDA) I discussed in the previous chapter.

These repositories are the outcome of the projects based in the United States, but their approaches to archiving the Fukushima nuclear disaster are completely different. SimplyInfo.org collects data and information from a number of external websites to be scrutinised by experts in nuclear technologies, and it has also published original research papers to assess the impact of the disaster. In contrast, Nukewatch.org's Fukushima archive is marked by a small number of archival artefacts retrieved mainly from news outlets, roughly half of which has been removed from its new repository, even though the previous version is still accessible on the web. These archival repositories distinguish themselves from other digital archives that allow users to participate in the process of archiving, but both created from the perspectives of experts in nuclear technologies are also the site that generates differential temporal and spatial registers in the processes of articulating the repercussions of the unravelling disaster.

In analysing these online repositories, I often reached an impasse for the opposite reasons: the excess and the lack of archival data. SimplyInfo.org is characterised by the detailed classification of disaster-related topics, some of which, however, have not been updated in the past few years. On the contrary, the news archive of the Fukushima disaster on Nukewatch.org was "out of place" in relation to other thematic categories featured. The question that initially struck me was: why is the Fukushima nuclear disaster the only nuclear accident that this watchdog features? Both excess and scarcity of information forced me to focus on particular features of their archiving practices: the engagement with deaths and injuries of workers at the Fukushima Daiichi NPS on SimplyInfo.org and the historical trajectories that Nukewatch.org draws on. It is also important to address that my attempt to identify and tell ghost stories that underlie

their construction led me to revisiting other digital archives I have examined, and to the unexpected coincidences and connections that they designate. One such example involves repeated references to Los Alamos, where the first explosion of the atomic bomb took place in 1945. Although it is not surprising that Nukewatch.org, based in New Mexico focuses on how the development of nuclear technologies has caused tragic accidents, tracing and tracking the backstories of its archived objects offered the opportunities for unexpected encounters I described as "bumping into" in Chapter Two. Specifically, I address that the small archival repository designates a return of the first atomic explosion, which explicitly situates the Fukushima disaster in the lineage of events since 1945.

Both archives animate the possibility of working and reworking on the archival fragments dispersed across time and space. I argue this as a possibility of what Rey Chow (2015) calls "montage" that becomes embodied "whenever we move things around from one context into another in the realm of thought, producing unanticipated, unsuspected relations – oftentimes triggering a crisis and a new situation – through the very gesture of juxtaposition" (Chow, 2015: 3). Not only did I juxtapose these two U.S.-based repositories, juxtapositions contingent upon thematic and temporal proximities took place during my exploration of them. The process of montaging is, at the same time, "the operation of scattering a (purported) previous continuum into fragments, which are then soldered or sutured together and distributed anew" (*Ibid.*, 3). In employing such a gesture for my hauntological reading of these archives, I engage with archival absences and ruptures as well as latent connections among disparate objects, which evoke a movement between the past, present and future. In other words, just as much as they are archives-in-motion afforded by digital technologies to assemble information across

the web, they "move" users to a certain direction in the way that both proliferates and limits the modalities of storytelling in the digital archive.

1. SimplyInfo.org

1-1. The Structure of SimplyInfo.org

A significant amount of my analysis of SimplyInfo.org derives from personal exchanges that began in March 2017 with Nancy Foust, communication manager of the project. I did not set out to write a formal questionnaire, because the structure of their archival repository is so complex that it is difficult to identify its organisational and thematic formation. Who is behind the collection of data is just as unclear as archival measures of the repository that offers a wide range of data and information retrieved from both official and independent sources. Thus, before looking into archived objects on SimplyInfo.org, I attempted to clarify structural and organisational issues in correspondence with Foust, which, however, ended in summer 2018, and the frequency of uploads showed occasional decline. Upon my first encounter with the platform, I recalled realising that most of the entries are tagged with "Nancy Foust" and they include links to the original sources of information. What perplexed me was that each entry seemed to be an annotation made by the members of the project, rather than a simple "copy-and-paste" object from external website, a format that the JDA and Nukewatch.org employs. In other words, the "rewriting" or editing information for the purposes of making data more intelligible for users is one of the key contributions of the project. As will be discussed below, the process of archiving is simultaneously made invisible while critical intervention by its members constitutes a crucial part of SimplyInfo.org. That is, users are invited to see disparate events through the

contributors' scope that provides versions of the Fukushima disaster.

For instance, even though it cites TEPCO's website as one of the key sources of information, SimplyInfo.org launched "TEPCO Super Search Tool," by pointing out that this specific tool "result in better results than using TEPCO's website search" ('fukuleaks.org/web TEPCO Super Search Tool'). By means of Google Search, SimplyInfo.org narrows down potential search categories in both English and Japanese, which would represent TEPCO's engagement with these issues (see Figure. 28).

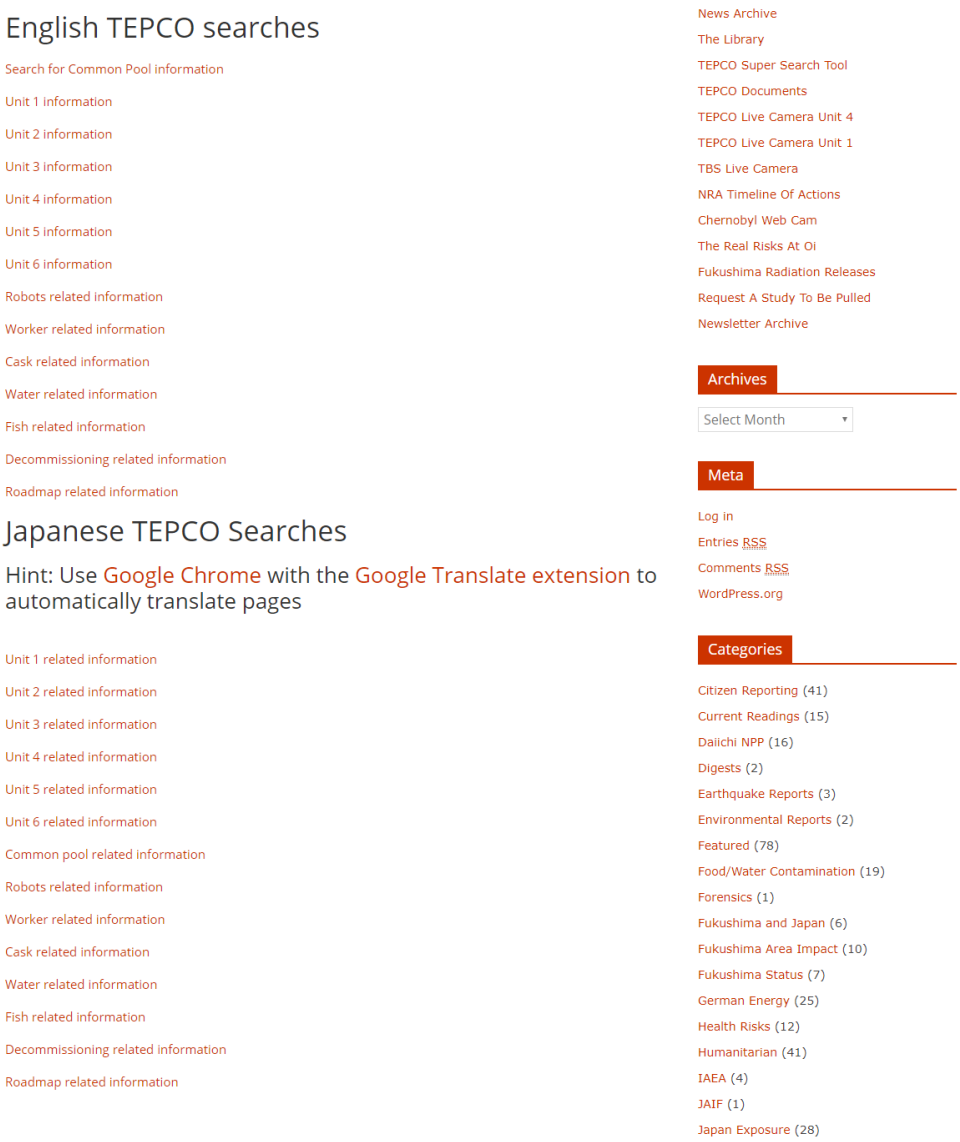

Figure. 28. Search options of "TEPCO Super Search Tool."

This is one of many examples of how they "adjust" and reinterpret other online resources in order to create an informational hub that augments searchability. I argue that the re-possessing and processing of information underscores the project's critical approach to the archiving of the Fukushima disaster. Put differently, in the ongoing and performative process of accumulating data, the original sources inevitably keep being interpreted, scrutinised and transformed, whose processes, however, remain inconspicuous. It also

relates to my thesis questions with regard to the digital archive's capacity of storytelling, in that "paraphrasing" the resources from external websites inevitably reflects the archive's decision-making practices of inclusion and exclusion.

According to Foust, the "members" of the archival project include researchers and doctors worldwide, who are willing to share their knowledge to individually assess both official and unofficial documents. Undoubtedly, its unique features and classification systems have been afforded by the participation of volunteers from several different disciplines. Rather than intelligible archival voids and absences I have analysed in previous chapters, SimplyInfo.org is marked by the astounding amount of information they have collected since the wake of the disaster, out of which they have developed different classificatory modes to access what they regard as valid accounts of the incident. Accordingly, its structural complexity and data abundance together multiply and proliferate the number of stories it could tell. Such an archival premise of SimplyInfo.org has allowed me to partially investigate how SimplyInfo.org has offered multiple versions of the disaster, especially in relation to their refusal to "remove" archived objects. Thus, looking at this archival repository is a distinctive experience of dealing with the flow of information retrieved from both external sources and the original research, and how they would converge to form an archival object.

Although what they tell about the Fukushima disaster is purported to be a result of rigorous selection processes, its textuality or storytelling capacity is not devoid of the project's own historicity. Despite its intention of providing up-to-date and accurate information about the disaster, the excess of information has certain pitfalls and uncertainties when it comes to the representation and organisation of data. The "versioning" of the events through experts' eyes would often lead to the inclusion of

images that are remotely related to the disaster, such as the use of cartoon images as thumbnails to describe an event, as well as blank spaces left with no trace of action. My employment of hauntology in this chapter, therefore, is intended for analysing hidden archival structures that overshadow discursive and temporal fluctuations under the guise of total and "expert-proven" accounts of the disaster.

Although the Japan Disasters Digital Archive I discussed in the previous chapter also aggregates information from various media outlets, SimplyInfo.org's participatory feature differs in that its archival entries are already edited by the contributors. The "versions" of updates call into question the underlying measures of archiving as to: why they have chosen to write about a particular topic; why they regard some sources to be worthy of referencing over others. There is no clear written indication regarding the choice of archival objects. In addition, the description of events in the repository is surprisingly flat and seamless, or so it seems, but it does not necessarily indicate that the project offers an epitome of the unravelling of the Fukushima nuclear disaster: there are hidden voices that permeate the making of the archive, which could be multiple and multiplied every time a decision is made. I argue that the very condition that makes this archival repository haunting is the occasional ruptures that may only be seen when the agency of archiving makes a sudden appearance through narrative displacements, or in the form of suggestion to users. For instance, the subsection "Japan Travel Guidelines" in the "Nuclear Safety" category was created in response to users' questions, with a list of useful resources that provide up-to-date information about radiation levels in Japanese cities. The voices of the project's members contingently dis/appear, and it is often difficult to identify the extent of their intervention to an archival object, because most of the entries are uploaded under the name "Nancy Foust," communication

manager of SimplyInfo.org.

Consequently, I claim that the tension between the list of latest information and rather "frozen" categories that include official documents and investigative reports create fissures and ruptures in their practices of archiving the Fukushima disaster. It is also important to highlight the repository's defiance to the removal of archived objects as well as what falls into the margins of such attempts. The excess information hindered me from identifying the coherent organising structure of the archive, but instead allowed me to encounter connections and discrepancies among archived objects. My analysis of SimplyInfo.org, therefore, involves unexpectedness at its core, especially when I accidentally bumped into the "blank spaces" of archiving that nevertheless work as the "missing piece" to understand the unravelling of the disaster.

1-1-1. Naming Matters

What first caught my attention is that the digital repository changed its name from Fukuleaks to SimplyInfo.org. Thus, during my email exchange between 2017 and 2018 with Nancy Foust, the communication manager and research team leader of the project one of the first questions I asked was about the change. She mentioned that the name "Fukuleaks" was bought as an additional domain name around 2014 after the extent of the leaks was admitted. But the original name remains unchanged, which accounts for the use of fukuleaks.org in the current URL. They began to use fukuleaks.org as a domain instead of the original simplyinfo.org as a result of a number of hacking attempts. According to Foust, the name was a second runner-up when the members polled for a name in 2011. It was an apparent wordplay on Wikileaks, a controversial non-profit organisation that publishes highly classified information, in relation to the level of

confidential and inside information about the Fukushima disaster they started to attain. As a result of polling, SimplyInfo was chosen because it was considered to be:

> "[M]ore universal, giving [them] the ability to focus research on more than one disaster."

These anecdotes surrounding the name of the archive is ironic in many ways. Not only are both "SimplyInfo" and "Fukuleaks" in themselves provocative, in considering the widespread confusion after the disaster with regard to a number of conflicting views and opinions about the effects of radioactive dispersal on the human body. While there are a myriad of websites that claim to know the "truth" about the Fukushima nuclear disaster, to bear the name of "SimplyInfo" could have been a misleading decision. In an almost self-contradictory manner, the project has engaged with the shifting landscape and controversy surrounding the incident, which is far from offering "simple" explanations for the unfolding disaster. I also remember wondering whether the "leaks" in her answer referred to the radioactive leaks at the plant or those of information, because the constant leaks of radioactive water have certainly characterised the troubling consequences of the Fukushima disaster.

It turned out that the domain Fukuleaks was actually bought when the massive water leaks at the plant were made public around 2014, according to Foust. That is, what was regarded as a tribute to the infamous organisation suddenly came to materialise as a remainder of events that occurred to their object of investigation. Furthermore, the notion of "leak" cannot be disconnected from the history of the website itself. On 26 April,

2011, Foust herself was featured in a short article published on *The Asahi Shimbun*[53], in which she discussed a leaked drawing of the front elevation of the reactor Unit 1 at the Fukushima Daiichi Nuclear Power Plant (NPS). She was one of the people who found the confidential design drawing online about a week after the disaster. She added that one of TEPCO's contractors might have leaked the drawing that allegedly belongs to General Electric Company, an American conglomerate accountable for the supply of Units 1, 2 and 6 of the plant. Although the report does not directly relate to the development of the digital repository, the article is listed in the "SimplyInfo.org In The News" section along with other feature materials on newspapers and radio and TV programmes. However, it is worth noting that the idea of "Fukuleaks" has come to take on multivalent implications as the disaster unfolds, which signifies both the physical and discursive configuration of the ongoing disaster.

Without any external affiliation or funding, SimplyInfo.org has evolved from a live blog run by Reuters in the immediate aftermath of the triple disaster. The founding members of the archive "wanted the real news and a way to do something about this unprecedented tragedy," and they recognise that their strength is in their diversity, since "[p]eople from around the globe, from varied professions and industries came together to research, investigate, analyse and educate about this ongoing incident" ('About Us,' SimplyInfo.org). At its inception, however, SimplyInfo.org was meant as a blog with the on-the-fly reporting of the disaster, yet its members started to regard it as an archive and long-term resource around 2013, according to Foust. Consequently, they intend to launch long-term projects regarding the decommissioning and fuel-finding issues that will not have been resolved in the near future. While it does not disclose the interaction

53 <http://www.asahi.com/special/10005/TKY201104250626.html>

with users, the overall format of the archive has been determined by the volume of requests for information they received. As SimplyInfo.org had hundreds of thousands of users in the chatroom in the early months of the Fukushima disaster, Foust admits that they received "lots of the same questions," to which mass media did not provide convincing answers.

This is a starting point for my exploration of SimplyInfo.org, but there are a number of issues that cannot be fully explained when I look at the archival repository, in terms of who makes archival decisions and how topical categories are determined, given that their archived entities are the product of interrogation by the contributors to the project. I reached an impasse when our exchange suddenly ended and the website has become less frequently updated. It needs to be addressed that the questions regarding the thematic structure of the archive and the political and cultural situatedness of this project remain largely unanswered. Without a strict guideline or explanation of classificatory modes, I was somehow "lost" in this archive, and my attempt to identify how SimplyInfo.org conveys different versions of the disaster would often reach a dead end. In other words, the abundance of disaster-related data was also the source of confusion, rather than the clarity of the situation at the damaged plant.

For instance, to what extent the "members" of SimplyInfo.org intervene to collect and modify data remains ambiguous, for it rarely credits individual participation, and Foust's comments on the launch of the project was the only clue to discern the formation of SimplyInfo.org. In addition, that the repository's second name alludes to the actual events that inflicted the Fukushima Daiichi NPS offers an interesting scope in examining this extensive hub of disaster-related data: the material reality of "leaks" appears to have engulfed their archiving practices to resist the forgetting or, "slipping

away" of the repercussions of the Fukushima disaster. The conflation of informational and material "leaks" is also pertinent to the digital archive's intrinsic flexibility, as well as the idea of "double invisibility" (see Kuchinskaya, 2012) I remarked in the introduction, which concerns the invisibility of radiation and that of information.

1-1-2. Transnational and Historical Coalitions: the Board of Contributors

My second question about who have contributed to SimplyInfo.org was partially answered in my dialogue with Foust. Although it is often the case with digital archives that contributors including users are anonymous, SimplyInfo.org puts an emphasis on "diversity" as its strength, indicating that all the information on the digital repository is scrutinised by a group of people across the globe with expertise in nuclear technologies. When I asked about how the members of SimplyInfo.org interact, Foust explained that they began as a live blog run by Reuters, and that people who had been active there established SimplyInfo.org as an independent live blog on the same platform. They communicate within a persistent chat programme in order to determine what to upload and save in the archive. After taking over a live blog by Reuters, Foust suggests, it developed a chat room where international experts could discuss the consequences and problems of the Fukushima disaster. The current team consists of people who make "on-and-off" contributions to the preservation and updating of information about the disaster, alongside a few original members.

According to Foust, key long-time members include: retired computer hardware engineer; medical doctor; former health physics expert who used to carry out academic research at nuclear plants in the German Democratic Republic; retired nuclear engineer at some of the early U.S. nuclear power plants and member of the Union of Concerned

Scientists[54] working at the boiling water reactor (BWR), a type of nuclear reactor; expert on Chernobyl; people working on the explosion at the Waste Isolation Pilot Plant (WIPP) in New Mexico in 2014, resulting in 21 workers exposed to radiation; nuclear historian who has been engaged with broader nuclear weapon issues in relation to how nuclear disasters impact communities and individuals; anti-nuclear activist who was one of the victims of radiation-related medical experiments in the 1950s and 1960s; Dean Wilkie, a retired manager of a nuclear facility at the Idaho National Lab, working specifically on the LOCA (loss of coolant accident) research with an academic background in nuclear engineering. Wilkie also spoke to several media outlets both in the U.S. and abroad, representing the project. His contribution to SimplyInfo.org has been prominent in the publication of papers and articles based on independent research practices[55].

Of a few people credited for uploading content, Robert Jacobs (2014) contributed an essay "The Radiation That Makes People Invisible: A Global Hibakusha Perspective" to the repository, which was later published on *The Asia-Pacific Journal*. His expertise in the history of nuclear technologies helps draw parallels between the experiences of atomic survivors and those who have been affected by the impact of the Fukushima nuclear disaster. He insists that people affected by radiation exposure will suffer from

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[54] The Union of Concerned Scientists (UCS) is a non-profit organisation founded in 1969 by scientists and students at the Massachusetts Institute of Technology after the Vietnam War broke out. Their primary aim was to share accurate scientific knowledge, and for scientists to work towards solving environmental and social problems. Their achievements and current projects involve the issues regarding clean energy, global warming, nuclear power and weapons, etc. Despite the organisation being based in the U.S., the section "What's at Stake" displayed at the top of their commitment to the safe use of nuclear power begins with a reference to the Fukushima nuclear disaster. It reads: "[t]he Fukushima disaster of 2011 showed what can happen when a nuclear power plant's safety systems fail. […] Nuclear disaster can happen *here* – but they don't have to [emphasis in original]" (UCS, 2014). As a nuclear safety watchdog, in close association with the Nuclear Regulatory Commission (NRC), the network of the UCS has conducted independent research on the disaster.

[55] "SimplyInfo.org Research Papers." <http://www.fukuleaks.org/web/?page_id=8744>

multiple forms of displacement as a result of: deterioration of health; loss of their homes, communities and support systems; becoming medical subjects and targets of blame for "overreacting" to the fear of radiation. Jacobs also indicates that "deep historical precedents suggests that the future for the people who lived near the Fukushima Daiichi meltdowns is predictable," even though the future of those who were affected by the Fukushima disaster is uncertain.

Jacobs also reflected on SimplyInfo.org in the paper I quoted at the beginning of the chapter, which emphasises its aims of challenging the official narratives about the Fukushima disaster. Although the network of experts has helped SimplyInfo.org evolve and thrive immediately after the Fukushima disaster, it remains unclear how their knowledge has converged to create this archival repository, or whether it has been through decision-making processes every time a new post is created. In regarding SimplyInfo.org as an evolving archive online, it calls into question "archivists' knowledge as always-already situated and partial, unable to account for the particular epistemological systems, recollections, narratives, and knowledges that contextualize archival records and collections" (Kumbier, 2014: 176). In other words, the "invisible" engagement by contributors confounds the place of accountability in the transmission and assembling of fragmented information. As a result, their expertise fades into the background when it comes to the bringing together of source materials. The collective agency of online archiving reiterates the concept of archival interfaces "as a means through which activists enable, but also constrain, the interpretation of the past" and as "a site where power is negotiated and exercised" between material and immaterial, human and nonhuman actors (Hedstrom, 2002: 22). I argue that the SimplyInfo.org's archiving practices as a collective interface simultaneously foreground and foreshadow

epistemological constraints that underscore what is (not) to be archived, as discussed in Chapter Three on TEPCO's multi-faceted archival repositories. Thus, SimplyInfo.org's capacity to aggregate multiple views and opinions makes it difficult to assess the situatedness of the archiving agency in terms of how power operates in collecting disaster-related information, which, however, leads to the employment of archival imaginaries to intervene to its formulation, especially in terms of contingent connections between entities dispersed across the repository.

1-1-3. Embracing Contradictions and Contingencies: the Stories behind Archival Measures

In response to the question with regard to the archival measures of selection, Foust suggests that the contributors to SimplyInfo.org have faced a dilemma of sorting out information that is significantly biased. They initially assumed that flawed or insufficient studies and articles might serve as their advantage because they would indicate how ungrounded or one-sided information had spread over time. But the concern remains as to the "validity" of the project itself, for archiving such data may result in misinforming users if they immediately consider all the information in the repository to be valid and correct. This is because SimplyInfo.org set off as a long-term project intended for sharing updates of the consequences of the Fukushima disaster through the scope of its contributors, and it is the shift in the discourse rather than a single entry that becomes meaningful in the long run. Although the archival repository draws mainly on official sources of information, Foust also addresses the difficulty in identifying the legitimacy of data, which resulted in shifting their approach to archiving disaster-related data over time.

In the early days of the disaster, many people were accused of inciting fear and rumours. Some of these accounts turned out to be accurate[56]. Foust shared one example of such cases about the change in people's sentiment, with reference to a man in Tokyo who posted radiation readings on YouTube, using a personal monitor in his apartment. He was then accused of fabricating the results to scare people. It took years to prove that his readings were well in the assumed range of radiation levels in Tokyo in the early weeks of the disaster. According to Foust, there have been many cases of such accusation especially in relation to the reports of illness and health problems. The questioning of the legitimacy of information has led to the creation of introductory sections on SimplyInfo.org that provide knowledge about "what happened" after the disaster.

Another significant input from Foust is a complete list of tags used on SimplyInfo.org she shared by the end of April, 2017. It includes a total number of 1,738 words (see Figure. 29)

[56] With regard to the rapid spread of rumours and inaccurate information in the immediate aftermath of the triple disaster, cultural anthropologist David H. Slater et al. (2012) argue that "[t]he unregulated nature of social media leads to false information spreading much faster and wider than print media, especially among the increasing number of those who use it as their primary source of information" (Slater et al., 2012: 104). The information disseminated via social media tended to be de- and re-contextualised without careful evaluation and interpretation. At the same time, it resulted in "a flooding of various discourses" and "a perplex feeling of multiplying realities" in the media space, which enabled people to articulate their own versions of the incident (Morita et al., 2013: 84).

Figure. 29. The first page of the tag list by courtesy of SimpliInfo.org.

These tags developed “organically” according to Foust, and have the purpose of allowing

the members of SimplyInfo.org to "go back and retrieve information as needed." That is, these tags navigate them to relate a new entry with previous ones, and every time they upload a new material, tagging follows a pattern of extracting "key points, date, events, technology of the event or information being reported." For instance, they would add "Fukushima," "Unit 3," "Torus," "Suppression Chamber" and "SC (abbreviation for Suppression Chamber)" to an entry related to the suppression chamber (also known as torus) for the Unit 3 of the Fukushima Daiichi NPS. Foust also adds that these tags are the by-product of increasing user accessibility, making it easier for users to find the information they look for. Tags with more than 100 entries cover such terms as Fukushima (1145, indicating the number of posts that use this tag), nuclear (424), daiichi (285), TEPCO (274), etc. in a descending order along with three reactor units (2, 4 and 1) damaged during the disaster[57]. It is not difficult to assume that the most frequently-appearing tags describe generic words that have widely been associated with the Fukushima disaster, such as disaster, water, food, workers, etc.

The words do not necessarily correspond to the default search options in the "Categories" section that enables users to conduct a topic-based search across the repository. Apart from unclassified tags such as "The Latest" and "Featured," the tags such as "US Nuclear News" contain the biggest number of items, followed by "Plant Status," "Radiation Exposure" and "Citizen Reporting." The thematic formation of the repository appears different when comparing these two modes of classification, as the former list of tags is implemented for the administration team of SimplyInfo.org. However, there is an interesting aspect in both topical classifications, in terms of the

[57] While Units 1, 2 and 3 went through a meltdown, Unit 4 was not operating at the time of disaster. Yet the roof and walls of the Unit 4 reactor building was blown apart after a hydrogen explosion on 15 March, 2011, whose cause still remains unknown.

number of references to the United States: "US" is the eighth most-frequently used tag in this de facto index for contributors, while "US Nuclear News" is one of the biggest thematic clusters on the archive. These modes of tagging and classification reveal that the emergent concerns about the impact of the Fukushima disaster have extended to engulf transnational issues, and thus point towards the re-contextualisation of the incident taking place in the processes of archiving.

1-1-4. Archival Defiance: Preserving the Traces of Discrepancy

In relation to the dilemma of retrieving "biased" information, I asked Foust whether SimplyInfo.org has ever deliberately removed or revised their archived objects, once they turned out to be false. She replies that many things have evolved over time, providing new understandings of the Fukushima disaster. However, according to Foust, it is important to show what they knew at a given time, which is a part of the project's history. In addition, she claims that it has been very useful NOT to have revised old reports, referring back to the time when TEPCO "had made a vague mention to the public about 'fuel ejected'" without detail or context, which propelled a number of people to speculate about the limited photographic evidence the company offered. Consequently, discrepancies between TEPCO's early statements and the ones the company issued months after the disaster led to the assumption that they knew the gravity of the incident, or even the fact of meltdowns. The confusion over the impact of the disaster drove the members of SimplyInfo.org to consider disaster-related information not as "big objects," but as "fine materials" that record TEPCO's initial response to the Fukushima disaster.

More importantly, Foust remarks that:

> "Had we deleted or revised those reports, the original context or even the subject could have been lost."

The underlying concern is that the loss of materials would lead to the loss of an event, or the fact that it had happened. That is, they recognise that the failure of archiving would result in the disappearance of an event that actually took place. The refusal to alter previous posts designates the possibility of conjuring ghosts that haunt the archival repository, which turns the informational excess – including contradictions and uncertainties in the past – into a constitutive part of its archival storytelling. Here, the relation between archiving and remembering becomes foregrounded in the way that their decision not to remove materials from the repository will have become a signpost to redeem the past. That is, just with a click of the delete button, "a file and remembered history can vanish from existence," or the original memory could be "buried under the various edits and remixes that the file has undergone, but unless one knows where to look this may be impossible to find" (Wilson, 2009: 194). Accordingly, SimplyInfo.org attempted to make a copy of everything related to the damaged plant publicly issued by TEPCO, because of the company's decision to revise and take down documents previously accessible. Such activities are highlighted in their "ongoing process of trying to reverse engineer the disaster to determine what happened and how it took place," says Foust.

This strategy of preserving as much information as possible might be the reason for the "messiness" and complex stratification of data on SimplyInfo.org, as will be discussed in the following sections. It is also worth noting that the failure to archive is juxtaposed with the loss of the object, whereby the online repository becomes an informational hub

that mediates disparate events distributed across time. In other words, SimplyInfo.org expects the contingent return of disaster-related information, often in the form of a "renewed" version or correction of early assessments. The project's painstaking attempt to reserve every upload thus echoes with the fear of forgetting what was once removed from official records, which emerges as the refusal to overwrite the informational traces of the disaster. Furthermore, the idea of "reverse-engineering" or refashioning of the past reflects the anxiety about letting go of the records of the disaster that will have been erased in the future. At the same time, the intrinsic openness of the digital archive makes it difficult to examine how this archiving agency mobilises the patterns of storytelling in re-positioning data provided by official institutions and external investigatory organisations, to the extent that the archival interface "blur[s] the lines between organisations and also between different kinds of content" (Ramsay, 2018: 296). With Foust's remarks as a significant entry point for my exploration of SimplyInfo.org, I interrogate how the pasts preserved in the archival repository come to interact with one another around certain topical issues that constitute the stories about the unfolding of the Fukushima nuclear disaster.

1-2. Getting Lost in the Archive

In taking into account Foust's comments on the formation of this archival repository, I began to explore how SimplyInfo.org aggregate information by means of numerous classificatory categories in order to attend to their thematic orientations. However, because of the project's aim of channelling diverse informational sources, it is difficult to identify how it employs unique archival protocols. A quick look at SimplyInfo.org's website will be enough to have a sense of the repository's meticulous classifications,

especially in terms of a number of options to access archived materials. There are three different indexes depending on the nature of archival content. As mentioned above, entries in “Categories” articulate the latest information about the disaster, and a typical post looks as below (Figure. 30):

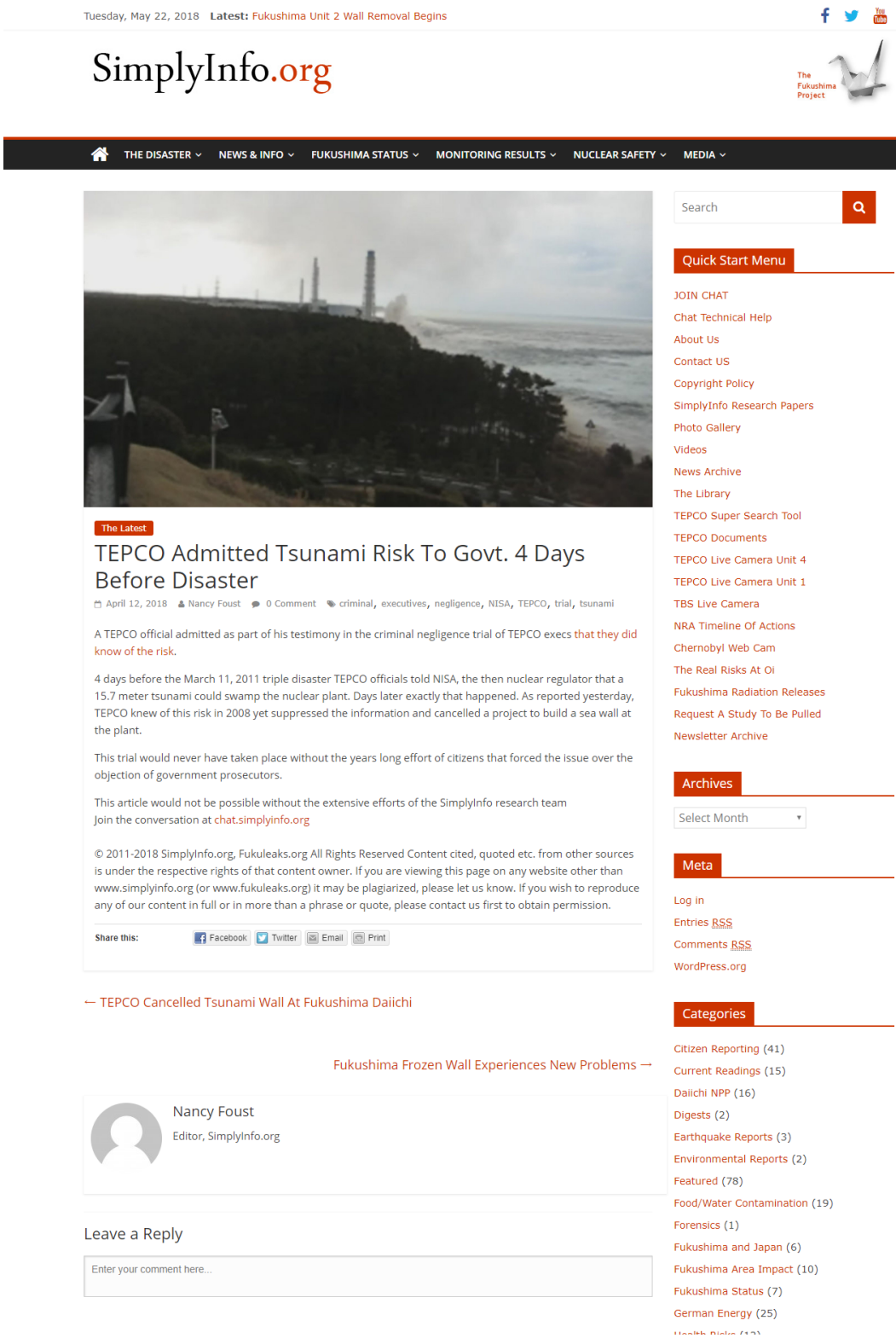

Figure. 30. An example of an archived entry on SimplyInfo.org.

This entry introduces TEPCO's announcement on 12 April, 2018 that they had predicted that a tsunami as high as 15.7 metres could reach the Fukushima Daiichi NPS. With an embedded link to an article on *The Japan Times*[58], Japan's largest and oldest English newspaper, it provides a shorter version of the original article. The materials accessible from "Categories" shares a similar format, in that they summarise the original sources of information mentioned in the post: that is, the articles and reports in those entries have already been remediated and rearticulated through the scope of contributors.

The row displayed at the top of the website illustrate default search categories (see Figure. 31) that provide fundamental data and information about the Fukushima nuclear disaster and SimplyInfo.org's research projects, while the "Quick Start Menu" provides a list of documents and links to websites that include TEPCO's on-site cameras and resources on the Chernobyl disaster (see Figure. 32).

[58] <https://www.japantimes.co.jp/news/2018/04/12/national/crime-legal/tepco-prediction-15-7-meter-tsunami-hit-fukushima-plant-stunned-regulators-just-four-days-2011-disaster/#.WwQf4e7RDIV>

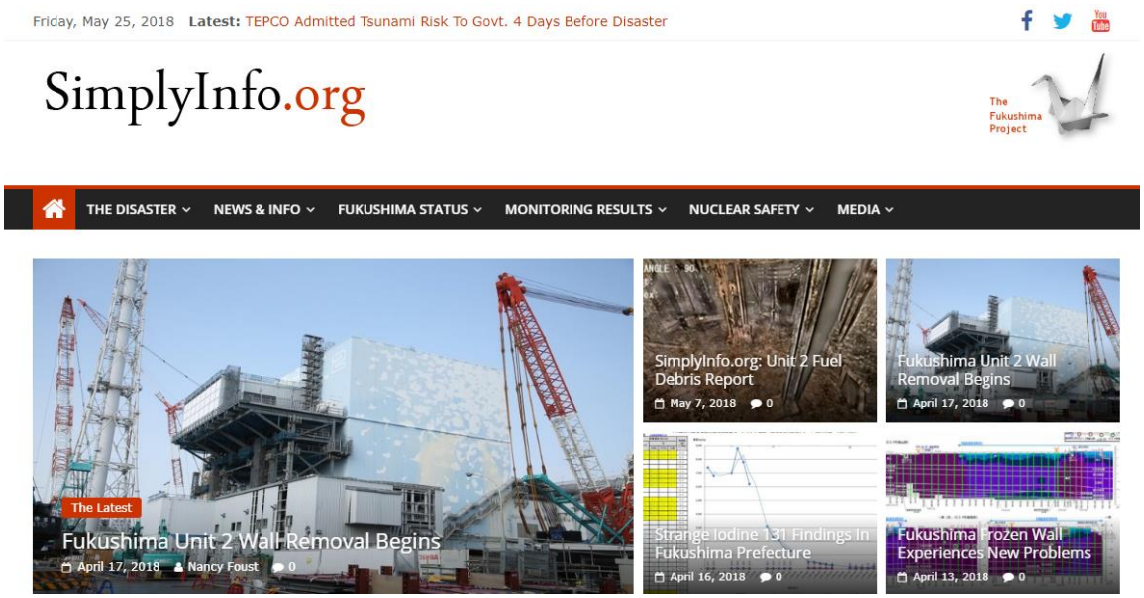

Figure. 31. SimplyInfo.org's top page.

Figure. 32. "Quick Start Menu" on SimplyInfo.org.

They are relatively dormant and stable categories that show thematic formations of the

repository, compared with frequent updates of latest news in Categories. Yet, it remains uncertain why such objects as "Chernobyl Web Cam" or "The Real Risks of Oi" are included in the index, especially when the latter is an independent research by SimplyInfo.org on the risks of the Oi Nuclear Power Plant, located in the middle of Japan's main island. The post attributed to this section on 19 June, 2012 begins with a provocative remark that "[t]he safety upgrades are all illusion intended to give the public a false sense of safety while the powers that be in Japan go right back to business as usual gambling with the lives and livelihoods of everyone[59]." Nevertheless, the Oi plant became the fourth Japanese NPS to restart after the Fukushima disaster in March 2018.

With regard to the default categories at the top, they are divided into subcategories to make it easier to look at specificities of the incident. For instance, "The Reactors" from "THE DISASTER" section allows users to have access to the details of what happened to each reactor Units 1 to 6. When looking up the "Important Links" section in "NEWS&INFO," one can see a number of links such as "Daiichi Contractors" that mainly refers to the companies involved in the construction of facilities at the plant; Fukushima Aid For Animals; Radiation Testing Information; Media Resources, etc. However, some sections such as "Japan Nuclear Company Documents" mysteriously do not contain any information (see Figure. 33).

[59] <http://www.fukuleaks.org/web/?p=6248>

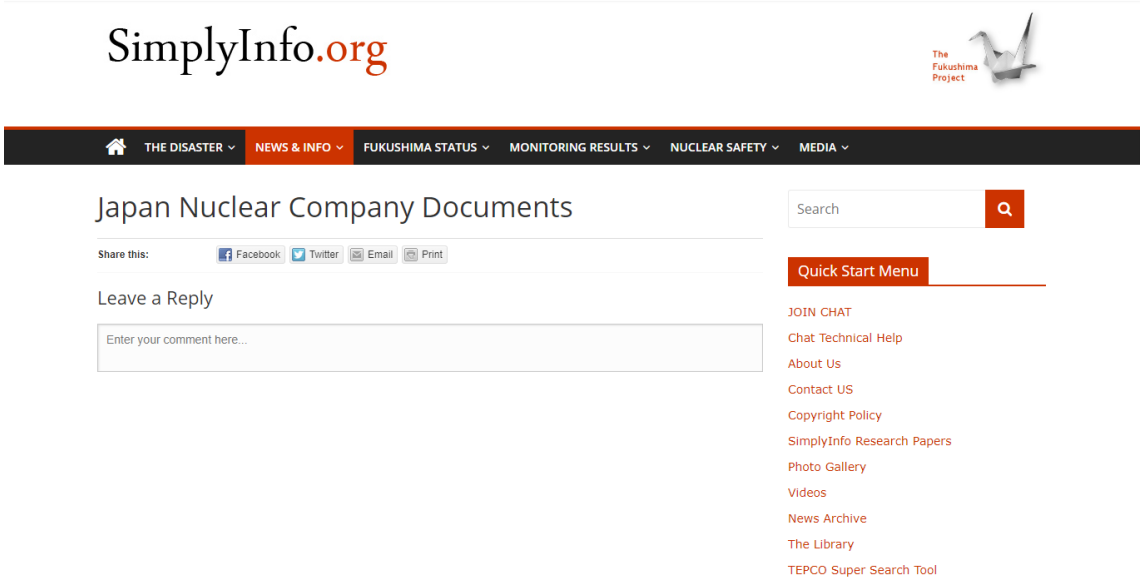

Figure. 33. "Japan Nuclear Company Documents" on SimplyInfo.org.

There is no knowing whether this section is intentionally left blank.

In addition, there are also "free-floating" entries that do not belong to any of the categories or tags used to organise the archival repository. I bumped into them while searching for information about the involvement of Nancy Allen, anti-nuclear activist and one of the contributors to SimplyInfo.org Foust named in our exchange. The entry is titled "SimplyInfo.org; What Have We Been Up To?[60]" without a date of publication. The first lines of the archived post read: "People may assume since the worst or more dramatic events of the Fukushima nuclear disaster is over that our activity has died down." Yet the statement reminds users that they keep working on a series of reports to be submitted to the International Research Institute for Nuclear Decommissioning (IRID), an organisation established in August, 2013 to promote research on the decommissioning of the Fukushima Daiichi NPS in association with domestic and

60 <http://www.fukuleaks.org/web/?page_id=11580>

international organisations. It then implies "some big new projects" that would finish "towards the end of 2013," as the only indication of when it was uploaded.

Such marginal entries do not appear in any search formats, and the "blank" entries can only be found at the point of access. Consequently, behind these "built-in" functions that aim to provide users with expert knowledge, there are the traces of in/decision due to the lack and/or excess of information associated with individuated incidents, which evokes a sense of estrangement. This sense of estrangement is akin to what Chow (2012) calls the process of "alienation," in which "the ability or potentiality to think otherwise, to stage the familiar through an alternative, phenomenological space, to produce the new through multiplication into segments and component parts" is faced with "a certain impasse, namely, its own im-plication (in-folding), through the rational processes of distribution and division, in the endless fragmentation and reification of thought" (Chow, 2012: 24). These empty spaces I encountered expose that the Fukushima disaster is construed both as the whole and a fragmented entity, and that the margins in this archival repository could also tend towards narrative ruptures – and the difficulty of "sticking with" the changing landscape of the disaster, whose traces appear when one encounters with archived objects that are left without updates, but nevertheless remaining on the repository.

1-3. Engagement with "Deaths at the Plant"

Despite the detailed categorisation of events at the plant alongside the delivery of up-to-date information about the Fukushima nuclear disaster, SimplyInfo.org is not devoid of archival ruptures and inconsistencies. While one may find detailed annotations and explanations by its members in several archival entries, I reached an impasse when I

attempted to identify the thematic structure of the repository, as a number of categories have not been updated for years despite the project's continuous attempt to remediate the disaster. One such entry I found relates to the description of deaths and injuries at the plant, which I also encountered during my exploration of TEPCO's online repositories. In contrast to the company's depiction of deaths and human casualties on the moving timeline, which hardly covers reported incidents so far, SimplyInfo.org offers its own accounts of the same topic, drawing on multiple sources of information.

The data on "Worker Death and Injury Information" are accessible from the category "FUKUSHIMA STATUS." It displays the records of on-site workers' death and injuries, with embedded links to major online news outlets and official bodies of investigation including: *International Business Times*, an American news publication; the Japan Atomic Energy Commission (AEC), an organisation in the Cabinet of Japan that has played a key role in promoting nuclear energy in Japan; *The Independent* and the Ministry of Economy, Trade and Industry. The section has not been updated since 2012, with a pdf file originally issued by TEPCO on 31 October, 2012[61]. This is another example of a record that they stopped updating in this specific category. While the last incident of human casualty and death archived on TEPCO's moving timeline is an accident on 8 August, 2015, in which a worker died after being caught in the tank hatch, the list of incidents on SimplyInfo.org mainly involve cases in the early days of the disaster during 2011. Yet, they carefully note that this information is subject to change, "given the fluid situation" at the plant.

The notification seemingly reflects its founding member Robert Jacobs' (2014) concern that "[i]t is disingenuous for nuclear industry apologists to say things like 'no one died

[61] <http://www.tepco.co.jp/cc/press/betu12_j/images/121031j0301.pdf>

at Fukushima' since they are well aware that for most of people who will eventually get sick this process will take time" (Jacobs, 2014: 3). However, it is unclear whether the section describes the decline of interest in the topic, or whether there is room for further updates. Following the discovery of the "frozen" category on SimplyInfo.org, I went back to examine "death" and "deaths" in the tag list provided to find that "death" is tagged to 14 entries while "deaths" is included in 3 entries. Apart from one post related to the death of a worker who worked at the Fukushima Daini (No. 2) NPS, not the disaster-stricken Daiichi, the two other entries tagged with "deaths" reflect SimplyInfo.org's views of TEPCO's insufficient efforts to prevent further deaths and injuries as well as the potential health and environmental effects of the dispersal of radioactive microparticles.

Unlike other annotated entries, an entry "TEPCO Says Safety Upgraded At Fukushima Plants After Two Deaths" uploaded on 28 January, 2015 in response to TEPCO's report regarding the deaths of two workers, includes an unusual manifestation of SimplyInfo's perspectives on the event:

> TEPCO's response is *obviously* superficial. It seems to lack any serious analysis of the work processes and management at the plant that are the root cause of the many accidents that have injured or killed workers in the last year [emphasis added][62].

The latest upload inscribed with the tag "deaths" is an independent report by SimplyInfo.org on "an uncategorised threat" of microparticles issued on 7 September,

[62] <http://www.fukuleaks.org/web/?p=14367>

2018, which raises awareness of the danger of small radioactive particles released after the disaster, drawing on extensive independent studies with reference to the cases of thyroid cancer and the deaths of sailors who worked on the USS Ronald Reagan during humanitarian operations in the immediate aftermath of the Fukushima disaster. The report expresses concerns about the disparities between official radiation exposure estimates and health problems in Japan, because of faulty or limited early data. It calls into question the effects of insoluble microparticles that may be "the missing piece of the puzzle" to understand the impact of the disaster[63].

This curious finding of the strong voice of SimplyInfo.org's contributors led me to return to other entries tagged with death. I argue that the archival project's aim of preserving all the records of previous updates allowed me to speculate on the dis/continuity in the narratives regarding this marginal but specific topic. The 14 posts made between 6 September, 2011 and 31 July, 2016 include the records of accident injuries and suspicious deaths of on-site workers. While at least 7 entries relate to fatal accidents with evident causes such as a fall into the tank and the collapse of a concrete wall, others claim suspicious cases that may or may not result from radioactive exposure. The headlines of these entries generally sum up the event described. However, one entry rather vaguely titled "Tokai Radiation Leakage And Other Nuclear Fairy Tales" specifically resonates with my research questions about the modalities of storytelling that digital archiving praxes produce, not only because of its evocation of "fairy tales," but also because of a reference to "Tokai," another nuclear facility in Japan that suddenly made an appearance "out of place" in the repository dedicated to recording of the unfolding of the Fukushima disaster.

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[63] <http://www.fukuleaks.org/web/?p=16788>

According to this entry, it was reported that workers at the reactor accidentally released 64 tons of radioactive water and they were soaked with radioactive liquid on 26 October, 2011. Even though the incident was not directly related to the Fukushima disaster, the annotation to the post continues:

> This is an old half truth frequently used by nuclear industry lobbyists to falsely claim the safety of nuclear power. The lie resides in the issue that nuclear exposure death rates have a long latency […]. To claim that no one has died and therefore the accident is not as bad or somehow less of a public threat is simply dishonest and a big distortion of the reality[64]."

As mentioned above, not all archival entries reveal SimplyInfo.org's posture on the consequences of the Fukushima disaster, but its suspicion about TEPCO's cover-up remains persistent.

While the index "Worker Death and Injury Information" is crystallised as a reminder of uncertain circumstances in the wake of the disaster, SimplyInfo.org keeps updating (what appears to be) the incidents that either relate to deaths or the danger of radioactive exposure. Undoubtedly, their accounts of death and injury after the Fukushima disaster are based on the premise that more and more health problems will emerge in relation to radiation exposure, and that TEPCO keeps lying about the "real" effects – that is, there is a sense of anticipation that the reality of the disaster will unfold in the way that leads to a more devastating and widespread calamity. In other words, SimplyInfo.org's critical approach to the prevalent discourse of cover-up initiates the retrospective gaze that will

64 <http://www.fukuleaks.org/web/?p=16788>

account for what they often describe as “mysterious” and “suspicious” incidents. At least the deaths-to-come appear to be imbricated in the narrative framework of SimplyInfo.org’s disaster assessments.

These partial traces of intervention designate the desire to fill in the gaps and discrepancies in the future, but simultaneously show its archival liminality in the present. In other words, these archival entries do not necessarily count as representing gaps, but rather the suspension of the archival promise that they will someday be translated as intelligible objects. I argue that the traces of their engagement with truth, accuracy and the desire for information evoke a strong sense of the anticipation for alternative realities. This testifies to the underlying archival imaginary that holds together disparate objects and external links imbricated in what Gilliland and Caswell (2016) calls “several affective threads,” based on “distrust of authority and of the archive, misplaced trust in artefacts […] that appear to represent reality, belief in what cannot be substantiated and disbelief in what can, fear of what might be in the archives as well as frustration with what is not, and sometimes the aspiration to recover what is absent from the archive” (Gilliland and Caswell, 2016: 62). In the absence of what can be immediately related to the series of suspicion and disbelief, what emerges from the fragmented accounts of deaths and injuries at the damaged plant the collective imaginings that provide a trajectory for future reworkings.

1-4. Promises in Suspension

The complex structure of SimplyInfo.org hindered me from identifying its archival measures and how this repository has been organised from the perspectives of anonymous experts. At the same time, “retelling” or reiteration of stories about the

Fukushima disaster plays a central role in their archiving practices, written out of existing materials retrieved from external websites. As the voices of the members of SimplyInfo.org contingently surface as a premonition of a bigger catastrophe, the modalities of archival storytelling are enacted by these traces of intervention, not only by the structural organisation of archived objects. Specifically, their latent archival intervention is exemplary of "how accounts of the past are recalled from a contextual point of view and how they are then changed and re-experienced through the endless reproduction of digital narrativity," by "the very process of reproducing information that the stories of the past – our memories can change or subsequently vanish" (Wilson, 2009: 185). Here, the "contextual" would mean contributors' backgrounds that make it possible for the archive to provide technical knowledge, as well as the networked nature of this repository that guides users to external resources, whose connection with the Fukushima disaster is often inconspicuous.

That the existence of storytellers is often unidentifiable in the production's knowledge production does not necessarily let an archival object "speak for itself." However, the sudden emergence of statements and annotations hidden in individual entries would become the only parameter to intervene to its discursive formation. As media researcher Jenny Kidd (2009) insists, it is important to suggest that "memories [articulated in the digital archive] might be constructions, creations or even manipulations, but the process of 'emplotment,' as individual venture, and as collective experience, remains significantly under-researched" in the processes of converting the externalised story into a solidified digital form (Kidd, 2009: 173). Indeed, what is "external" to the archival project's memory and knowledge production cannot always be distinguished, because of SimplyInfo.org's relentless attempts to challenge and rewrite the official discourse. Foust's comments on

the change in the repository's name is particularly indicative of the traces of such manipulation that underscores the rationale of this project, regardless of the fact that SimplyInfo.org refuses to delete or modify its archived objects.

Furthermore, its unique listing of topics and categories is to be regarded as "archival description," the most visible interface "between the past and the present through the presentation and representation of archives to their [archivists'] users through various actions" (Hedstrom, 2002: 38). As Foust indicates, some materials on the repository might prove wrong, but preserving the trails of archiving offers ample opportunities for future scrutiny in that what was once regarded false will turn out true. That is, the unconditional preservation of archival records itself entails the possibility of writing and rewriting the stories about the Fukushima nuclear disaster. Margaret Hedstrom (2002), scholar in digital preservation studies argues that "positivist assumptions" about the impartiality and neutrality of the archive would lead to the denial of the influence of archival appraisal or decision-making, in that such a process "can be both an exercise of power by archivists in shaping social memory and an act of resistance by archivists against other powers that wish to shape social memory for their own purposes" (Hedstrom, 2002: 37). In this context, the archival project certainly challenges "other powers" demonstrated by the government and institutions as well as the tremendous power of forgetting – alongside the fear of erasing the records imbued with uncertainty.

SimplyInfo.org's aim of "reverse-engineering" the impact of the Fukushima nuclear disaster results in the creation of different temporalities across the archive, with a sense of recuperation, not of absences and gaps, but of disparate fragments of disaster records. Here, the past is conceived of as something that can be "reworked on," so long as we preserve the traces of record-making. However, the urge for the recuperation of archival

gaps and absences is not always fulfilled, whereby archived objects become suspended and "floating" in the margins. Consequently, the cacophony of voices that threads through the archival repository creates the effects of what Grace M. Cho (2008) calls "distributed perception" across diverse actors and agencies, which creates "*altered repetitions of past experiences* [emphasis in original]" in this archival storytelling (Cho, 2008: 167). I argue that the refusal to discard archived objects amplifies the ghostly forms of collective remembering, which waver between the past and the future, even though they are aware of the occasional "leaks" – both material and informational – that may contaminate and disrupt their retelling of the ongoing disaster.

My exploration of SimplyInfo.org, with some additional backstories of the project to constantly scrutinise and articulate disaster-related data and information from its communication manager ended up in further confusion with regard to the practices of archiving what happened, what is happening and what *will have* happened in the wake of the Fukushima disaster. Yet, the preservation of data for the sake of rewriting the stories about the disaster specifically envisages "a movement that stretched from the evidentiary promise of the past into the narrative possibilities of the future," which carries "futurity as its promised overture," while "the break between what it desires and what it otherwise (re)covers renders its promise inevitably incomplete" (Arondekar, 2009: 5). I thus suggest that the tension between "stable" entities (e.g. the list of "useful links" and the records of early assessments) and ostensibly abrupt uploads of topic-based, annotated entries creates a space of relentless negotiation as to what the archival repository desires to reveal. In other words, their archival objects are destined to function as "the missing piece" altogether with the promise of assemblage in the future – the promise that is nevertheless held in suspension.

2. Nukewatch.org

Another digital repository I examine in this chapter is Nukewatch.org, also known as Nuclear Watch New Mexico, a U.S.-based organisation founded by veteran anti-nuclear activists in New Mexico in December 1999. It has conducted comprehensive research and engaged with public education and citizen activism in order to "promote safety and environmental protection at regional nuclear facilities; mission diversification away from nuclear weapons programs; greater accountability and cleanup [sic] in the nation-wide nuclear weapons complex; and consistent U.S. leadership toward a world free of nuclear weapons" ('Mission Statement,' Nukewatch.org). Their website is also politically informed by its aim of abolishing nuclear weapons and diminishing the danger of exposure at nuclear facilities. For instance, the most recent category in the "Dossiers" section includes "Trump's Nuclear Posture Review" in relation to how the current nuclear strategy in the U.S. would have lingering repercussions on the global security regimes. One of the characteristics of the organisation's website is that it covers a wide range of international discussions regarding the implementation of nuclear technologies, which varies from the NATO-Russia relations to the denuclearisation of North Korea. Nukewatch.org also shares a platform with both national and international grassroots organisations as important sources of information. In addition, it is worth noting that the organisation is primarily funded by the Ploughshares Fund: Investing Peace and Security Worldwide, the Windfall Foundation, Santa Fe Community Foundation Donor Advised Grants and the New Mexico Community Foundation. It is not surprising that the Ploughshares Fund, Nukewatch.org's principal funding body uses this familiar yet still haunting image below to explain their visions and goals (see Figure. 34).

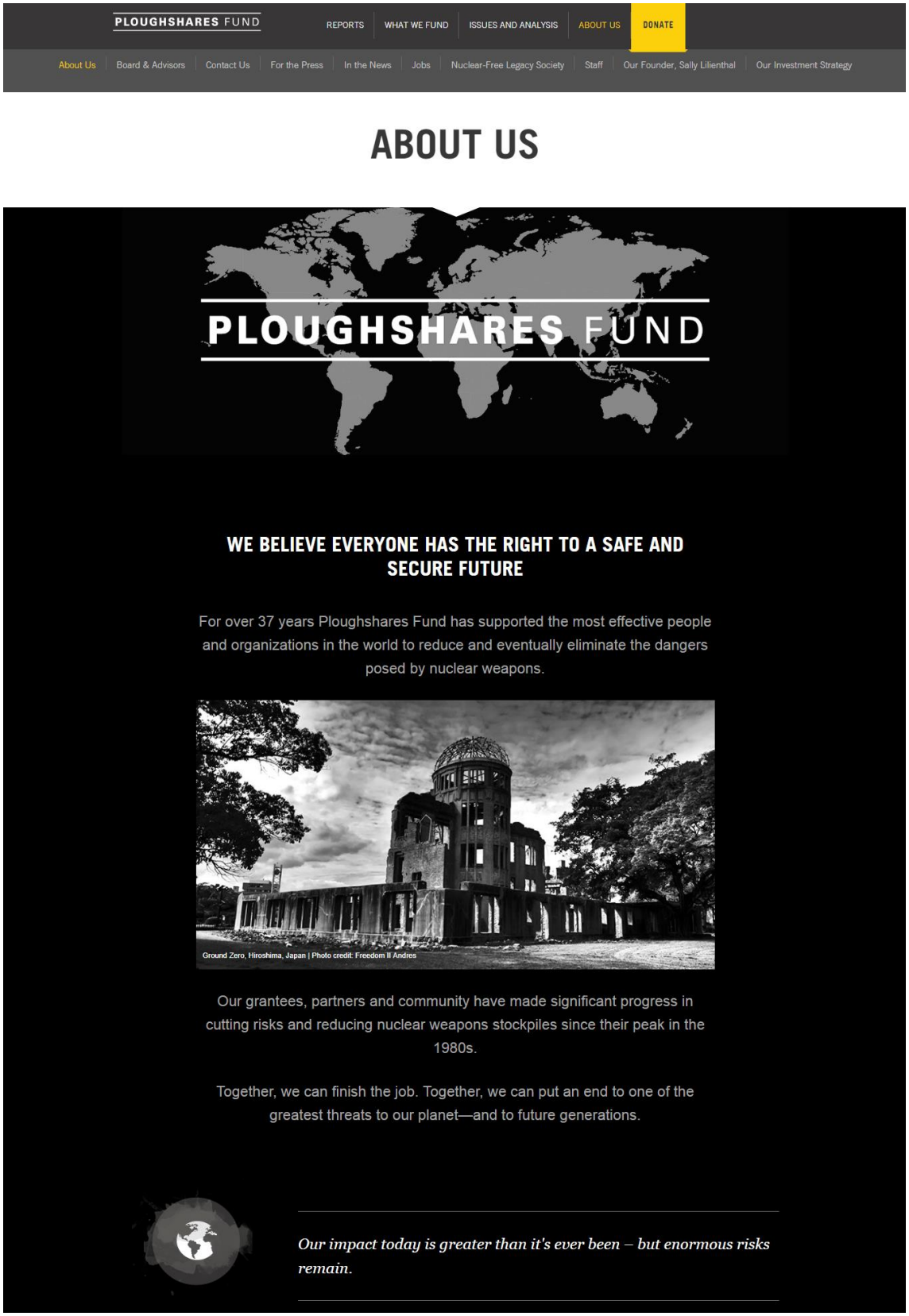

Figure. 34. “About Us” on the Ploughshares Fund website.

The fact that the Trinity test in New Mexico led to the Hiroshima bombing less than a month later seems to underscore Nukewatch.org's mission statement and its activities to promote the safety at nuclear facilities. The articles, videos and documents related to the Fukushima nuclear disaster are archived in the "Dossiers" section as "Fukushima Updates and Recent News Archive," along with "Atomic Histories" and "Nuclear Testing Since 1945" in addition to the categories mentioned above. This category was allegedly created to archive the consequences of the Fukushima disaster in relation to the organisation's previous activities as an international watchdog. Although the archival repository contains 22 items in total by the 7th anniversary of the incident, the first three of which do not have the upload date, it covers disparate topics with reference to multiple sources of information alongside the explanatory videos and interviews displayed on the right column. These archived objects are accompanied by annotations and/or quotes from the original sources of information, including major news outlets such as *The Guardian*, *The Telegraph* and *The New York Times*, as well as online materials from Democracy Now!, an American news network and Safecast, an international volunteer-based organisation established after the Fukushima disaster to monitor, collect and share radiation data.

My encounter with this online archive as a part of a long-running project on denuclearisation led me to examine how this small online archive is contextualised within a bigger platform and, at the same time, how the Fukushima disaster has been construed and reanimated in relation to atomic pasts. I argue that this marginal archive nevertheless produces historical and transnational trajectories that have also inspired my analysis of another archival project Teach311.org in the next chapter. In addition, the unexpected connections among archived materials and annotations led me back to the

margins of other digital archives, including TEPCO's online repositories.

2-1. Transnational Repercussions

The key feature of the website of Nukewatch.org is an aptly-named "Arsenal of Information" that includes documents and press releases related to nuclear waste and weapons programmes, sections on the organisation's years of contribution to the clean-up of nuclear waste and arms reduction, and dossiers that cover historical and global issues regarding nuclear power and weapons. The archived objects in the "Fukushima Updates and Recent News Archive" differ in format in that some entries attribute annotations to the original sources, while others only include excerpts from the referenced articles. It needs to be noted that Nukewatch.org runs two portals for the records of the Fukushima nuclear disaster, old and new, and as of September 2018, the Fukushima Updates and Recent News Archive cannot be traced back before 3 February, 2016 (see Figure. 35 and 36). The remarkable changes include the disappearance of videos and additional resources, in that the new repository only includes a video interview with Natalia Manzurova, one of the first responders at the Chernobyl disaster and Democracy Now!'s exclusive interview with the then-Prime Minister of Japan Naoto Kan.

Figure. 35. The older version of "Fukushima Updates and Recent News Archive" on Nukewatch.org.

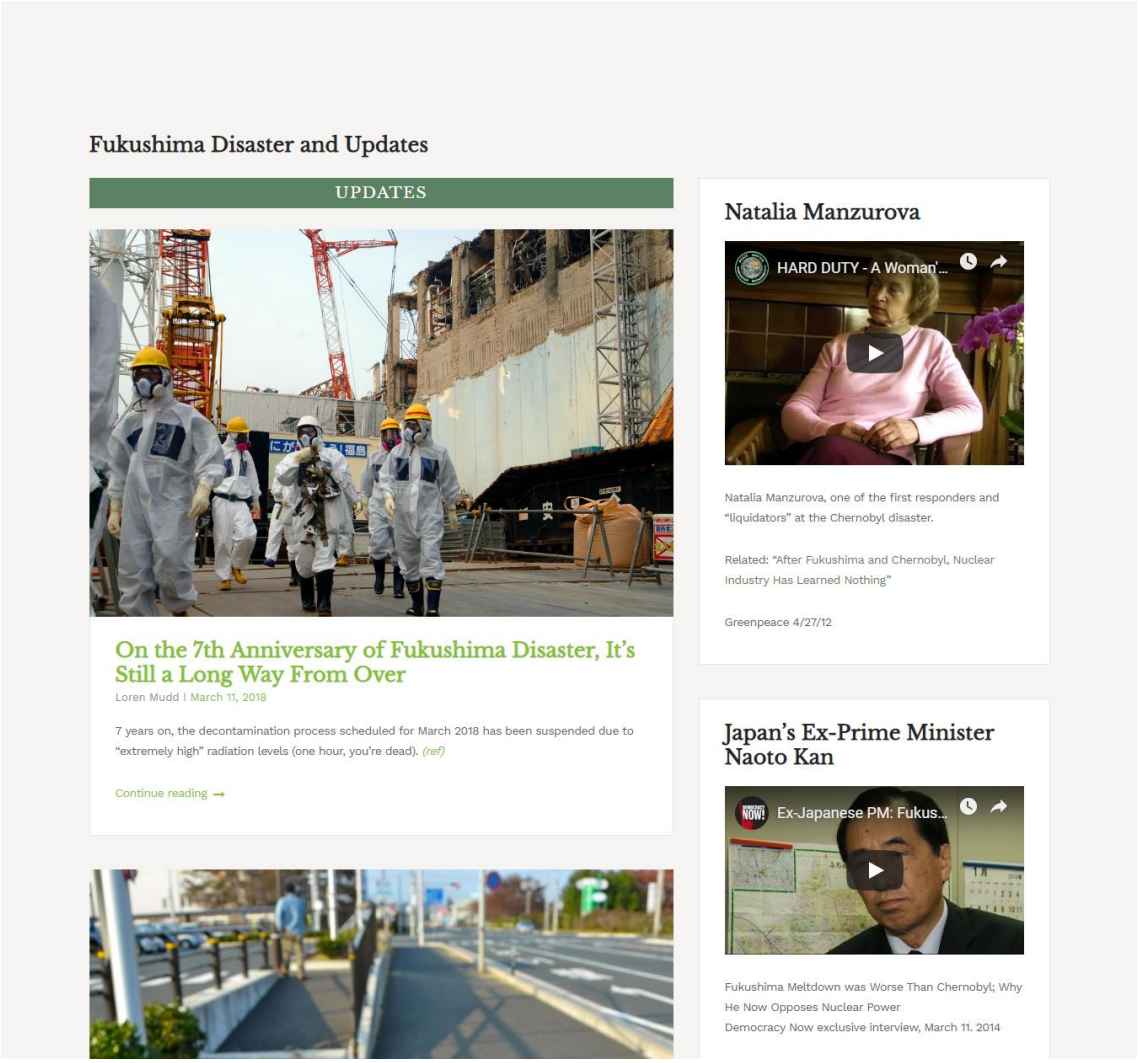

Figure. 36. The latest version of "Fukushima Disaster and Updates" on Nukewatch.org.

The word "archive" is dropped from the current repository of resources related to the Fukushima nuclear disaster. My overall analysis of the archive is based on the previous one that is still accessible, as new materials have not been added to the current repository. The two remaining videos on the new website in particular show the organisation's focus on the only nuclear disasters in history labelled as Level 7 (Major Accident) on the International Nuclear Event Scale (INES), which provides a stronger sense of thematic consistency.

The interview with Natalia Manzurova was conducted by EON (Ecological Options Network)[65], a media platform that primarily focuses on nuclear power, weapons and waste in order to support grassroots movements working for environmental and human rights. The video was uploaded on the EON's YouTube channel on 27 April, 2011, just over a month after the Fukushima disaster. Manzurova was one of the few surviving "liquidators" at Chernobyl, who were ordered by the Soviet government to "liquidate," or "cover up" the impact of radiation in the contaminated area. She recalls that the liquidators were once ordered to examine the burial grounds where they disposed radioactive materials. They played an important role in finding out that radiation was leaking into the groundwater and a nearby river, so that they could "re-bury" the grounds. Manzurova brings up the Fukushima disaster when she remarks that the situation would have been different if the impact of the Chernobyl disaster had been recognised by the government. In claiming that people in Fukushima are "already" the victims of the disaster, she goes on to argue that not a single lesson has been learnt since Chernobyl, because the official and industrial reaction to Fukushima and Chernobyl appeared the same: the nuclear industry is only concerned about "saving their face" and their profits, instead of health and environmental risks of a nuclear accident. The clip ends with her quiet anger as she asks what the officials would in the U.S., Japan and Russia would say if they were forced to face young children with thyroid cancer and their mothers.

The other film "Ex-Japanese PM: Fukushima Meltdown Was Worse Than Chernobyl & Why He Now Opposes Nuclear Power[66]" in the new archive is an exclusive interview of Naoto Kan by Amy Goodman, host and executive producer of Democracy Now!, which

[65] <https://www.youtube.com/watch?v=0-zGXQ-lzKU&t=415s>
[66] <https://www.youtube.com/watch?v=YHY4NhOtBZo>

was uploaded on the third anniversary of the Fukushima disaster. Kan, now as a vocal opponent to nuclear power explains the early days of confusion after 11 March, 2011. Repeatedly, he emphasises that it was impossible to have accurate information, and even after a report that electricity stopped and cooling facilities failed at the Fukushima Daiichi NPS, it was believed that water levels were above the fuel to avoid a meltdown. Comparing the situation with the Three Mile Island, he notes that the Fukushima disaster is much closer to "the China Syndrome[67]" than to previous nuclear accidents that involve partial fuel leakage inside the container. As Goodman asks him about the worst case scenario, he then compares the grim prospect at the time with the Chernobyl disaster: while only one reactor was affected at Chernobyl, there are 10 reactors in total at the Fukushima Daiichi (No.1) and Daini (No.2) NPSs, and they could release a hundred times more radioactive materials into the environment if they all went meltdown. In this case, areas in the radius of 250km must be evacuated, which means that roughly 40% of the population are inflicted.

The two accidents are seamlessly connected in these videos, in the way that constructs the government and the nuclear industry as ignorant about impending health effects, while the population is ill-informed about radiation: no one is certain about the consequences of a nuclear disaster at all. In contrast with other "erased" content[68] from

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[67] The "China Syndrome" is a fictional worst case scenario of a nuclear meltdown, a term popularised by an American thriller film *The China Syndrome* (1979). The implication is that the fuel would melt though the containment vessel and the earth, reaching the other side of the planet ("China").

[68] It includes: a documentary by VICE Japan that features the members of Safecast installing a Geiger counter at the house of a man who lives close to the plant three years after the disaster; a clip from the PBS NewsHour, an American news programme broadcast on the Public Broadcasting Service about the process of fuel removal at the reactor Unit 4; a video of the World Uranium Symposium held in Quebec City in 2015; articles from international news outlets including *Reuters*' special report on Yakuza, Japanese crime syndicates' recruiting of homeless people for clean-up operations at the Fukushima Daiichi NPS in 2013 and the documentation of the Nuclear Regulatory

the old repository, the two remaining videos show how one disaster provides context to another, connecting disparate incidents in the past and the present. The inextricable ties between nuclear disasters emerge as the recurrence or "re-enactment" of past catastrophes, as American historian of science Susan M. Lindee (2016) argues, because of contradictions and uncertainties in radiation research in general. She maintains that "reliving" is a crucial part of the evaluation and construction after a nuclear accident. That is, all the past events involving radioactive exposure become a reference point to one another, being "technically and socially relived, through photos, maps, stories, measurements, archive hunts, and explosions" (Lindee, 20016: 198). Manzurova's interview is exemplary of a person who relived the Chernobyl disaster through Fukushima, while Kan recalls speculating upon the worst case scenario in relation to Chernobyl and Three Mile Island, as well as a fictional story that could have an irreversible impact on the planet.

What brings together these interviews that remain on the archival repository is the historical analogies used by people who have experienced a nuclear event. In her research on the history of the Radiation Effects Research Foundation (RERF) that played a significant role in the assessment of radioactive exposure at Chernobyl and Fukushima, Lindee revisits the history of the foundation that commenced as the Atomic Bomb Casualty Commission (ABCC, active from 1947 to 1975) to investigate the effects of the atomic bombings. As the RERF has become the evidence for the uncertainty and inextricability of nuclear events, Lindee quotes Avery F. Gordon's (2008) question "how do we reckon with what modern history has rendered ghostly?" (Gordon, 2008: 18) in

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Commission in the U.S. on Japan's "emergency." They all describe contemporaneous issues in contrast with the remaining videos' focus on the retrospective assessment of a nuclear disaster.

order to argue how the impact of atomic bombings will have shaped the future-yet-to-come. Through these archived films that engage with different nuclear disasters, I argue that the Fukushima disaster is relived and re-enacted in a bigger historical framework foregrounded after the removal of other archival objects, which has ghostly repercussions.

2-2. Pulling the Threads Together

Albeit small in numbers, archived objects on Nukewatch.org have striking affinities with the other archives I have discussed in previous chapters. For instance, I introduced a collection with a distinctive theme on the Japan Disasters Digital Archive (JDA), which describes the passing of the State Secrecy Law in 2013. The incident is also featured on the first post in Nukewatch.org's Fukushima archive, which is titled "A States Secrets Act, Our [American] Sailors Irradiated, and a Boost for Humanoid Robots" without an upload date. This is one of what I call an archival cluster, consisting of articles, videos and documents drawn from external websites, and accompanying short annotations.

The first article in this category is drawn from *CounterPunch* with a provocative title "Japan's New 'Fukushima Fascism,'" published on 12 December, 2013. *CounterPunch* is a political magazine established in 1994, and its political views are often descried as left-wing. It warns that the enactment of the Secrecy Law allows the government to ban or arrest any individuals who attempt to report the status of the damaged plant, "throwing a shroud of darkness over a disaster that threatens us all" (*CounterPunch*, 2013). Nukewatch.org's annotation to this article adds a more alarming remark: The latest bad news? – Fukushima continues to spew out radiation." The other two entries in this cluster accompany videos that allegedly represent the topics "US Sailors Suing TEPCO, Japan" and "Robots to the Rescue," both of which are recurrent issues in this archive.

However, these videos have been deleted due to copyright grounds and the suspension of the account that uploaded it (see Figure. 37).

Figure. 37. The deleted videos in the first two entries in the “Fukushima Updates and Recent News Archive” on Nukewatch.org.

The apparent absence of source materials cultivates archival imaginaries, since they provide a trajectory to other archived objects collected in the archive. For instance, the latest follow-up articles were included in the post on the seventh anniversary of the Fukushima disaster in 2018, with details of ongoing court cases. It is also important to point out that the annotation to the latter introduces the strange term "humanoid robots" because "the units are too radioactive for humans to enter, and 'humanoid,' because the valves and levers and controls that need to be accessed are all made by human hands," with reference to a BBC documentary where the deleted film allegedly came from. Here, the definition of "humanoid" appears to refer to human involvement in the creation of robots that operate in highly contaminated areas, not the representation of robots as "humans" or their resemblance to the human body. Whether intentional or not, the inversion of the original meaning is a curious displacement in considering how TEPCO has widely featured robot technologies as the alternative forces for thorough internal examination of damaged reactors (see Chapter Three).

Robot technologies are covered in several entries in this archive, including an article retrieved from *The Japan Times* and updated on 21 July, 2017, with a headline "Fukushima robot finds potential fuel debris hanging like icicles in reactor 3[69]"; another article was retrieved from *The Guardian* on 3 February, 2017[70], captioned "High Radiation Forcing a Rethink of Robot Strategy." The latter is a part of another archival constellation in February 2017, and the rest of entries describe ongoing controversies over radiation levels. Both of them concern first key findings with regard to the whereabouts of melted fuel in reactors 2 and 3, which could not have been possible

[69] <https://www.japantimes.co.jp/news/2017/07/21/national/fukushima-robot-finds-potential-fuel-debris-hanging-like-icicles-reactor-3/#.W9cgRnv7TIV>
[70] <https://www.theguardian.com/environment/2017/feb/03/fukushima-daiichi-radiation-levels-highest-since-2011-meltdown>

without remote-controlled robots. However, the article on *The Japan Times* warns that "the unprecedented nature of the Fukushima disaster means that Tepco [sic] is pinning its efforts on technology not yet invented to get the melted fuel out of the reactors" (*The Japan Times*, 21 July, 2017). There is an optimistic anticipation that not-yet-invented technology will help accelerate the decommissioning process, but the inevitable reliance on robotics overshadows human workforce and, the uncanny coupling of humanoids and robots Nukewatch.org indicated in the earliest post in this archive.

Not unlike the porous remarks on human casualties and deaths in TEPCO's online repositories, the conflation of human and machine again leads to a confusion of boundaries deep-rooted in the inception of Nukewatch.org. One possible explanation of this conflation is Evelyn Fox Keller's (1992) argument about the quote from Bhagavad-Gita "I am become Death, the destroyer of worlds," famously used by Robert Oppenheimer who is frequently referred to in Nukewatch.org's entire website. Keller examines how metaphors of life and death are arbitrarily attached to, and detached from scientific discourses when the unknown realm of technology would "function to articulate a boundary: an interior not visible to outsiders, the demarcation of a separate domain, a sphere of autonomous power" (Keller, 1992: 40). According to Keller, the development of atomic power has inverted the traditional metaphor of life and death, ever since the atomic bomb was called Oppenheimer's baby, a baby born into secrecy without maternal procreativity, a monster destined to kill. It is not surprising that she also reflects on the replacement of blood and fresh referents, through which "vulnerability" and "survival" become the words to describe weapons systems, not human beings. Keller's piece written nearly 20 years before the Fukushima disaster gains traction in the context of the implementation of "humanoids" that are designed to use the tools "all made for human

hands." Moreover, as I discussed in Chapter Three, the machines' "survival" became a popular trope that often overwhelmed the interest in the conditions of human workers. Although I have argued that the "Fukushima is not Hiroshima" discourse spread rapidly after the disaster in order to avoid mass panic, the uncertain consequences of the Fukushima disaster brought about what Joseph Masco (2006) calls "the multigenerational technoaesthetic confusion of bodies and machines" (Masco, 2006: 95). However, Nukewatch.org's focus on the conflation of human and robots has further implications, especially when these fragments of the disaster come to converge at one historical node: Los Alamos.

2-3. The Lost Arc: From Los Alamos to Fukushima

While the focus on robot technologies also relates to other featured articles and videos that engage with the invisibility of radiation, Nukewatch.org's unique illustration of "humanoid robots" is seen in two separate entries uploaded respectively on 15 February ("Three Years Later, A Harrowing Visit To Fukushima[71]") and 17 June ("Assessing Fukushima Damage Without Eyes on the Inside[72]"), 2014. While the former introduces an article on WBUR, Boston's NPR (National Public Radio) news station about a journalist's visit to the reactor 4, the latter is retrieved from *The New York Times*. Three years on, it was not unusual for TEPCO to show a part of the damaged facilities to foreign media, and the NPR's correspondent in Asia, Anthony Kuhn reports his visit to the reactor that was going through the process of fuel removal. This rather promotional trip to the Fukushima Daiichi NPS does not reveal much about the progress of

[71] <https://www.wbur.org/npr/277385083/three-years-later-a-harrowing-visit-to-fukushima>
[72] <https://www.nytimes.com/2014/06/18/world/asia/measuring-damage-at-fukushima-without-eyes-on-the-inside.html>

decommissioning and the status of the damaged reactors, only to make Kuhn remark "I don't feel eradicated."

Out of the limited number of archived objects on Nukewatch.org, the thematic focus on robot technologies particularly open up spaces for reflection. While the organisation's intervention to these materials is obscure, I look further into what brings them together in order to interrogate untold stories and the stories that hover at the margins. In the process of following the literature relevant to this particular cluster of archived objects on Nukewatch.org, I argue that different archives are reanimated in the way that brings the past forward into the present in an unusual and unexpected manner. That is, the reification of memory objects through the act of archiving demonstrates the "liveness" of those entities that disrupt the past-present-future relations. It runs counter to the desire for possessing history that "can only come in fragmented, incomplete forms" because of "the often accidental nature of the encounter" (Chow, 2012: 61). Such an unexpected encounter underscores the formulation of a hauntological method, and particularly my attempt to reconcile archival fragments on Nukewatch.org exemplifies the possibilities and limitations of collecting and organising them by making connections. Consequently, the following findings emerged from my chance encounter that revealed the overlapping scenes of the disaster. What the absences and margins on Nukewatch.org's Fukushima archive bring into question is pertinent to Rey Chow (2012)'s idea of "the scenes of entanglement," multiple crossings across time and space. Accordingly, the forms of cross-historical connections I identified here demonstrate "the nostalgia for owning the past that is embedded in collecting" that is "inseparable from a utopian sense of anticipation, of looking forward to a future that is not entirely known or knowable" (*Ibid.*, 61). What appears as "nostalgia" in the historical entanglements here, however, is more dystopian

than utopian in that it returns to the original scene of an atomic explosion.

For instance, *The New York Times* article adds more contexts to the abyss of invisibility, revealing that the Los Alamos National Laboratory (LANL)[73] contributes to the investigation of the reactor. Here, there emerges an astonishing link between Los Alamos, where Nukewatch.org is based and Fukushima, which comes to have profound implications. In 2014, LANL declared collaboration with Toshiba, a Japanese company in charge of the initial clean-up operations and the implementation of robot technologies that include machines at work I introduced in Chapter Three. In order to deal with the problem of identifying the whereabouts of melted fuel in the reactors that are too radioactive for humans to enter, the Energy Department of LANL offered the technology of muon detection: it functions like X-ray scans, but involves hitting muons, subatomic particles to the reactor in order to produce a three-dimensional image of remaining uranium, plutonium and other radioactive substances. The technology was originally used "in a device that screens shipping containers for smuggled uranium or plutonium that could be used in a nuclear bomb" (*The New York Times*, 17 June, 2014).

This was a significant moment when I accidentally "bumped into" the specific historical implications of the technologies used for the dismantling of the Fukushima Daiichi NPS. The traces of connection among these archived entities offers a glimpse of the premise that *any* nuclear disaster is a return of what has always already been present, in the world haunted by the nuclear fear since the invention of the atomic bomb. I claim that this is one clear indication of ghostly forces that quietly resurface after the Fukushima nuclear disaster, in that the implementation of robots developed by the

[73] LANL was founded as a United States Department of Energy for the design of nuclear weapons during the WWII, and has been the hub of scientific research to improve nuclear security in the U.S. national security regime.

research facility in Los Alamos delineates an insidious recursive loop that makes ends meet: it was the centre of the Manhattan Project, and now provides knowledge for the decontamination of nuclear power plants. This finding also led me to revisit TEPCO's Photo & Video Library where the visual records of the operations by robots are archived, almost suspiciously, with the keywords "muon" and "Los Alamos." Between 2015 and 2017, there are five entries that illustrate the muon screening of reactor Units 1-3 in TEPCO's visual repository. (see Figure. 38).

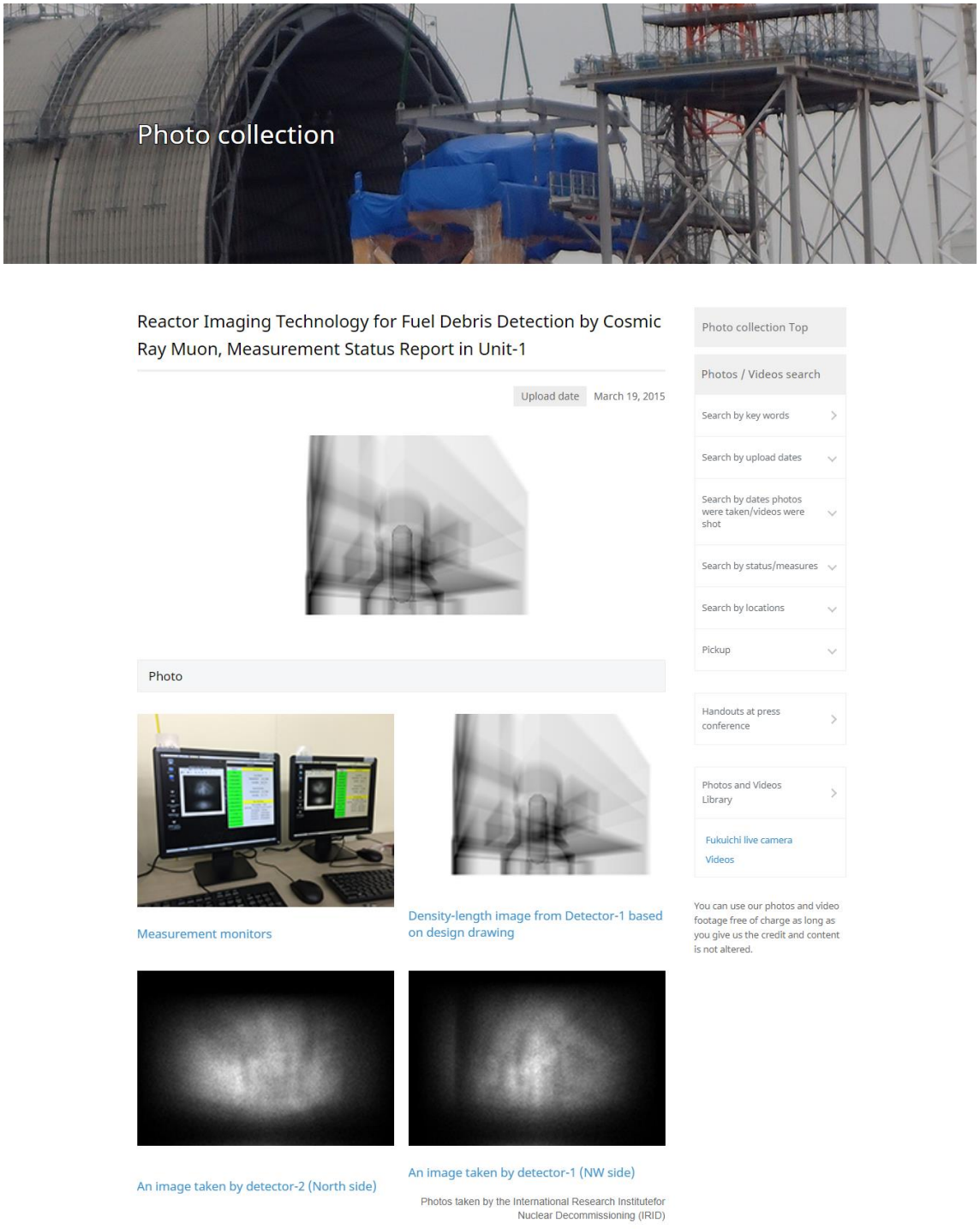

Figure. 38. The images of muon tomography of the Unit 1 in TEPCO's Photo & Video Library.

However, there is no reference to LANL or other specific organisations or institutions that helped TEPCO implement muon screening in these entries. Even a special feature "Application of Robot Technology" on TEPCO's website does not name international collaborators, whose details can only be found in the repository of documents and their footnotes. Is it just coincidental that this New Mexico-based project sheds light on robot technologies used to identify the damage of the Fukushima nuclear disaster, and then eventually return to the site where it all began? The story behind the decommissioning project of the Fukushima Daiichi NPS reanimated my thesis question about the digital archive's capacity to create temporal and narrative modalities across time and space.

The curious encounter led me to find LANL's report "Fixing Fukushima" issued in December 2016, in which the processes for the implementation of muon tomography are explained in detail. The detection technology is also referred to as the "muon vision system," which plays an important role in making visible the locations of melted fuel. Although LANL prides itself on the efficiency of the technology, which can be seen in a subsection titled "Seeing is believing" in the report, the vision is not only technologically mediated, but historically charged. This historical resonance is apparent when Christopher Morris, leader of LANL's Muon Tomography Project asks "you know what else is amazing?," to which he answers:

> "It was Los Alamos that ushered in the nuclear age. Since then, the Japanese have embraced nuclear technology as being fundamental to their energy and national security. That security is threatened by the Fukushima disaster, and now the Laboratory is going to help them dig out from under it. *The arc of Los Alamos's history with Japan is truly awesome* [emphasis added].

("Fixing Fukushima," 2016)

Albeit few in number, Nukewatch.org's archive of articles, images and videos indicate that the very technology and institute behind the invention of the atomic bomb have contributed to the investigation of the Fukushima Daiichi NPS. It does not only testify to this archival repository's engagement with the historical repercussions of nuclear technologies per se, but also demonstrates a hidden backstory of Fukushima clean-up I could not have found without Nukewatch.org's intervention. That the "arc" of Los Alamos's legacy from the Manhattan Project to the Fukushima nuclear disaster is "awesome" is an appalling revelation that is also a reminder of the implementation of nuclear technologies in Japan in the name of "Atoms for Peace" declared by Dwight D. Eisenhower in 1952: it entails a symbolic transition from Japan as a victimised nation to Japan that thrives on the peaceful use of atomic energy that once devastated its people. Here, the mise-en-scène of the Fukushima nuclear disaster is displaced, and incorporated into the legacy of Los Alamos.

The "double speak" inherent in the use of atomic power is simultaneously employed to recuperate the troubled past of the development of nuclear weapons. Nukewatch.org's archive of the Fukushima disaster also plays a role in disclosing linear historical trajectories that associate the Manhattan Project and subsequent nuclear events. This "flattening out" (see Fuller, 2009) of the past, present and future emerges as a consequence of the inquiry into the invisibility of radiation danger. The all-encompassing fear and uncertainty of radiation is, therefore, compromised by what precedes the incident because "[i]nvisibility, or more precisely the ability to determine one's relation to and place within the visible spectrum, is linked to power, to the possibility of absolute

power, which leads to destruction, self-destruction, and ultimately madness" (Mizuta-Lippit, 2005: 92). The power dynamics operating underneath the search for visible records of the state of the melted fuel is pertinent to the gesture to recuperate, or to legitimatise the historical development of atomic power. Here, the Fukushima nuclear disaster is implemented as the backdrop of the U.S. national security regime that epitomises every nuclear incident that has taken place and will take place in the future.

2-4. Historical Conversions

That the Fukushima nuclear disaster marks its place on Nukewatch.org not only indicates its impact on anti-nuclear activism, but also entails the transgression of geographical boundaries triggered by a technological breakdown that has its roots in the first detonation of the atomic bomb in 1945. The integration of the Fukushima disaster in a broader historical narrative is suggestive of Joseph Masco's (2006) remark that "[n]uclear materials not only disrupt the experience of nation-time (confounding notions of both the present and the future), they also upset the concept of nation-space, in that they demonstrate the permeability, even irrelevance, of national borders to nuclear technologies" (Masco, 2006: 11-12). Nukewatch.org's material-historical embeddedness in New Mexico, where the Manhattan project took place particularly has a symbolic value in articulating the widespread and continuing effects of radioactive fear that encompasses the post-WWII global order. In addition, several archived entries in the "Fukushima Updates and Recent News Archive" elucidate subtle connections and intersections with other archives I have discussed.

However, the Fukushima disaster might also be "out of place" on Nukewatch.org's website, given that the rest of the categories engage with the disposal of radioactive

waste left in the production of nuclear weapons, the post-Cold War nuclear deterrence and anti-proliferation, and contemporary "flashpoints" regarding the nuclearisation of Russia and North Korea. The "Fukushima Updates and Recent News Archive" is the only repository of information that captures the consequences of an ongoing nuclear disaster, even though other nuclear incidents such as the Chernobyl disaster are occasionally mentioned in unclassified blog posts in "WatchBlog." This is a manifestation of what Nukewatch.org has selected to remember, and the question "why Fukushima?" must have been expected from the beginning. The issue here is not only the anonymity of creators of this self-claimed archive, but to what extent the archiving organisation interferes with the content *as an interface*, or the "seamless interlinking of different kinds of records from different sources," which may in turn "undermine the structures of archival description and, by doing so, threatens the foundational principles of the archive itself" (Ramsay, 2018: 296). Consequently, the way in which Nukewatch.org collects and annotates various resources on the web could also be a parameter of the organisation's epistemological premises.

Even though the digital archive enables fluid and transformative encounters with the past, the limited number of archival entities on Nukewatch.org gestures towards *one* possible explanation of the unfolding of the Fukushima disaster. Without apparent archival structures, the "return" that this small archival repository envisages is that of the original site that commenced the nuclear age. Of all digital repositories I examine throughout the thesis, this is a distinctive feature that belongs to Nukewatch.org. Given the organisation's aim of promoting anti-nulearisation, it might sound too obvious that the Fukushima disaster is regarded as an event that *overwrites* atomic histories. However, the single narrative axis testifies to the archival premise that remembering is

a set of practices "that permit both the creation of a continuous, useful past and the transmission sub rosa of information, stories, and practices from our wild, discontinuous, ever-changing past" (Bowker, 2005: 9). More to the point, the stories that the "Fukushima Updates and Recent News Archive" delivers are about the pertinence or "usefulness" of the atomic past that is reworked through assembling fragmented information about the ongoing disaster.

One entry that clearly demonstrates Nukewatch.org's orientation towards the Fukushima disaster is the introduction of a video made by Democracy Now!, titled "From Atomic Bombings to Fukushima, Japan Pursues a Nuclear Future Despite a Devastating Past[74]" on 15 January, 2014. In this short clip, Amy Goodman has a conversation with David McNeil, a foreign correspondent of Democracy Now! in Japan, who also writes for *The Independent*. They discuss the current situation of the Fukushima Daiichi NPS, the increase in thyroid cancer in children, Japan's historical engagement with nuclear energy and the recruitment of homeless people for clean-up work. Although McNeil admits that it is a "fascinating story" that Japanese people have overcome the memory and trauma of atomic bombings, he is careful in defining the Fukushima disaster in relation to Japan's past as the only nation that experienced such terror. Even though the topical focus in the clip is neither atomic bombings nor a "devastating past," but the implication is profound – the Fukushima disaster does not exist outside the nuclear imaginary, the premise on which Nukewatch.org is based.

Along with the transformation of the repository into a much smaller collection of articles and videos, the materials that remain on Nukewatch.org's Fukushima archive elucidates dense historicities surrounding the Fukushima nuclear disaster, which

[74] <https://youtu.be/QcWBmPvLIxk>

connects one archive with another. Given the organisation's aims and scopes, I argue that these archived objects and annotations related to the invisible effects of radiation and the implementation of robot technologies lead to the historical crossroads, simultaneously summoning a submerged discourse within the official archival framings (see Chapter Three). The fact that one category is dedicated to the Fukushima nuclear disaster among other dossiers that preserve the records of nuclear conflict, the nuclear weapons complex and radioactive waste disposal, therefore, is itself a telling evidence of "the assimilating resemblance of discourses" (see Derrida, 1984) in the nuclear age based on the ubiquity of radiation fear and the inextricability of the Fukushima disaster from other nuclear events. Yet, the realms of remembering, or what can (not) be remembered are both restricted and expanded by these cross-historical connections with a ghostly presence of the atomic bomb as "a multigenerational, national-cultural, economic, and environmental mutation, one that has already colonized a deep future" (Masco, 2006: 38). While such connections produce the conversion of multiple histories, registering the Fukushima disaster as another nuclear catastrophe, they also generate new "missing links" that are the source of speculation and alternative imaginaries that create the tension between the frozen past and the ongoing present, the all-encompassing discourse of the nuclear imaginary and possible futures.

3. Conclusion

As I set out to examine these archival repositories based in the U.S., my initial question was how the independent archives would contextualise the Fukushima nuclear disaster in the processes of articulating information about the event. My inquiry into these archives has been fragmented and often failed to register the traces of decision-

making without clear indication of archival measures, as I was incapable of having a full overview of their archiving practices. At the same time, they navigated me to other archival records and unexpected connections among them, especially in terms of how "official" records have been displaced and given additional contexts. I argue that this is a kind of movement generated by unique affordances of each networked repository, which "set in motion" archived objects and those who inquire into them. While SimplyInfo.org's constant uploading of up-to-date information contrasts with "frozen" or dormant categories as well as the occasional surfacing of its contributors' voices, the constellations of archival materials on Nukewatch.org converge to allude to the historical significance of Los Alamos as a monumental site that marks the beginning of the atomic age. Although I had difficulty identifying archival protocols in these archives, my attempt to weave the stories out of their fragmented records of the Fukushima nuclear disaster became a practice of reprocessing and re-possessing what these archival repositories afford users to tell. It required "detective work" and archival imaginaries that allowed me to intervene to specific topics such as the deaths and injuries of on-site workers and the use of robot technologies.

Despite a number of structural differences, they share curious similarities in that they both anticipate how the Fukushima disaster will unfold, which in turn creates a sense of suspension and anticipation. When I looked back at the list of tags on SimplyInfo.org after my exploration of Nukewatch.org, I found nine entries related to "Los Alamos." This is another thread of archival storytelling I accidentally bumped into during my exploration of these two repositories. Except for one entry on the muon screening of the reactors at the Fukushima Daiichi NPS, they all describe safety issues of radioactive waste at LANL and the WIPP. How SimplyInfo.org's "reverse-engineering" approach

would work to reconcile these events in the future is unknown, but the implication is that those atomic traces are expected to merge with the unfolding consequences of the Fukushima disaster. This finding has carried me so far as to discover one uncanny, but itself a telling example of ghostly haunts I would not have been able to identify without their intervention to the birthplace of the atomic bomb. It is an article "History's Ghosts" (1996) by Walter Howerton Jr., published on *Santa Fe Reporter* that caught my attention during my search for the relevance of the U.S. nuclear arsenal to the Fukushima disaster. The article illustrates how words to describe New Mexico have shifted from those of "presence, possession and entitlement" to those of "dispossession, loss, betrayal, disenfranchisement and separation" (Howerton, 1996). This unexpectedly adds to my findings of submerged and displaced narratives of the Fukushima nuclear disaster, reanimated by archiving practices on SimplyInfo.org and Nukewatch.org. Behind archival storytelling that encapsulates the Fukushima disaster are the histories of colonisation, violence and the building of a nuclear nation state, all of which could constitute "the missing piece" to understand the unravelling disaster. And, indeed, the shift in words used to describe the event transforms archival stories and possible futures yet to tell in these repositories.

I have discussed that SimplyInfo.org's diverse archival objects are held in suspension, because it preserves information that had been proven wrong, in order to keep the traces of archiving to be reviewed retrospectively. In the marginal archive of Nukewatch.org, the Fukushima disaster is contextualised vis-à-vis other nuclear events, which is reflected in the organisation's concerns with potential cover-ups of the current status of the crippled plant. Given that the consequences of the Fukushima nuclear disaster have been incorporated into the fabric of everyday life, the uneven distribution of vulnerability

often disappears – especially in relation to life and death that awaits to be recognised. Consequently, these archival repositories designate the modes of slow violence (see Nixon, 2011) that operates and unfolds across time and space. Political theorist Anthony Burke (2016) defines the dynamics of "nuclear time" as not only the reflection of particular historico-political rules," but also a conveyer of "genres of narrative, description and thought with particular protocols about what kind of desires and realities could be admitted, created and worked on" (Burke, 2016: 79). If there is anything haunting about the archiving protocols of these two distinct archives, it is the possibility of working and reworking on the archival fragments dispersed across time, which may or may not conjure the ghost of the past from the future unfolding of the Fukushima disaster.

The process of exploring these archives became akin to environmental humanities scholar Peter van Wyck (2010)'s endeavour to "track stories" of "the Highway of the Atom," the route Canadian uranium took from a subarctic mine to the atomic bomb, which turns out to be the assemblage of archives, interviews, fieldwork, memory and physical objects in his journey to weave the threads of radioactive landscape across time and space. Van Wyck describes the Highway of the Atom as "a route along which a language of the dead make a claim on the living," because the (memory of) contaminated land "can reveal its burden only through transmission to something or someone else" (van Wyck, 2010: 154). The digital archive's capacity of reanimating the dead is intertwined with the enduring legacy of atomic power, in the way that can only be intelligible through relentless transmission and juxtaposition. My tracing of temporal and narrative modalities in the two archival repositories is also the result of such transmission that produces unanticipated relations through the archival power of "moving" archived objects as well as those who intervene to the archive. To reiterate, this gesture of reading archival

fragments not only summons the ghost from the past and the traces of invisibilities and exclusions, but opens for the new order of things to be realised, or to emerge in the future. Unfortunately, my intervention to the two platforms remains partial because of both excess information and the lack thereof, but their underlying scepticism about, and anticipation of a hidden catastrophe to unfold reveals how archived objects, including those that do not appear relevant to the disaster, too haunt the composition of the entire archive as well as the process of reiteration and re-writing the event.

In the next chapter, I will analyse a unique transnational project Teach311.org that collects resources and records related to the triple disaster for academic purposes. While I have discussed that the repercussions of the Fukushima nuclear disaster that are closely associated with the legacy of atomic power and eerie premonitions it conveys in this chapter, the times and places of the Fukushima nuclear disaster will rather multiply in the archiving practices of Teach311.org towards the further opening up of temporal and narrative registers of the event, together with a curious finding of a "dead" link to an archival object.

Chapter Six

Teach311.org

0. Introduction

> "If there are such things as ghosts […] why don't they haunt the Americans?"
>
> "That Day at Hiroshima" by Andrew H. Leighton (1946)

In this chapter, I explore Teach311.org, an interdisciplinary project with a primary focus on collecting disaster-related materials for educational purposes. Unlike the Japan Disasters Digital Archive, an archive founded by an academic institution that proliferates the range of stories to be told through user participation, Teach311.org is marked by the uploading of annotated entries by its contributors and original projects aimed at the collection of oral interviews and making of a documentary film. Although the contributors to this project do not refer to the repository as an archive, I claim that there are several archival measures at work with regard to the inclusion of expired or "broken" links in their annotated entries. Initially, I hesitated to call it a "digital archive" because the participation in this project is limited to scholars who volunteered to share educational resources related to the triple disaster, and because of the frequency of updates as most of the resources were uploaded in the first few years of the disaster. However, the fact that the virtuality of the repository has contributed to transnational scholarly intervention to the consequences of the disaster, and that the materials on Teach311.org are means to be revisited for the production of knowledge in the future has

allowed me to look into the repository as the result of collective archiving in the digital domain. That the contributors are aware of the formation of "knotted histories (see Onaga and Moore, 2017)" at work in the aftermath of the disaster has also helped me explore historical juxtapositions and junctures that constitute archival storytelling with regard to what can (not) be said – a crucial aspect of archival discourse that "feeds on the multiple uses and meanings of the archive," which is "complicated and strengthened by the integration of perspectives from a variety of disciplines" (Manoff, 2004: 18).

One of the striking features of Teach311.org is that their tag cluster often indicates historical junctures that include the atomic bombings of Hiroshima and Nagasaki, post-war Japanese politics and the Cold War, which call for hauntological imaginaries about the connections between disparate historical events. The chapter discusses how the archival measures, purposes and formats on this repository generate "blank spaces" that hinder interpretive interventions, yet simultaneously opens up alternative imaginaries in relation to the recurrent references to historical events employed to contextualise the triple disaster. As the commitment and contribution from international scholars have brought about rich discursive spaces where the Fukushima nuclear disaster is being discussed, I specifically look into the implications of the return of places, both material and conceptual, in order to explore how the disaster has (been made to) travel across space and time. The processes of situating the disaster in the repository not only reflect researchers' own standpoints, but the evocation of certain places helps reconstitute what the Fukushima disaster is and how it is to be studied and remembered.

In contrast to the two vast archives I have explored in chapters Three and Four, run respectively by TEPCO and Harvard University's Reischauer Institute of Japanese Studies, Teach311.org specifically brings to the fore cross-historical and

transgenerational references that generate latent links[75] between the Fukushima nuclear disaster and other historical events. With regard to the understanding of the Fukushima disaster in a global context, the event is often regarded as a planetary event that transgresses national and geographical boundaries, as Christophe Thouny[76] (2015), scholar in modern and contemporary Japan studies insists. However, there is an emergent question as to the complex interplay of the divisions between local and global, "us" and "them" in this transnational approach to collecting educational resources on the triple disaster. Thus, rather than claiming that "[n]obody is Fukushima (Thouny, 2015: 21)," I attempt to speculate upon the way in which the making of this digital repository relies upon, and challenges the spatial and temporal dynamics that keep reshaping the meaning of the Fukushima disaster.

In analysing the voids and absences as well as the proliferation of meanings attributed to the triple disaster that underscore Teach311.org's archival structure, I will specifically examine how multiple spaces emerge and then converge in accounting for what is "useful" as a resource to better understand the disaster. As the names of distinctive places are

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[75] Here, I draw on Andrew Hoskins (2011)'s remark on "the re-activation of latent and semi-latent connections" generated by digital networks, which keeps reconfiguring and transforming past relations (Hoskins, 2011: 26).

[76] In his paper "The Land of Hope, Planetary Cartographies of Fukushima, 2012" that analyses a Japanese film of the same name, he refers to the fictional place "Nagashima (an apparent homage to Nagasaki, Hiroshima and Fukushima)" in the film as "an interesting displacement that challenges both official discourses of national resilience and attachment to ancestral dwelling places" (Thouny, 2015: 23). Yet it is deeply problematic when he notes that Nagasaki and Hiroshima were "nuked" respectively on 6th and 8th of August, 1945. The dates do not correspond to the event he refers to, and, more importantly, it was 9 August that the U.S. dropped the atomic bomb on Nagasaki. Even though he discusses the disruption of temporality triggered by the uncertainty of nuclear radiation, the misconception is appalling and seems to trivialise the actual event behind the concept of what he calls "a planetary cartography," an alternative cartography to encompass the planet as a whole. This is an example of the displacement and decontextualisation of historical events. It occurs in such a way that it is a single similarity rather than their individual specificities that comes to the fore. The conflation of historical references resonates with several annotated entries on Teach311.org, which bring together multiple focal points, as I will discuss throughout the chapter.

seen in Teach311.org's tag cloud to retrieve archived objects, *Fukushima* does not signify the only place of the disaster. Because of the project's interdisciplinary and transnational nature, it is unsurprising that various sites appear in the tag cloud, including Hiroshima, Nagasaki, Kobe, and the United States, but how they are associated with certain aspects of the Fukushima disaster is crucial in exploring the unique contextualisation of the incident. Here I develop Peter van Wyck's (2010) focus on what he calls a "manner of spacing." He claims that place should not be confused with topos, an already-always determined place. Drawing on Julia Kristeva's notion of chorography (1984)[77], he argues for the importance of attending to the multiplicity of a place. I develop his remarks in relation to Fukushima as a place for the disaster and show how the voids and excesses in the archive are delineated by the latent associations with places already marked by dense histories from hauntological perspectives.

Throughout the chapter, I extend the scope of hauntological analysis to explore the value of putting into circulation the erased materials, fractured and distributed allusions to "haunted places" and events in order to animate what lies in the background, which I call the shadows of history. These submerged and displaced versions of the Fukushima nuclear disaster as "haunted data (see Blackman, 2015; 2019)" reconfigure the disaster as a more-than-one event. I argue that the participation of scholars in diverse disciplines attributes various meanings to the disaster in conjunction with various pasts, which simultaneously point towards the production of "ghost stories" out of contingent

[77] Kristeva conceptualises *chora* as articulation rather than disposition, "as rupture and articulations (rhythm)" that "precedes evidence, verisimilitude, spatiality, and temporality" (Kristeva, 1984: 26). How the unarticulated aspects of *chora* become regulated relies on natural and socio-historical constraints along with the existent symbolic order, which testifies to the process of ordering, and thus calls into question the intrinsic gap that exists in the production of the subject. According to Kristeva, language allows to "make a place," or "the place of the signifier" so that the body can signify itself through positions that traverse through the articulation of boundaries (*Ibid.*, 49).

connections between an ongoing disaster and what precedes it.

1. Teach311.org: Sharing and Passing Down the Knowledge of the Disaster

Teach311.org is a multi-language, volunteer-based collaborative project launched on 14 April, 2011 as a simple WordPress website, and settled in Singapore in 2012, with several project members working at local universities. The Library at Nanyang Technological University has helped build and design digital tools. The collaborative aspects of the project have also expanded the range of activities it could foster, including publication projects, workshops, and the making of interview collections. Lisa Onaga and Grace Teo (2019)[78], co-founder and digital content curator of the project share significant insight about the aims and scopes at the outset of Teach311.org. The project has developed on the premise that "[w]aves of stories, postures, and interpretations contribute to the temporal wake following disasters," and that "[d]isasters are multiple and as they unfold over time and space, meaning both sharpens and obscured" (Teo and Onaga, 2019: 1). It also involves a diverse community consisting of STS (Science and Technology Studies) scholars and historians, which helps the project critically intervene to the production of disaster knowledge in relation to various topics, especially across Asia. In collaboration with other digital projects on building historical resources, such as the Hurricane Digital Memory Bank and the World History Matters, Teach311.org has demonstrated interdisciplinary and transnational scholarship to engage with the triple disaster.

This project revolves around three key questions: "What should I read?" "What should

[78] During our email exchange, Onaga gave permission to quote their forthcoming article "Making Meanings: Introducing the Teach311.org Interview Collection," which will be published on *Verge: Studies in Global Asias*.

I teach?" and "Who studies these issues?" since the wake of the triple disaster. The archive aims "to enhance the collective knowledge of scholars worldwide working at the intersections of history of science and technology and Asia by presenting, annotating and organising pertinent scholarly work and teaching materials" (Teach311.org, 2011). While the rationale for building an academic repository lies predominantly in the retrospective assessment of the complex disaster, Teach311.org also intends to contribute to future research regarding the cultural and historical repercussions of the disaster. Its scope has been expanded to invoke broader discussions among a global audience by posting materials in six different languages (English, Japanese, Korean, Arabic, Bahasa Indonesia and Chinese).

With its aim of encouraging interdisciplinary debates on the 3.11 disaster, the international network of academics has come to form a participatory forum to draw on "a range of what might otherwise be overlooked sources," in order to answer the "seemingly simple" question of "Why did the disaster happen?" (Onaga and Shell, 2016: 225). It is important to highlight that their archival practices are not based on the search for scientific truth about the root cause of the complex disaster. Rather, the digital repository is organised around the impossibility of answering a seemingly simple question –why did it happen? Consequently, Teach311.org puts an emphasis on multi-faceted views about the events on 11 March, 2011, in order to inspire the continuing conversations on the disaster in the academy. As the project has developed, it accumulates entries that cite other natural and industrial disasters in Asia, based on the affinities among disparate incidents, although those associations are not always apparent. Throughout the chapter, I will foreground these latent associations in order to open to the complexity of the Fukushima disaster that has been situated and

contextualised at various theoretical and conceptual crossroads, in the practices of creating a repository to pass down the knowledge of the event.

One curious feature of Teach311.org is the curation of time and the time of new postings. Although the latest annotated resources were uploaded on 11 March, 2017, new postings are originally designed to be uploaded at 2:46pm on the 11th of every odd month, which memorialises the time and date of the disaster. In other words, not only does this repository attempt to offer constant updates of archival objects, it marks "mini-anniversaries" of the events on 11 March, 2011 as a reminder for users to remember the exact moment of the disaster. In this way, it functions as a commemorative site for the unravelling disaster, helping users to remember this particular moment when they access the repository. Lisa Onaga (2011), STS scholar and co-founder of Teach311.org argues that, in the midst of chaotic circumstances after the Fukushima nuclear disaster, there emerged the need for "the ability to collectively consider […] matters of temporality and historicity to appreciate why events unfolded as they had" (Onaga, 2011: 418). "Matters of temporality[79]" are central to the construction of the archive, since Onaga expresses her concern about the excessive focus on "the here and now" after the Fukushima nuclear disaster in terms of the immediate environmental and health risks of radioactive exposure. She adds that reductive and facile explanations prevailed as to the causes of the unprecedented disaster, such that often led to the praise of "Japanese stoicism" or a myth of homogeneity that is said to have promoted national solidarity in

[79] Here, "matters" should not simply be confused with "issues" or "problems," as they resonate with what Bruno Latour (2004) calls "matters of concern," in that the "matters of temporality" circumscribe the political and historical renderings and transformations of temporality per se. Such a contingent understanding of the Fukushima disaster can be seen in Atsuro Morita's (2013) discussion of "multiplying realities" after the incident, in which he claims that "the Fukushima Daiichi nuclear power plant was transformed, almost in an instant, from a little-known technological object into a global and hugely controversial, evolving, and uncertain 'matter-of-concern'" (Morita, et. al., 2013: 82).

its aftermath. Onaga also argues that the assumption that the retrospective assessment of the disaster would provide preventive measures for future disasters may lead to the trap of hindsight, to claim that some people "should have known" the consequences, and thus are responsible for the damages done.

With these dilemmas of recording the unsettled and unsettling disaster, multiple axes of temporality are already implicated in the construction of Teach311.org, which prevent the making of a simplistic causal link between events. Onaga remarks that "[w]hile the past has indeed been used to gauge the present, the historical record of these disasters depends greatly not only on the archival practices of the past, but also on how these events were understood and perceived" (*Ibid.*, 419). That is, instead of simply aggregating disaster-related data, Teach311.org was designed to provide context for the construction of epistemological frameworks to understand a series of incidents that followed the triple disaster. It results in a number of archived materials that do not directly refer to the disaster. As will be discussed, the making of historical juxtapositions underscores the repository's uniqueness, in which one can find persisting traces of the past in a haunting manner, in that archived objects often fail to reveal such connections, leaving margins and ambiguities in the stories they tell. In the following sections, I will focus on how the participatory project excavates the persisting effects of the past, and how particular places are repeatedly "summoned" to understand the Fukushima nuclear disaster, which invoke multiple modes of haunting even when the relation between the haunting and the haunted is uncertain.

2. Working in the Margins

In terms of its classificatory modes, Teach311.org offers few topic-based options for

users to search through the repository. Users are allowed to access archived objects by: language, type of resources ("Books and Articles," "Films," "Web Resources," "Photographs" and "Interview Collection") and other features ("Notes from the Field," "Teaching modules," "Workshop: Exposure and Effect" and "Terms of Disaster"). The "Features" section includes materials unique to this archive such as the reports of ongoing academic projects and the oral interview collection. The search option by material type does not allow users to apply multiple filters at the same time (i.e. one cannot filter the result of keyword search by material type). Consequently, the list of tags attributed to each entry is subtle but the only indication of what has been archived, revealing the repository's engagement with cross-historical references. Those keywords listed at the bottom of the website (see Figure. 39) are displayed in different sizes related to the frequency of appearance.

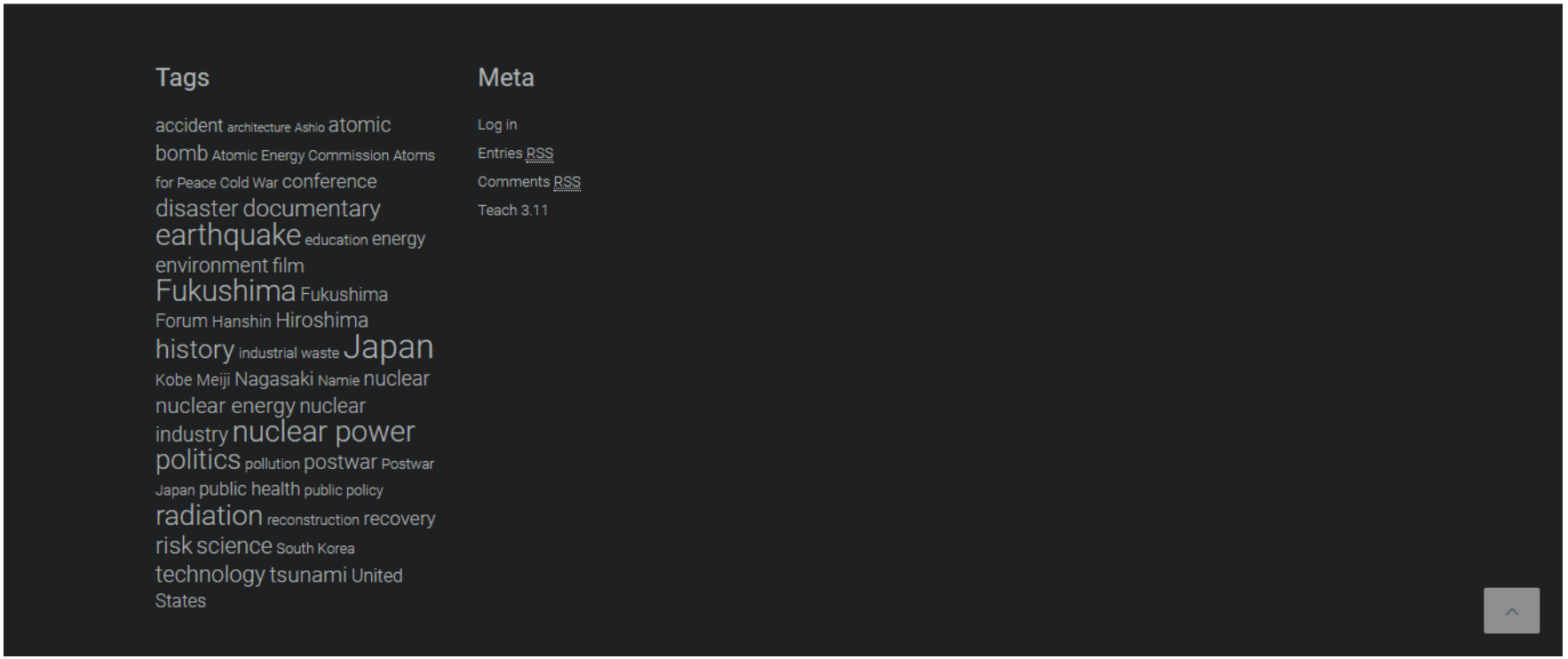

Figure. 39. Tag cloud on Teach311.org.

Among them are generic terms such as accident, industrial waste, pollution, tsunami, reconstruction, etc. and the most frequently used tags include Fukushima, earthquake, nuclear power, radiation. What is striking is the tags that cannot be immediately associated with the triple disaster: atomic bomb, Atoms for Peace, Cold War, Hanshin[80], Hiroshima, Nagasaki, Postwar Japan, and so forth. These tags are significant indicators that allow users to make an assumption that there *must* be something that brings these words together with the 3.11 disaster, in terms of what is made visible in the process of archiving. As a result of these latent connections, I began my analysis on the temporal and discursive implications of those words distributed across time and space. These will be illustrated throughout the chapter.

As it is often difficult to detect *why* such keywords have emerged and become associated with the disaster, I first examined what entries are tagged with words that do not address a direct connection to the triple disaster, which would in turn feed into the creation of users' archival imaginaries. My decision to interrogate the attribution of tags that identify the content of archival objects led to the analytical focus on annotated entries written by the project's contributors. An annotated entry is accompanied by the description of the educational resource it features, be it a book, film or academic module, and indicates why it is of educational use. These entries make it possible to explore archival intentions in terms of the importance of an object to be articulated for future research and memory production. The absence of thematic categorisation simultaneously requires discursive intervention to the archive's "ideological implications" (see Hayles, 2012) that delineate the hidden processes of inclusion and exclusion.

[80] It refers to the Great Hanshin Earthquake also known as the Kobe Earthquake that struck the Hanshin area, the southern part of the Hyogo Prefecture on 17 January, 1995. It was the biggest earthquake that hit Japan before the 2011 Great East Japan Earthquake.

Therefore, I engaged with tracing entries tagged with a specific word that contributes to creating interpretive frameworks to make sense of the disaster. In other words, I regarded each annotation as a manifestation of the value of an archived object. It is also important to argue that archival artefacts on Teach311.org had gone through the process of scrutiny and interpretation before they were finally uploaded, which accounts for the resurfacing of what seems to be random historical remarks.

Even though these annotations may read as recommendation notes to the material cited, individual reworkings on what should be archived gesture towards the project's reliance on, and the capacity to enact historical bonds that surface through such displacements. The analytical process involves the examination of the distribution of tags, particularly the ones that refer to specific places, and how they are attributed to annotated entries in the way that formulates discursive spheres that constitute the understandings of an ongoing disaster. My analysis depends on the search for annotated entries following the tag cloud illustrated above, which initially involved some "detective work" and archival imaginaries to identify terms that might be associated with the Fukushima nuclear disaster. I also conducted an interview with the contributors to the project to clarify how it has evolved on the voluntary participation of international scholars, with regard to their motivation to participate in Teach311.org and how and why they have chosen specific materials to be featured in the repository, to be archived for educational use in the future. Despite the premise that all the uploaded materials will help encourage academic practices on the triple disaster, a reference to the disaster is often curiously missing in several entries, which made me speculate upon the pertinence of those archival objects to the study of the events on 11 March, 2011. Thus, I extend what Grace M. Cho (2008) has called the "method of juxtaposition" that she argues

"creates unlikely connections and makes gaps more apparent" in order to interrogate the gaps and absences they entail, and their haunting implications (Cho, 2008: 47). Consequently, the unexpected findings in search of the materials on the Fukushima disaster reveal the lingering repercussions and return of the past that permeate through the production of knowledge about the unravelling incident.

2-1. The Forms of Participation in the Teach311.org Project

Following my email exchange with Onaga in the summer of 2018, I interviewed four contributors to Teach311.org she personally introduced to me. The form of their contribution to the project differs, but they all have written annotated entries based on their own research interest, which helped me better understand the constitutive structure of the project.

These four researchers started to participate in the project during the period between 2011 and 2016. I sent a questionnaire via email to have a clearer idea about how the project has developed, and my questions concern: their academic backgrounds; motivations and rationales to engage with the project; the extensive use of Teach311.org as an educational resource. As the stories behind every post will count as significant information to analyse Teach311.org's role in articulating disaster-related knowledge, the following answers provide additional context to the decision-making processes as to the selection of materials to be passed down and archived. It needs to be noted that, while most of the annotated entries include a contributor's name unlike the Japan Disasters Digital Archive and SimplyInfo.org, these participants remain anonymous and their views will not be treated as representing that of the entire project, or any third parties they belong to.

The interviewees A, B, C and D, from Singapore, Indonesia and Japan all participated in the Teach311.org project through personal contact with its founders. Their research field include: history, modern Japan and social studies of science and technology (participant A); science and technology studies (B); history of science (C) and colonial history, centring on Southeast Asia (D).

Interviewee A from Singapore, also editor of Chinese and Japanese language describes her research interest in the history of atomic bombings, the subject of disasters and nuclear energy as well as that of digital humanities as the reason why she began to engage with this project. Additionally, she mentions that she liked the idea that "it would be open-access and its efforts to cater to a wide range of users across linguistic and professional backgrounds as well." Her contribution includes writing annotated entries for books and a website, and making two teaching modules to accommodate annotated materials in classrooms. Although she notes that her annotated entries do not necessarily reflect her research per se, she sees them as "ultimately related in the sense of being part of the broader flow of nuclear history," because Teach311.org "spoke to broader concerns implicated in 3.11 [sic] and its aftermath." Her other contribution relates to the making of a film *Healing Fukushima* (2016) as writer and co-director, through which she combines her academic interest with creative projects and "the longue durée of nuclear history in Japan as well as globally."

Interviewee B is originally from Indonesia, and is also a contributor to a new Arabic channel and translation along with the Arcadia + Teach311.org collection that calls for papers on land, water and air as key environmental categories that define disasters, in association with *Arcadia*, an open-access, peer-reviewed publication platform for environmental studies. His contributions to annotated collection are based on the

selection of resources he uses in his courses as teaching materials. He initially "wanted to learn about the literature on disasters more and engage virtually with others who were interested in the disaster studies virtually by reading their contributions to the website," and have chosen materials that he regards "to be relevant to [his] overall course theme." Using entries on Teach311.org gives him opportunities to engage his students with browsing and translating them in the classroom, which led to his participation in a workshop "Teaching Disasters' in the Classroom," and uploading his module syllabi on the repository. While he is aware that "little is still being done to write about how victims and survivors of disasters deal with catastrophes," the annotated literature helps him think about how he could write about a particular disaster.

Based in Japan, interviewee C contributes to providing annotated entries on books and articles mainly suggested by a co-founder of Teach311.org. Her aim of participating in this project is to "share useful knowledge," especially that of nuclear history in Japan.

Interviewee D was introduced to the project in the fall of 2016 by Lisa Onaga as her undergraduate thesis advisor. She recognised that the opportunity Teach311.org offers "would play an incremental role in enhancing disaster awareness and education," especially because she felt "*removed* from the discussions of disaster elsewhere [emphasis added]" as a researcher living in Singapore. Her research field involves colonial history in Southeast Asia. Her key contribution includes the creation of Teach311.org's ongoing project on Interview Collection as a video curator and subtitle writer. Her motivation to continue her involvement in making these multimedia teaching resources "stems from [her] hope that these oral history will be used to give students outside of Japan and insight into a disaster event from an angle other than what the news media may provide." She also indicates that "[p]reserving transient voices and

narratives through documentation is also something that [she values] immensely as a student of history." In uploading an annotated entry on a book, she engaged with the history and fictional representation of disaster, with a specific focus on "the nature of time" and the 3.11 disaster in Japanese fiction. It relates to her main interest in "stigmas and stereotypes of groups that persist, and accompany the occurrence and remembrance of disaster in history," which she associates with the looming issues of "identity politics and discrimination."

At the end of the questionnaire, I asked broader questions about which aspects of the 3.11 disaster they are most interested and why, followed by another question regarding how the Fukushima nuclear disaster and its uncertain and controversial nature would specifically affect their contributions to Teach311.org. Interviewee A names "the history of nuclear energy and the history of radiological protection, as well as how citizens have interacted with those things" as her specific interests, and states that the "delicate" nature of the Fukushima disaster makes her "sensitive to what kinds of things [she] thought would speak to the impact of the disasters." On the other hand, B is more interested in "the so-called 'natural' disasters or disasters that involve natural phenomena than nuclear disaster," but his contributions "helped expand the materials on the Fukushima disaster" as well as those not directly concerning the incident. With regard to the impact of uncertainties and controversies surrounding the disaster on her contribution to the project, C argues that "[previous] studies have dealt with that [sic] uncertainties and controversies in many ways and [she] would like to share with users." To the same question, D mentions that "the issues of responsibility and accountability at the level of the individual, society, and between societal actors" have influenced her contribution to Teach311.org. These issues surface in some of the oral history interviews

and documentary clips she has been working on, especially when "relocation, evaluation of 'risk' on radiation levels, and plant and building standards are discussed."

It is clear that Teach311.org is a multi-functioning hub for researchers to develop educational materials including syllabi and module resources, and annotated entries specifically provide entry points for these activities. Although the contributors' academic backgrounds vary, it is significant to address that the "digital" or "virtual" aspect of the project and the disaster's historicity are common interests among those I interviewed. In other words, uploading disaster-related resources online in several languages allows researchers and students to accommodate educational projects, no matter where they are, and to discuss the triple disaster in a more transnational context: at the same time, Teach311.org itself has become a site where contributors "connect the dots" across time and space, relating the disasters with past incidents, such as atomic bombings, the history of natural disasters and the development of nuclear energy in Japan. That the project is built upon virtual and long-distance communications is particularly important to intervene to the multiplicity of a place of the disaster, as well as different levels of scholarly and personal attachment to the ongoing event, which I will argue in the following sections.

2-2. The Return of the Places

In exploring how the Fukushima nuclear disaster has been articulated on Teach311.org, the tag cluster is the only means of looking at the entries related to the disaster, apart from a search engine installed at the top of the webpage. In addition to comprehensive words that describe the disaster such as "tsunami," "accident," "nuclear power," "reconstruction" and "radiation," the tags involve historical markers including

"Atoms for Peace," "Cold War" and "Postwar Japan." While there is no questioning why Japan, Fukushima or Namie (a town severely affected by the Fukushima nuclear disaster, with the whole population ordered to evacuate on 12 March, 2011) are used as tags, there are a number of keywords allegedly "out of place" both literally and figuratively: South Korea, United States, Hiroshima, Nagasaki, etc. My initial question was "what are their implications?" because it was not at first apparent how they would help understand the consequences of the triple disaster. The question resulted in my "bumping into" (see Gordon, 2008) archival objects that draw unique historical trajectories between events across time and space. I argue that the unexpected encounter with the entries inscribed with the names of places marks the return of those places that recontextualise what the Fukushima nuclear disaster is and will be. Therefore, I specifically focus on how cross-historical and transnational connections are made in the practices of archiving educational materials, which make the "here and now" of the Fukushima disaster waver.

After I examined six tags Ashio, Hansin, Hiroshima, Nagasaki, South Korea and United States, I found all the entries tagged with these specific places cover nuclear incidents that include atomic bombings, except for the annotated posts tagged with Hansin[81]. The implication is that these distant places converge as reference points to delineate the impact of the Fukushima nuclear disaster. For instance, the only entry tagged with "Ashio," translated in three different languages (English, Korean and Bahasa Indonesia) alludes to the Fukushima disaster with an annotation that expresses

[81] 1995. The entries tagged with "Hanshin" introduce a book and an article: *Reconstructing Kobe, the Geography of Crisis and Opportunity* translated in Japanese, Korean and English and "Disaster Capitalism in Motion: What can we learn from Kobe, a city twice destroyed?" in Japanese and English. In relation to the triple disaster, both share another tag "earthquake" and engage with the issues of post-disaster reconstruction and recovery.

the relevance of the industrial disaster in the late 19th century. The annotation writer Yoshiyuki Kikuchi, social historian of science indicates that book *Toxic Archipelago: A History of Industrial Disease in Japan* (2010) extends "beyond these cases of industrial pollution to the realms of nuclear accidents and so-called 'natural disaster.'" It is remarkable that an industrial accident over a hundred years ago is summoned to delineate the ongoing disaster. Although the aim of Teach311.org is to encourage collective and transnational knowledge about the triple disaster, there is a stronger emphasis on the Fukushima disaster throughout the repository, as will be discussed in more detail.

As one entry usually includes more than one keyword, the distribution of tags indicates the conflation of historical references attributed to the disaster, and therefore the complex web of meaning-making that opens for further interpretations. The volunteer-based structure of the project allowed me to move between those entities marked with a set of keywords that signal the traces of connection – the traces that lead to specific speculation on the dynamics of projection and dislocation (see Cho, 2008) at work, travelling across time and space. Such a structure also signposts how things are remembered on Teach311.org, for the act of tagging is one indication of submerged narratives that expand differential understandings of the Fukushima disaster and how it has been situated in certain temporal frameworks. I argue that the "place" of the disaster, or where "Fukushima" belongs extends by these annotations that create multiple scenes of the disaster.

2-2-1. Fukushima via Hiroshima and Nagasaki

Of all the place-related tags I listed above, "Hiroshima" contains the biggest number

of entries with eight articles, two of which were written only in Japanese, and one in Bahasa Indonesia. My initial expectation was that they might refer to Fukushima in annotations, but I found that one entry in Bahasa Indonesia that introduces an academic article "The Energy of a Bright Tomorrow: The Rise of Nuclear Power in Japan (2011)" has both tags "Hiroshima" and "Fukushima." This makes the connection between the disaster and the events described in these entries ambiguous, and thus opens up for the production of certain archival imaginaries. Furthermore, these entries tagged with "Hiroshima" include all seven annotated posts uploaded with the tag "Nagasaki," which suggests that the two atomic bombings are somehow made comparable in the history of nuclear technologies. The only exception is a 2012 entry on a film *Hiroshima* (1953) directed by Hideo Sekigawa, which describes trauma and stigma in everyday life after the atomic bombing of Hiroshima.

In order to explore their pertinence to the Fukushima disaster, I thoroughly examined how the annotations associate the ongoing disaster with the materials they introduce. What is striking in those tagged with "Hiroshima" is that most of the annotated materials date back *before* the moment of the triple disaster, whereby they acquire afterlives in the repository. Kenneth Masaki Shima, researcher who contributed an annotated article on the film *Hiroshima* argues in the entry that the film's value as "a historical record and lesson for a post-Fukushima world gives it a second life," because it "proves to be a powerful representation of historic trauma and serves as a reminder of the way in which victims of nuclear tragedy sought – and continue to seek – understanding, support, and reconciliation." Consequently, historical trajectories continue to be made between the events that are more than 65 years apart, with a specific emphasis on the lingering effects of radiation on the human body and society.

At the same time, it is the entries that lack a reference to *any* aspect of the disaster that particularly caught my attention. What does this absence entail in a repository that passes down knowledge about the triple disaster? There are two annotated articles contributed by urban studies researcher Christian Dimmer respectively on 15 and 21 January, 2011. As I will later come back to analyse a latter entry in terms of the enigmatic disappearance of an archived object, *Tale of Two Cities* (1946) is listed as the first entry that used a tag "Hiroshima." The film was produced by the U.S. War Department a year after Japan's defeat in WWII. Dimmer introduces the film by arguing that "[a]s if describing a scientific experiment, the narrator takes the viewer on a tour through the ruins of the two devastated cities." Although it was regarded as a propaganda material to commemorate the U.S. triumph in the war, the film engages with the deadly effects of the bombings. Its dramatic script depicts Hiroshima as a city that "vanished from the list of living cities," or "the first city in history to be atom-bombed into oblivion." There follow the details of the Nagasaki bombing, and the narrator raises concerns about the atomic age that commenced with the Trinity test, pointing at a shadowy figure left on the pavement after the bombing, which could be of an average man of "any race or creed."

The atomic trace left on the ruined landscape is a clear indication of the deadly potential of unconditional damage inflicted by nuclear technologies, which entails the future perpetually haunted by its devastating impact. However, the original annotation does not refer to the film's relevance to the triple disaster, except comments that "the fresh impression of the horrific effects of the atom on the two cities" led to a strong anti-nuclear movement that would "obstruct the introduction of the peaceful use of nuclear energy in later years." Does this "obstruction" include the rise of anti-nuclear sentiment

after the Fukushima disaster? I suggest that the entry uploaded only *a day* after Teach311.org's launch fails to address the ongoing disaster, but nevertheless reanimates latent connections with the past. The interpretation of the archival object is therefore reliant on archival imaginaries (see Gilliland and Caswell, 2016) that produce differing trajectories to the future, and future understandings of the disaster. The evocation of Hiroshima and Nagasaki particularly situates the Fukushima disaster in the nuclear imaginary regardless of the absence of a reference to the very event. Unlike the JDA's collections that reanimate archived objects through second-order archiving, I argue that these entries inscribed with historical places call to attention the archival power of binding different historical moments together, which retrospectively reanimates and recontextualises the events that have been cited.

2-2-2. Transnational Repercussions

In contrast with the tagging of Japanese cities to the annotated entries discussed above, "United States" and "South Korea" are the only countries that appear in the list of tags. All of the six entries tagged with "United States" concern the issues of nuclear technologies, which includes the aforementioned film *Tale of Two Cities*. One of the most striking characteristics of these entries is that none of the annotated materials were written or made after the triple disaster, with three entries cross-tagged with "Hiroshima." The four entries with a tag "South Korea" are also about articles and books on nuclear technologies, three of which were published before the disaster. Despite the similarity in the issues they cover, the annotations and tags attributed to the articles do not show intelligible patterns, because the reference to the triple disaster again remains missing in several of them.

Nevertheless, they indicate multiple historical valences that include the relationship between these two countries, as seen an annotated entry "ARTICLE: Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea (2009)," which discusses the differences in the development of sociotechnical imaginaries regarding nuclear power between the United States and South Korea. This briefly points to the usefulness of the framework of the contrasting national imaginaries, respectively described as "the atoms for peace" and "the atoms for development" to understand the reaction to the triple disaster. However, apart from one entry on the book *Getting Off of Nuclear: Post-Fukushima and the Logic of Energy Transformation* (2011), originally written in Korean, those tagged with "South Korea" concern the implementation of nuclear technologies in South Korea.

Again, because of the lack of consistent measures for tagging, the connections between those entries and the triple disaster often remain ambiguous. However, one entry "FILM: Various British Pathé Newsreels (1952-1962)" calls to attention various historical trajectories with the conflation of tags that include "atomic bomb," "Fukushima," "Japan," "Postwar Japan," "protest," "Tokyo," "U.S. occupation" and "United States." It portrays the brief history of anti-nuclear movement in Japan with reference to clips on another archive, British Pathé that has collected newsreels of historical and cultural significance from 1896 onwards. The films in 1952, 1957 and 1962 show how the Japanese public protested against the proliferation of nuclear weapons amidst the rise of tension between the United States and Russia during the Cold War period. Comparing anti-nuclear sentiment in the 50s and 60s, and in the aftermath of the Fukushima disaster, the author of this entry denounces the decline in the current protest movement as "what seems a largely uncritical acceptance of nuclear energy," regardless of different political and

social contexts.

As different events across time and space collide, I argue that these entries with place-specific tags of two countries reflect the production of a bigger but more abstract and generalising archival framework. At the same time, they testify to the workings of contributors' own archival imaginaries, such that surfaces in "FILM: Various British Pathé Newsreels (1952-1962)" – how is "Japan" different from "Postwar Japan?" The lack and excess of references in tagging and annotations disclose that a classification system "opens up new avenues […] yet also closes off others," and simultaneously create the "taken-for-granted-ness" of relevance of specific materials to the disaster, to which I will come back later in this chapter (Featherstone, 2006: 593).

2-3. A Weird Encounter: the Dis/appearance of Pluto-kun

While those entries with historically charged episodes of disparate disasters demonstrate affinities with certain aspects of the triple disaster, here I aim to provide a more in-depth examination of one enigmatic entry "FILM: Trust Your Friend Pluto-kun: A Plutonium Story" created by Christian Dimmer, tagged with "Hiroshima," "Japan," "Japan Atomic Energy Agency," "Nagasaki" and "nuclear industry," which barely suggests any connection with the disaster. Not only is it difficult to assume its educational value, the upload reveals the impossibility of tracing digital ephemera in the production of the digital repository, yet simultaneously shows what such elusive objects on the web keep generating in terms of perpetual echoes with the past. My encounter with this specific annotated entry raises questions as to the traceability and afterlives of data, as well as a multiplicity of haunting that the annotated material evokes especially in relation to its depiction of a radioactive matter. I argue that the strange lack of

reference to the Fukushima disaster in the tags attributed to the post foregrounds the significance of the absence in contextualising the Fukushima nuclear disaster.

The annotation to a promotional video made by the Japan Power Reactor and Nuclear Fuel Development Corporation (also known as the Power Reactor and Nuclear Fuel Development Corporation, or PNC) in 1993 was uploaded on 21 April, 2011. The video titled「プルトニウム物語 頼れる仲間プルト君(directly translated as "A Plutonium Story: Your Reliable Friend Pluto-kun, or Little Mr Pluto")」is nowhere to be found on official websites after the organisation pulled down the promotional film, when it drew criticism from the U.S. Energy Secretary for trivialising health effects of plutonium. However, the video caught unexpected public attention soon after the Fukushima disaster, as people started posting it on online video-sharing websites without licence, most of which were deleted after a copyright claim[82]. This is another propaganda film in stark contrast with the other annotated film that describes the impact of atomic power, in that "Pluto-kun[83]," a spooky anthropomorphised figure representing plutonium as a boy wearing a green helmet, with the chemical symbol of plutonium (Pu) promotes the safety of plutonium for the sake of Japan's growing nuclear industry (see Figure. 40).

[82] <https://blogs.wsj.com/japanrealtime/2012/03/15/sayonara-denko-chan-tepco-unplugs-cartoon-mascot/>

[83] The character made a quiet exit from the public sphere, almost unnoticed when its patron went out of business after a series of nuclear accidents in 1990s, and ultimately, when an interactive museum called the Atom World where Pluto-kun was featured as a mascot was closed down a year after the disaster.
<https://blogs.wsj.com/japanrealtime/2011/03/29/the-lighter-side-of-plutonium/>

Figure. 40. The image of “Pluto-kun” from the article “Kumamon leads Japan’s mascot craze, but don’t mention Pluto-kun” published on *The Guardian* on 12 May, 2013.

Even after the character was once deleted from the original website, it enjoyed a strangely ephemeral life in the wake of the Fukushima nuclear disaster. The screenshots below illustrate the online popularity of the word “Pluto-kun (プルト君)” in the Google search engine. The data extracted from Google Trends show the results since 2004 (when the oldest data is available), and during the year 2011 respectively (see Figure. 41 and 42). The relative popularity of the search term is measured on a 0-100 scale, and the regional interest shown on the map, related topics and related keywords are displayed below the graph.

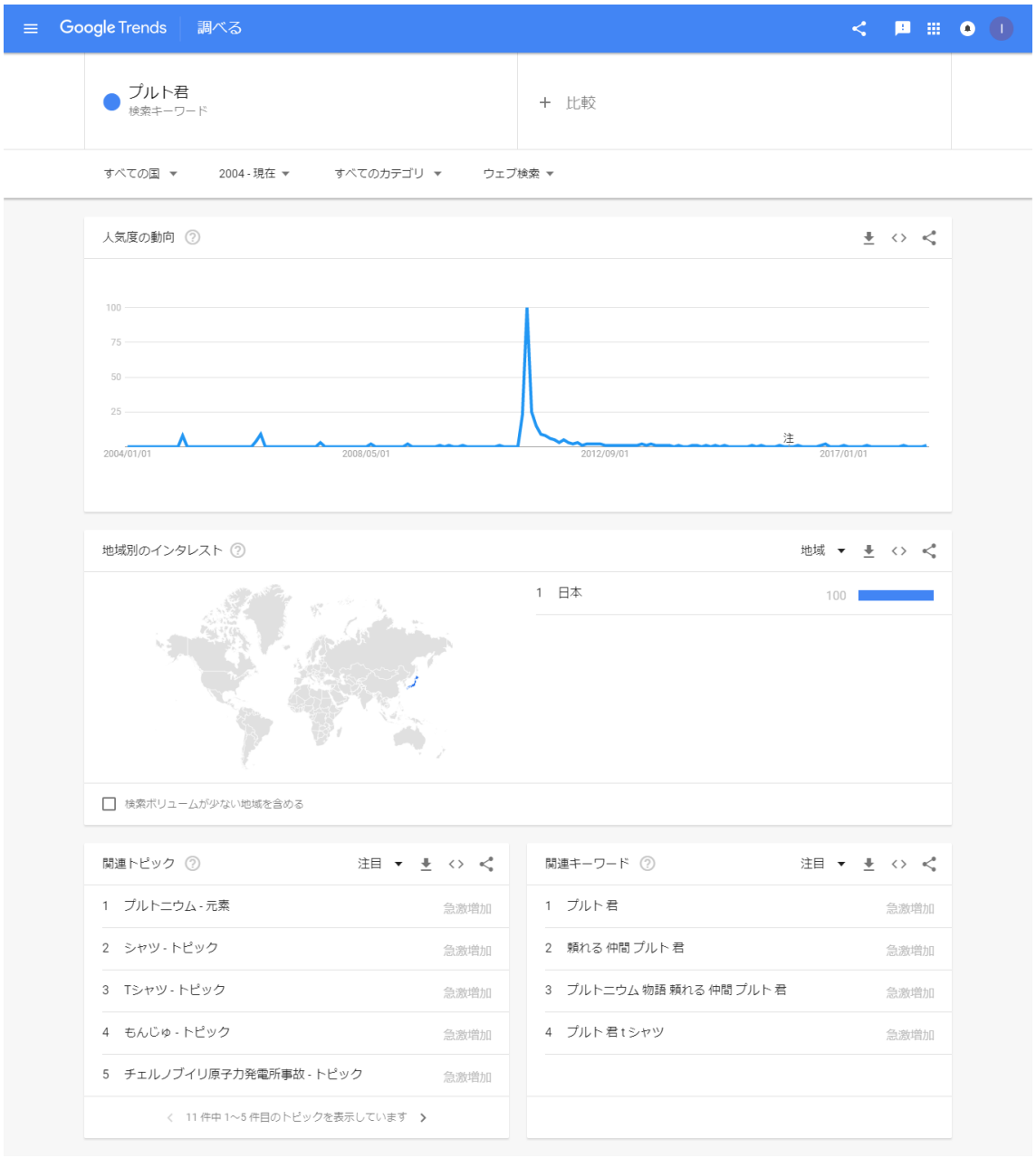

Figure. 41. The result for a keyword search for “Pluto-kun” in Japanese since 2004 on Google Trends.

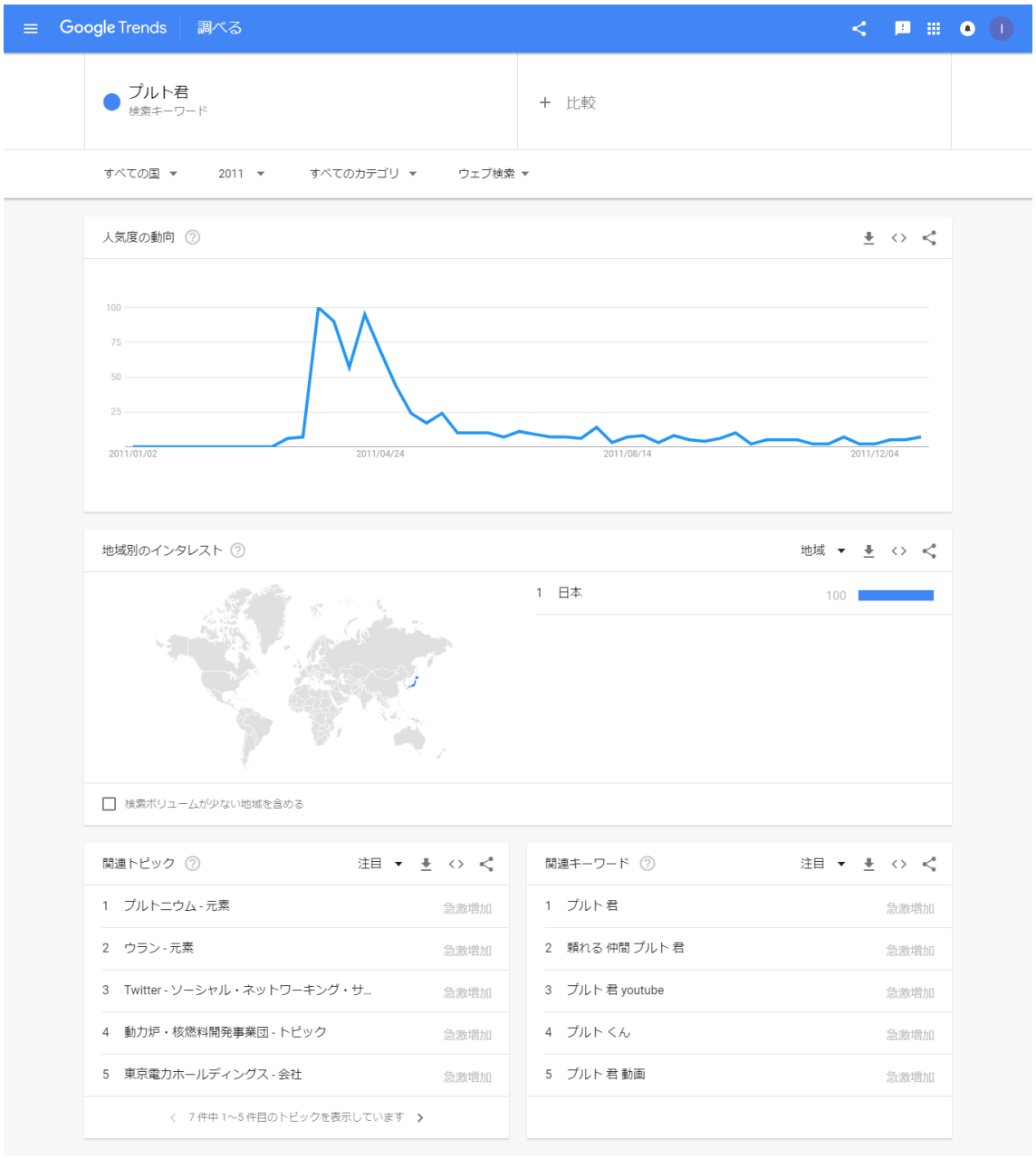

Figure. 42. The result for a keyword search for “Pluto-kun” in Japanese in 2011 on Google Trends.

From the first graph, it is clear that there was a remarkable spike in the word’s popularity during a short period in 2011, and the second one shows that people started searching the word shortly after 11 March, 2011. Its popularity peaked during the week

that commenced on 17 April, 2011 with the score of 100, followed by the week from 27 March to 2 April with 90. However, it quickly lost traction two months after the disaster, since when the relative popularity rate remained below 20. It is apparent that the word that can only refer to this fictional character grew popularity during the short period of time. The five most related search terms are equally interesting, for they include "Plutonium – element," "Uranium – element," "Twitter," "Japan Power Reactor and Nuclear Fuel Development Corporation (NPC)" and "TEPCO." This suggests that the word was likely to be associated with the Fukushima disaster as well as the uncertain characteristics of radioactive substances, and that the character was widely recognised on Twitter. The rise and fall of the fictional character had taken place so rapidly that it is difficult to pinpoint its relevance in the immediate aftermath of the disaster, but this annotated entry on Teach311.org plays an important role in preserving its value for future reference.

It is indeed difficult to compare the perception of the film before and after the Fukushima disaster, but sociolinguist Barbara Pizziconi (2015) points out that the film is a pivotal example of Japan's "progress package" to promote nuclear energy. She argues that pro-nuclear campaigns in Japan often employ "the language of 'cuteness' – soft colours, a child's voice-over" in addition to the use of anime, which is "all the more grotesque in light of the recent [Fukushima] disaster, […] as a recurrent aesthetic trope in many other forms of nuclear discourse" (Pizziconi, 2015: 167). There are interesting patterns in the circulation of the video, in that it is continuously "revived" and re-contextualised despite its absence, which accounts for how "haunted data" (see Blackman, 2015; 2019) are produced at the intersection of different temporalities, and of the material and the immaterial.

For a YouTube link to the film in the annotation on Teach311.org was already removed, the question of data traceability came to the fore, when I attempted to identify its exact content. What I could find was a number of images and comments related to the film, as well as a few illegally-reproduced videos on the web[84]. In other words, it is the "second-hand" knowledge about the character that floats in narrative fragments without the original referent. According to the annotation to the video, the character talks to the young audience in a friendly tone, explaining "the true story of plutonium": if ingested, plutonium is discharged without harm to the human body, even though inhaling or taking into the bloodstream would be fatal; there has been no known case of cancer caused by the intake of plutonium; with peaceful and calm mind, plutonium can be a good human companion. The character is also "saddened" by the fact that he has been associated with the atomic bomb, because he "dislikes war and loves his work in peaceful energy generation." Despite a rather flat description of the film in the annotation, the summoning of the ghostly figure – both in terms of its illustration and the fact that it had already disappeared from the original website – foregrounds Teach311.org's capacity of articulating such erasure, of creating what can (not) be archived.

At the same time, the reference to the deleted film has a haunting presence of online archiving, given that its repercussions and aftershocks have survived long after the loss of the original material. The sudden excavation of "Pluto-kun" is a poignant example of what Lisa Blackman (2015; 2019) calls "haunted data," because of its capacity to generate an assemblage of relations consisting of comments, responses, agencies, sites, and practices. In this respect, I argue that the video is an archival object that carries

[84] There are a few "surviving" versions of this video on YouTube translated in several languages, but it is unclear to what extent the PNC, the producer of the film engaged with removing some of them.

such relations, which, as Blackman argues, might be "visible and invisible, material and immaterial, covering the Internet like a spider web of present and ghostly traces" (Blackman, 2015c: 261). Not only does the excavation of the video's character act as an attractor that draws past responses and comments, but it also reanimates the names of places associated with the archival entity. There is no knowing why those place-specific tags including Hiroshima and Nagasaki are attributed to the annotated entry, yet the very uncertainty enables the employment of archival imaginaries that associate this elusive material with the Fukushima nuclear disaster.

The character does not attempt to hide its paradoxical nature: the film begins with the image of ghosts and pumpkins flying around, and the bedsheet ghost uncovers itself to be Pluto-kun, as though the character primarily identified himself with the scary and threatening existence. At the same time, he is quick to deny the association, and begs for a "proper" understanding, asserting that he is a "friend" of human species. Here, it is the anthropomorphised figure's identity that is radically contested. Once hidden in the shadows of ghosts, the character then exclaims "I'm not a ghost! (So get along with me!)," and tries to knock out his own ghosts. I argue that the arbitrary and paradoxical appropriation of ghostly figures is amplified by the digital affordances of Teach311.org as an archival repository that preserves traces of information, raising questions about the boundaries between self and other, inside and outside, subject and object, human and nonhuman, and ultimately, fact and fiction. In this context, the implication is that those who omit radioactive materials after the intake of plutonium become radioactive materials themselves like Pulto-kun, accruing afterlives of radiation. The process simultaneously entails that the incorporation of plutonium triggers the transformation of the human body into something unfamiliar, uncanny and haunted.

The film also fails to distinguish two modes of temporalisation that inhere in the figure of the ghost – one that has been historically associated with nuclear catastrophe and the other that signifies the long-term and imperceptible effects of a radioactive substance. Which one does he attempt to cast away by awkwardly punching them in the face? After he manages to convince the audience of the purported safety of plutonium, could his appearance as a ghost erased or forgotten? If plutonium must be "handled with care," could its ghost be treated in a similar way? Then, given that plutonium in the body remains radioactive "for a long term," is it the physical contact or its lingering historicity that renders him haunting? Although the series of questions cannot be fully accounted for, the ghost that tells its own ghost stories is more than a satire here, in considering the repercussions that its erasure and return imposes on archival gestures on Teach311.org. That is, the enigmatic reappearance of the video is complicit in creating multiple modalities of haunting mediated firstly by the growing attention to the material in the immediate aftermath of the disaster, and then by the process of referencing it as an archival entity. Thus, the staging of hauntings takes place through the traces distributed across the Internet, which become reanimated by this particular archival activity on Teach311.org.

Although the video could have been trivialised or lost traction because of its scientific inaccuracy and naivety, its dis/appearance soon after the Fukushima nuclear disaster instead functions as "an exemplary instance in which the boundaries of rational and irrational, fact and fiction, subjectivity and objectivity, person and system, force and effect, conscious and unconscious, knowing and not knowing" become unsettled and unsettling (Gordon, 2008: 97). It certainly belongs to the system in which the nation attempted to install false and misguided information in order to proclaim the safety of

nuclear energy, but the wide circulation of the video after the disaster testifies to the rise of public resentment with regard to the indifference and ignorance about the potential risks of nuclear power plants years apart. Consequently, its fictive storyline echoes with the actualisation of the worst technological breakdown it so desperately denies. However, the fact that Pluto-kun's own subject/object position as a storyteller oscillates throughout the video also indicates that "he" has no agency, despite the haunted legacy of atomic power. Humans are to blame for the misuse of plutonium after all, because they should be able to "control" the most dangerous toxin on earth. A number of historical associations implicated in the film are yet reduced to two prominent atomic incidents in Hiroshima and Nagasaki in this annotated entry, but I insist that even a small allusion to the Fukushima disaster would lead to positioning the ongoing event in a complex web of connections.

In my email exchange with Onaga, she mentioned that there was a discussion as to whether the entry should remain as it is, because the contributors received a fair amount of feedback about the link being unavailable. The "backstory" of this article later added to my speculation about the significance of absence and erasure, of indicating "something had been there." I have argued that the uncertainties surrounding the Fukushima nuclear disaster have increasingly become a point of departure for reflection upon those places buried in the historical development of nuclear technologies per se. Yet, the juxtaposition with the past gets flattened out especially when one anticipates a linear temporality that threads through one event and another. In other words, various contributions from researchers to the making of Teach311.org with diverse archival intentions and rationales often result in the unsettling of the place and time of the disaster, generating new connections between the ongoing event and what precedes them.

Specifically, the recurrence of such places as Hiroshima and Nagasaki testifies to the premise that people *should* be able to associate the events with the disaster, with a sense of anticipation. Consequently, the absence of the disaster, albeit insinuated in the entry, leads to the making of "not-so-obvious" connections between the disaster and historical events. To reiterate, the places that bear the scars and traces of nuclear catastrophe surface differently every time they are referenced, as the site of rewriting and reshaping our understanding of the disaster. I suggest that such gaps in time and space create both confining and emancipating effects, expanding our archival imaginaries as the sudden return of Pluto-kun poignantly demonstrates.

3. Other Archival Fragments: Collection of Photographs, Interviews and Fieldwork

In addition to the educational materials I have analysed in the previous sections, other unique features of Teach311.org disclose hidden archival forces operating in the making of the digital repository. Such features as the Interview Collection highlight the project's original contribution to the studies of the triple disaster. Launched in the spring of 2018, the collection consists of two parts: Documentary Film Interviews and Oral History Interviews. Both of them "problematize disasters, from immediate occurrence to the emergency response, and the slower reflexive processes of societal recovery and revitalisation," as a "modest counter to the waning of historical memory in Japan after disasters" (Onaga and Teo, 2019). The videos are only made accessible for classroom use upon request, and the interviews conducted with students from Miyagi Gakuin Women's University, a civil engineer and a thyroid specialist as well as other research materials show an interesting trend in that they have come to put a specific emphasis on the Fukushima nuclear disaster, despite the project's aim of aggregating information of the

triple disaster and disasters in Asia.

I argue that the archived objects in the subcategories of Teach311.org differ widely in terms of their focus on specific time and place of the Fukushima disaster. The fragmented recollections and records of the disaster including the dotted map, the collection of interviews and field notes on one's experience of the incident come together to confuse and dissipate the haunted imaginary produced by annotated entries I discussed in the previous section.

In the "Resources" category, one may find three subsections ("Books and Articles," "Films" and "Web Resources") that introduce external resources with annotations by contributors, whereas the categories "Photographs" and "Interview Collection" involve original research activities conducted by the Teach311.org project. While visual materials archived in "Photographs," titled "Namie Visual Archive (Beta)" purport to show the images that document the destruction and recovery following the triple disaster. Yet, the map tagged with the places where photographs were taken seems rather scarce in information, with three identifiable spots marked on the map (see Figure. 43). The visual repository is divided into two sections "Fukushima Prefecture" and "Miyagi Prefecture." While a number of images have been archived in the former category from 16 April, 2011 to 7 December, 2015, the latter only contains pictures taken together on 31 March, 2012 in the towns Ishinomaki, Noribu and Onagawa, devastated by the tsunami. The early images stored in "Fukushima Prefecture" are those of Iwaki and Minami-soma on 16 April, 2011. At that point, Minami-soma was declared as the mandatory evacuation zone, and Iwaki, the second largest city in the northeast Japan had become a main destination for evacuees despite the damage done to the city's populations. Despite the limited number of actual visual records, it is apparent that the

project's attempt to archive the visual records of the disaster has come to converge around the Fukushima nuclear disaster.

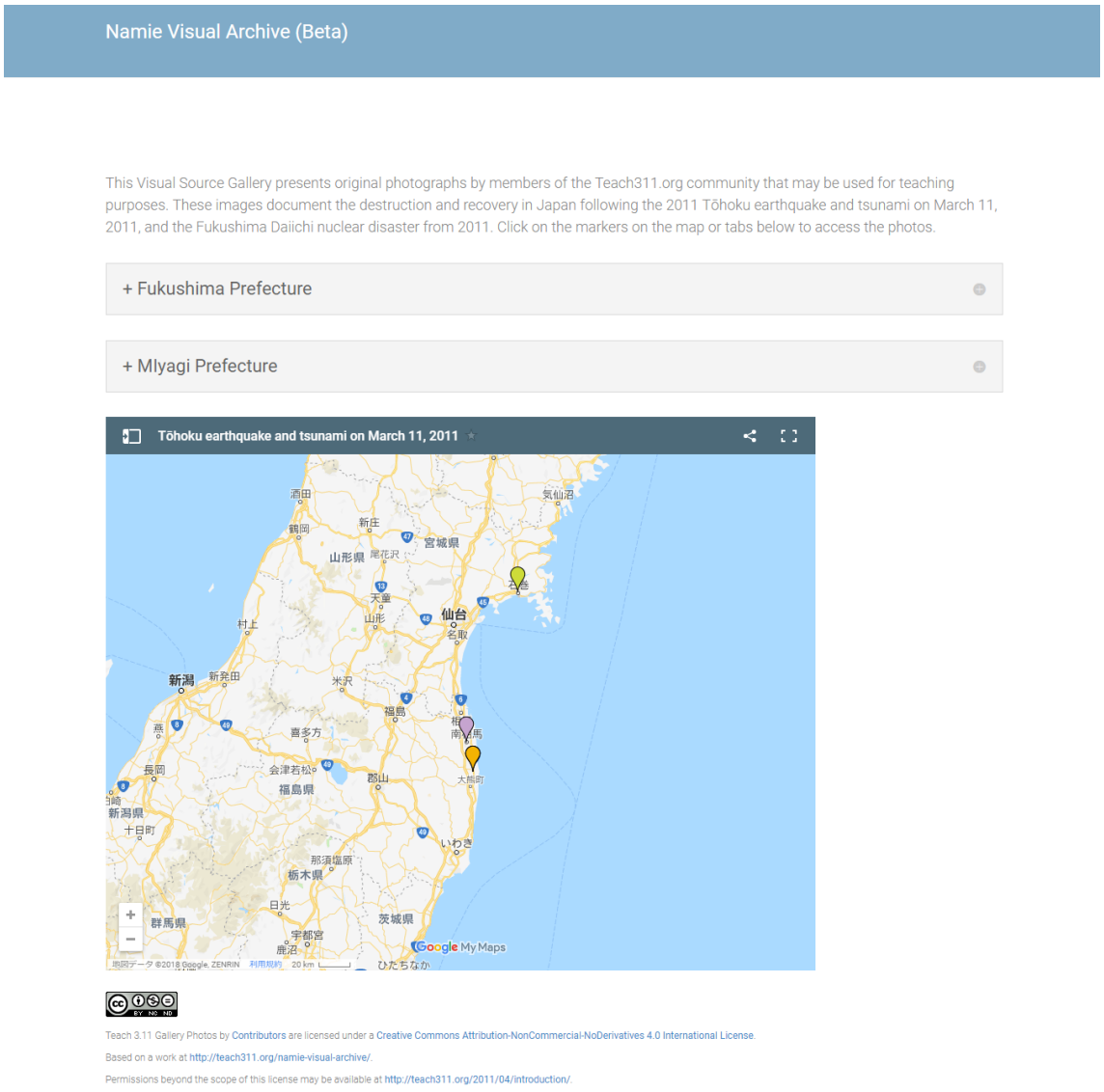

Figure. 43. “Namie Visual Archive (Beta)” on Teach311.org.

The interview collections of Teach311.org include a documentary film *Healing Fukushima* (2016) and oral history interviews with people involved in post-disaster recovery efforts. The film is directed by Sulfikar Amir, associate professor of STS at Nanyang Technological University in Singapore, and written by Shi Lin Loh, researcher in modern Japanese history and STS. It depicts how medical professionals responded to the Fukushima disaster and generated a new mode of knowledge with four distinctive

themes: responses, contingencies, practices and subjectivities from the perspectives of medical practitioners. Three short selected clips from the film are available on Teach311.org, all of which contain interviews with medical experts working in Fukushima. While their painstaking effort to share medical knowledge with the public is striking, especially when medical students attempt to explain the difference between radiation and radioactive substances (the former is emitted from the latter, causing physical effects), the undertone of the film is much more daunting when Dr. Kumagai Atsushi, endocrinologist and hibakusha (the atomic bomb survivor) in Nagasaki emphasises the individual responsibility to "live with" the risks of radiation. Another physician tells the audience that she is now responsible for her own body and her child's future, as she decided to give birth in Fukushima. These struggles among medical experts revolve around the public's lack of knowledge, and irresponsibility for not having seen what they ought to see.

The category "Notes from the Field" includes four entries that illustrate different experiences of the disaster with interviews and personal recollections. As an example, in "Essay, Learning with Namie," anthropologist Eli Elinoff reflects on his first visit to the evacuation zone in Namie in 2015. Through the guided tour, he recollects that he wanted to "make sure the things in front of [him] are not lost, that their meanings are transportable back to others […] and to understand and explain what has happened here, what is still happening" by telling his own stories (Elinoff, 2016). He expresses a sense of being left behind the rapidly changing landscape without being able to make sense of "Fukushima" as disasters "overrun" themselves. Elinoff's essay reads as the record of personal recollections in contrast with annotated resources that comprise a bigger part of the repository. The trace of intervention to the transformation of the ruined landscape

resonates with another field note “Photo Essay, Three Years after 3.11” by Ryuma Shineha, Teach311.org’s multimedia editor. It provides critical insight into the unholy trinity of the triple disaster: three years, three disasters, three prefectures damaged. Alongside the pictures of inflicted areas taken between 2011 and 2014, the essay indicates that many things remain unchanged since the moment of the disaster. Shineha’s remark on the 3rd anniversary of the disaster with reference to a quantitative description of mortality hardly indicates a sign of recovery: the destruction of abandoned houses and buildings is slowly taking place while the scars of the damage is being removed outside the restrictive zone.

Time has been both accelerated and frozen in these marginal features on the archival repository, which further extends to include a fieldwork report about a tragedy in South Korea in 2014, when a ferry sank with 476 people on board, resulting in the death of 295 people with 9 missing. Another entry in this category is an essay “Oral History and Earthquake Survivors (2015)” shared by Indira Chowdhury, the current President of the International Oral History Association. The first part of the essay is based on an interview conducted by Chowdhury with a 95-year-old survivor of the 1934 Nepal-Bihar earthquake, one of the biggest earthquakes that hit Nepal and India in history. On the same day of the interview, an earthquake with a magnitude of 7.8 occurred, which killed nearly 9,000 people and destroyed the Madan Puraskar Pustaklalaya Archives, the principal archive of books, periodicals, ephemera and other collections in the Nepali language. This is another moment of “bumping into” unexpected cross-historical connections in which one disaster leads to another, and to a collapse of an archive. Chowdhury’s piece goes on to illustrate her experience of the earthquake during a workshop later on the day, which makes her realise that “[t]he interview is now endowed

with meaning – not just from the narrator's experience but also from [her] own," and that "the connections [she is] now able to trace, create new meaning for [her]" (Chowdhury, 2015). Even though the essay does not include a reference to the triple disaster, it implication is profound and overlaps with my analysis of the digital archive by following ghostly traces in the production of memory and knowledge. The de-contextualisation and re-contextualisation of the triple disaster simultaneously take place on Teach311.org, which makes Fukushima belong to multiple times and places.

In contrast with the elusive and enigmatic entry of "Pluto-kun" that compelled me to search for digital remnants regarding the perception and the content of the video, I argue that the fragmented and ongoing projects on Teach311.org foreground the haunting forces that lurk under this interactive and participatory repository of disaster-related resources. The informational traces and fragments represented by a dotted map and personal recollections provide several vantage points to reanimate pasts and possible futures not only in disaster studies, but also in a broader imaginary that circumscribes the Fukushima nuclear disaster as "one of the most important places where meanings – comprehension – and force intersect" (Gordon, 2008: 194).

4. Reflections / Reflexivities: Mise-en-scène of the Disaster

> Nothing will have taken place but the place. (Derrida, 1991: 37)

It is not surprising Onaga (2018) revisits the prevailing notion that any research of radiation effects on the human body and the environment is based upon a long-term examination of atomic bomb victims. She introduces the idea of genba (現場), a Japanese

term for “an actual place,” with the paring of Chinese characters meaning “now” and “place” respectively. She envisages the eventfulness of the Fukushima nuclear disaster by referring to the multifaceted connotations that the word evokes as well as the im/possibility of identifying the “here and now” of the incident. However, several dilemmas arise when the word is commonly used to describe the scene of the disaster and its unfolding, as well as the material place of the incident. It stands for on-site activities to dismantle the damaged plant (see Chapter Three for TEPCO’s use of the word to pass down the records of decommissioning work), the amalgamation of technological and environmental factors that led to the disaster, or the genealogy of nuclear crises and those working in the field. Onaga thus indicates that it “carries the connotation of a real space produced through lived experience or intimate proximity, and those in it struggle to develop a scientific, technical, or medical knowledge base in order to resist dismissal or marginalization” (Onaga and Wu, 2018: 267). I will argue that the multiple discourses of “genba” in the context of nuclear events also create alternative spaces for new politics and social understandings, because of insufficient information and uncertainties regarding the repercussions of the disaster. Questioning the “here and now” of the disaster has also helped me interrogate the haunting persistence of the past in the present because the ghostly figures create “the wavering present,” which “forces a something that must be done that structures the domain of the present and the prerogatives of the future” (Gordon, 2008: 179). This makes “genba” a porous domain that is being contested, laden with histories that entail what it includes and excludes.

Onaga’s remarks concerning “genba” are thus particularly helpful in exploring how the Fukushima nuclear disaster has come to engulf the haunting resonance of other historical places, as different valences of place come to be associated with the incident.

In addition, she has already predicted that the "bind" between the Fukushima disaster and the genealogy of atomic bomb casualty research stays intact, and that medical data collected from Fukushima survivors "may tell a story that disturbs or reckons with prevailing universal understandings about the origins of extant radiation effects" (Onaga, 2018: 266). In other words, the Fukushima disaster had been destined to be a part of the intellectual legacy of radiological study that dates back to 1945 even *before* it occurred, and is now expected to be a future referent for those research activities. I therefore argue that the "here and now" of the disaster ironically extends its horizon in relation to the places of return, of both past and future disasters.

That the ongoing disaster is shaped by past events is not a novel idea. For instance, Akira Mizuta-Lippit (2015) reiterates that "[d]isaster destroys the condition of its own possibility and so *takes place without taking place*, its impossibility and thus its postponement – its deferral – is the event [emphasis added]" (Mizuta-Lippit, 2015: 4). It is worth noting that Mizuta-Lippit does not hesitate to mention that the name of Fukushima has come to stand for the entire crisis, alongside "the names of Hiroshima and Nagasaki as the names of atomic disaster in Japan," which echoes with Onaga's discussion of "genba" that articulates multiple meanings (*Ibid.*, 4). Yet, I aim to challenge the idea of the disaster "taking *the* place" or being possessed as a signifier of, for example, a nuclear catastrophe. I argue that the conflation of both physical and epistemic spaces increasingly points towards the contingent reconfiguration of the disaster as an evolving site of inquiry in the making of this archival repository. As my exploration of Teach311.org began with the entries inscribed with distant places, I am going to intervene to the production of archival stories enabled by those sites imbued with historical connotations and their own ghostly figures. At the same time, archival

decisions such as the preservation of the entry on “Pluto-kun” despite the disappearance of the original resource shows the difficulty of reaching a certain place, of identifying the mise-en-scène of the disaster. As the contributors I interviewed mentioned, the “virtual” aspect of the repository is an important factor that bring together researchers across the globe, but their engagement with disaster-related resources simultaneously calls to attention how the triple disaster is situated at a particular time and place, as a recollection of a disaster leads to the evocation of another disaster. In the following sections, I argue how the act of attuning to those places in the process of archiving wavers between two forms of speculation as to “what could have been” and “what will have been,” whereby the memories and “pastness” of the place would be kept intact.

4-1. “Meet Where We Once Were”: The Place of the Ghost

Since the tag cloud on Teach311.org is the only indicator of the thematic formation of archived entries on Teach311.org, I have specifically examined those that include the name of a place, in order to interrogate narrative modalities that the associations between distant places would create. The recurrent reference to such places as Hiroshima and Nagasaki is used to illustrate the gravity of the Fukushima disaster, even though “Fukushima” is often absent from annotations, while the entries tagged with “South Korea” focus more on the contemporary issues regarding the implementation of nuclear power. In the previous chapters, I have indicated the contingent emergence of historical trajectories that bind the Fukushima disaster to the atomic past (see Introduction and Chapter Five). But Teach311.org’s undisguised turning back to the places that generate cross-historical connections and affinities specifically brings to the fore the figure of the return, not only as an indication of ghostly haunt, but also as the

amalgamation of fragmented memories buried in history.

The projection of specific places onto archived objects on Teach311.org invokes a backward move. I have described such an unexpected encounter in relation to Avery F. Gordon's (2008) notion of "bumping into" someone else's rememory, a memory that does not belong to oneself but nevertheless emerges as a return. According to Gordon, the picture of the place is "its very sociality, all the doings, happenings, and knowing that make the social world alive in and around us as we make it ours," which "linger well beyond our individual time, creating that shadowy basis for the production of material life" (Gordon, 2008: 166). I argue that attending to the recurrence of places also leads to the crystallisation of their histories. It was a sense of anticipation that occurred to me when I saw the list of tags displayed modestly at the bottom of the website: there would be a parallel between those places and Fukushima in terms of the magnitude of events that took place in those places. That Hiroshima and Nagasaki have become key referent points to reflect upon the unfolding of the Fukushima disaster also designates Fukushima's becoming of a signifier to represent the deep historicity embedded in the complex disaster, just as Teach311.org's research projects have come to revolve around the study of those who engaged in the recovery work in Fukushima.

The message carried by these places gestures towards the transitive movement of memory and knowledge. The persistence of past lives in the "here and now" particularly resonates with Onaga's initial concern with the myopic focus on the present, and how the archive has eventually contributed to generating and dissipating multiple temporalities by means of historical markers that each contributor "bumps into." And, even though the place is where the ghost makes its occasional and unexpected return, the place as a "containment" of histories and memories of destruction "obscures other

contemporary realities: namely, that the nuclear horror may in fact be present everywhere outside this [sic] museumized site, that the world may be thoroughly contaminated by nuclear weapons" (Yoneyama, 1999: 72). I argue that Teach311.org's archival repository is not different from other digital archives I have discussed in terms of its "moving" aspects, in the way that it collects and organises disaster-related resources to be transmitted for future research, and "moves" those involved in the project to contribute their own memory fragments. At the same time, their transnational practices of archiving could also become complicit in conjuring up and consolidating the "pastness" of what the return of the place may implicate.

Lisa Yoneyama's (1999) remark on the instrumentalisation of a mnemonic object is particularly salient here, in which the Atom Bomb Dome in Hiroshima has turned into the nation's and humanity's collective heritage of catastrophe. A recognition that the Fukushima nuclear disaster is situated in the genealogy of atomic tragedies is not mere déjà vu, but also an act invoked by bumping into the layers of the shared collective memory that has long been buried and disregarded, such as an eerie return of the American propaganda film about atomic power, foreboding the danger of a new technology. The monumentalisation of the place cannot be dissociated from the temporal ideology, as Yoneyama suggests, because any surplus from the past, including those who are no longer present is cast away from the dominant narrative "justified by the a priori assumption that the unseen future toward which we are compelled to progress is already legitimate" (*Ibid.*, 75).

While "bumping into" the places where somebody else's memory resides opens up potentials for transforming the present, it nevertheless runs a risk of removing complexities of a referenced place, as many archived entries tagged with place-names

leave their connection to the disaster rather unsaid. Although the place becomes a site where one encounters the ghost and its persistence in the present, there remains a painful dilemma that the power of the haunted place may overwhelm the present, in the way that ironically generates an axis of linear time. Fukushima, then could be dis/placed in a broader and even all-encompassing discourse that brings together the history of technology, catastrophe and, after all, eventfulness – that some events are considered worthy of recording more than others.

As an example of what I mean by this, one of the first responses to the triple disaster was a recollection of the atomic bombings, as seen in the annotated entry to *Tale of Two Cities* uploaded soon after the launch of the Teach311.org project. This is a crucial precursor to consider the powerful discursive force of destruction, or the enactment of what Derrida (1984) calls "the assimilating resemblance of discourses" in the nuclear age, which eliminates the possibility of thinking otherwise (Derrida, 1984: 21). It appears that the widespread claim "Fukushima is not Hiroshima" is no longer valid in the constant and uncanny return of the place. Teach311.org's collection of annotated entries and references to various external projects point towards the process of "bumping into rememory" inscribed onto the sites where both likely and unlikely connections are made with the past. Through encountering somebody else's rememory and a haunting force that triggers cross-historical affinities, Fukushima's now and here is rather obscured than contested. Given these temporal and spatial displacements, I argue that it is important to take into account how historical trajectories on the archive helps imagine alternative ways of understanding the disaster, despite the occasional absence of the very disaster from the archived objects.

4-2. Re-enacting the Scenes of the Disaster

While the sudden return of places may characterise archival decisions by the project's contributors, the question remains as to how the conflation of historical references could give different perspectives about the ongoing disaster. Is their archiving attempt a way of remixing the past to make the Fukushima nuclear disaster more intelligible? Are those references purported to trigger shared historical imaginings that complement uncertainties and our lack of understanding about the consequences of radioactive exposure? In addition, the sudden dis/appearance of the "Pluto-kun" video shows that the place marked by an absence also constitutes the understanding of the disaster in relation to the production of haunted data and the ephemeral aspects of digital archiving. Here, I further explore entangled temporalities and spatialities afforded and re/enacted by the making of Teach311.org.

I argue that the archival decision to preserve a deleted film is exemplary of temporal and discursive fluctuations in the production of the digital archive, which becomes intertwined with the evocation of material places, both of which reanimate and redefine the scenes of the disaster, in that they together envisage the processes of historicisation. The idea of "knotted histories" that Onaga and Aaron S. Moore (2017, see Chapter One) introduced upon launching the project resurfaces through the act of collective archiving. That is, the "collision" of different places is an important precursor to identify the conversion of multiple histories triggered by the triple disaster. They questioned "What unintended consequences have resulted from past decisions?" and "What histories have remained out of view and out of reach until now?" (Onaga and Moore, 2017: 158). While these questions point towards the intricate relationship among the past, present and future, it is important to address that what the archival repository affords its

contributors to do also *have* consequences – those which call into question the past decisions *they* made. Given that the archival entities on Teach311.org have been through peer-review and scrutiny before uploading, it is the traces of their intervention that make them tell alternative stories about the disaster. Thus, I suggest that the undifferentiated listing of annotations to the materials made *before and after* the disaster, in contrast with ongoing and unfinished research projects too designates the conflation of histories. Yet, the precise temporal punctuation by uploading entries at 2:46pm certainly entails the ghost that haunts the entire project.

Consequently, Teach311.org's ambitious intervention to the histories "out of view" or "out of reach" carves out both voids and crossings, especially when it enables a number of stagings to tell fragmented stories about the Fukushima nuclear disaster. Despite the small number of materials archived in "Collections" and "Fieldwork," I argue that the deep-rooted fear and uncertainty in those personal recollections characterise "voids" in the archive. In the aforementioned fieldwork in Namie, Elinoff concludes that "with the disappearance of this profusion of displaced matter [bags filled with radioactive soil] both questions and answers also disappear," with a recognition that "the story will change once again […] something more will be understood, but many things will be lost" through another guided tour after his (Elinoff, 2016). The complex interplay of the past, present and future is in the process of reconfiguration on this loosely bounded archive: while it foregrounds historical connections that appear in a number of entries, there remains narrative margins and excesses that defy the act of interpretation. I claim that such entanglements of scenes entail that the Fukushima disaster is everywhere and nowhere, in the unidentifiable place dense with histories and uncertainties.

While Teach311.org leaves much of historical analogies to users' imagination, "the

place" of the disaster keeps being challenged in the processes of assembling disparate information across the repository. Now that the place-name "Fukushima" has often come to be spelled in *katakana* (フクシマ) instead of the original 福島 in Chinese pictograms, because "[t]he same was done with the names of Hiroshima and Nagasaki, and common element of nuclear incident and radiation" (Gill, et al., 2013: 14). Distinguished from the prefecture and city of the same name, Fukushima might have become a non-place, existing only in relation to other nuclear sites that would never be, as a city only populated by ghosts. The project's emphasis on multiple histories that converge in the wake of the triple disaster, Onaga's reflection on the idea of "genba" and my untimely encounter with the promotional film that is "ghostly" in many different ways are brought together in this question of the place of the disaster in an extended temporal and spatial framework.

5. Conclusion

That Teach311.org serves as a hub of educational materials selected by international scholars highlights the importance of passing down the knowledge about the triple disaster across time and space. However, its structure is nevertheless porous in that some of its features of do not provide sufficient grounds for why they should be regarded to be of educational importance in relation to the disaster. The relatively small number of artefacts with the last update on the seventh anniversary of the triple disaster [at the time of writing] appears to have been a random collection of disaster-related resources, despite its carefully-calculated upload time. As Teach311.org gives great freedom for international scholars with different academic backgrounds to contribute useful information, the variety of materials and forms of annotation has allowed me to identify

and analyse some unexpected returns of long-forgotten histories through distinctive tags and projects including the mapping of disaster-inflicted areas, which have not been updated since 2015. I argue that the making of this participatory repository offers significant insight into the practices of collective remembering, in which the disaster is always construed "in association with" existing fields of knowledge and other historical events.

Consequently, the contributors' commitment to providing educational materials, especially by means of annotation-writing, might be understood as the production of what Martin Pogačar (2018) terms "co-historicity," the condition of the present that "we live in a time of audiovisualized histories and memories that are ready to be kneaded and knitted into personal narratives" (Pogačar, 2018: 44). As Onaga (see Onaga and Moore, 2017) indicates "knotted histories" that constitute lived experiences of the triple disaster, the parallel historicity that threads through the project points towards the re-living of the moments of the disaster. The annotated entries related to the Fukushima nuclear disaster include those that date back long before the incident, including archival objects concerning Japan's implementation of nuclear power and the atomic bombings of Hiroshima and Nagasaki, as well as other natural and technological disasters that took place in Asia. It is clear that different historical axes criss-cross on the repository, hinting at what-if history (see Minh-ha, 2015), or "history's hidden and unseen, unrealized and annihilated potentials," whereby "past events are decontextualized, repurposed, and turned into an affective individual historical narrative to be followed, or not, by other historical communities that share our compassions" (Pogačar, 2018: 40). That is, while scholarly commitments to the project endow the repository and its archived objects with certain legitimacy for educational use, Teach311.org also becomes a vehicle to interpret

knotted and submerged historicities that resurface from the distribution of fragmented entities.

Specifically, the processes in which "Fukushima" – whether it stands for the name of a place or the nuclear disaster – have come to acquire symbolic value underscore the modes of storytelling that the project enables. The fact that such tags as "Hiroshima" and "Nagasaki" are used almost interchangeably, without reference to any aspect of the triple disaster gestures towards the inextricability of historical connotations attached to particular sites and how they extend across temporal and spatial boundaries. Consequently, the mise-en-scène of the disaster is not only a material place where it occurred, but it also engulfs a myriad of possibilities of creating and opening up spaces to the extent that the landmark disaster belongs nowhere and everywhere. The absence of (a reference to) the Fukushima nuclear disaster in the entries that allegedly relate to the event is certainly a curious phenomenon, in considering that they are uploaded as educational materials to be used in classrooms. The absence of the disaster as well as that of the original archival object nevertheless proliferates archival imaginaries to "fill in" those gaps often marked by affinities between disparate historical events. Therefore, in attending to the way in which Teach311.org makes discernible the epistemic contours of the Fukushima disaster, I argue for the need to account for the links and connections that the entities in this "virtual" online repository makes, which bring to the fore the historical resonance and tenacity of the disaster. In this context, there are parallels with Andreas Huyssen's (2003b) interpretation of "floating signifiers" which exemplify the reproduction of discursive patterns through one event with great historical repercussions. This is analogous to the way in which that the Holocaust attaches itself to very different situations. In the context of the Holocaust, Huyssen argues that the opposing forces of

relativisation and exceptionalism at work enable "a strong memory discourse and bringing a traumatic past to light or blocking any such public reckoning by insisting on the absolute incommensurability of the Holocaust" (Huyssen, 2003b, 99).

Throughout the thesis, I have argued that "bumping into" the unexpected traces of dis/appearance would affect how we perceive an event in the present. At the same time, there is a risk of legitimatising and reproducing particular narrative frameworks about the past in the production of the digital archive, within which the Fukushima nuclear disaster is to be situated. It could be said that the absence of annotation that clearly explains the entry's relevance to the triple disaster consolidates historical ties along with a few tags attributed to it, while generating discursive margins that produce the possibilities of alternative storytelling. This is a dilemma that arises not only from Teach311.org's structural features or its fragmented forms of archiving based on individual contributions, but also from certain "taken-for-granted-ness" of historical trajectories that forever binds the Fukushima disaster to the ghosts of the nuclear age and the history of calamity.

The urge to claim that the disaster is always already haunted by another disaster is all the more prevalent. Mizuta-Lippit (2015) raises questions with regard to "How to understand this not as three separate events (earthquake, tsunami, and nuclear meltdown); nor as two separate nuclear disasters (1945 and 2011); nor even one disaster that returns at a distance, its closure deferred? Rather, how to understand the space between disaster, the space suspended between 1945 and 2011, a space of suspense but also a space and time marked by the suspension of space and time?" (Mizuta-Lippit, 2015: 14) Although the impossibility of capturing the disaster's moment in the present would fixate the event in a suspended state between the past and the future, I argue

against the understanding of the ongoing disaster in relation to the limited number of "reference points" such as Hiroshima and Nagasaki, or the year 1945. Rather, my unexpected encounters with a dead link in an annotated entry, a dotted map and a personal recollection of two disasters as well as the concomitant destruction of an archive in Choudhry's essay gesture towards a multiplicity of haunting. Instead of reinstating the logic of a disaster being a return of something we already know, it is important to acknowledge that "[e]ntering one place, another often emerges in juxtaposition, along the lines of defamiliarization coalescing into a moment of connection, a configuration" (Gordon, 2008: 66).

With my primary focus on the contingent making of connections, whether conspicuous or not, between the Fukushima disaster and other sites in my analysis of Teach311.org, I indicate that multiple modes of contribution to the project disclose the flexible reconfiguration of the time and place of the Fukushima nuclear disaster. This is in part because of the repository's role as a virtual space that intrinsically has the potential to create a transnational network of scholars working at different physical locations. In addition, the dynamics of spacing in the making of this digital repository also generates thematic and temporal ruptures in uploading annotated entries and the records of other archival projects, which unsettles the "here and now" of the disaster. Consequently, several historical junctures that appear on Teach311.org destabilise and multiply the meanings of the Fukushima disaster, simultaneously decentralising and displacing the epicentre of the incident. Therefore, I claim that the haunting capacity of digital archiving and the ghosts from the past collide to engender new orientations to the unravelling disaster, by means of the equivocal and ambivalent rendering of "place" – both material and immaterial, inscribed with histories as well as futures-to-come.

In the next chapter, I will give concluding remarks on disparate archiving practices in the digital realm I have argued in chapters Three, Four, Five and Six, in relation to how hauntological imaginaries they enact permeate through all the possible stories about the unprecedented *and* familiar incident that invokes the traces of ghostly figures.

Conclusion

Figure. 44. A photo taken by the author on 19 December, 2015 at the Niels Bohr Institute.

> "We are suspended in language, in such a way that we cannot say what is up and what is down. The word 'reality' is also a word, a word which we must learn to use correctly."
>
> ——Niels Bohr, quoted by Aage Petersen in *Bulletin of the Atomic Scientists* (1963)

It was not until 5 September, 2018 when the Health, Labour and Welfare Ministry of Japan confirmed the death of an on-site worker from radiation exposure[85]. The man in

[85] <https://www.theguardian.com/world/2018/sep/05/japan-admits-that-fukushima-worker-died-from-radiation?>

his 50s had been working at the Fukushima Daiichi Nuclear Power Station (NPS) following the accident in March 2011 until 2015. He was diagnosed with lung cancer in 2016, which was the direct cause of his death. While his family did not wish to disclose the date of his death, it was revealed that his total radiation exposure was around 195 millisieverts (mSv), of which he reportedly suffered 74 mSv after the meltdowns. News of the death was later deleted from the news website of the NHK[86], Japan's only national broadcasting company. TEPCO's disaster-related portal does not mention anything about the case. Several investigative organisations formed after the disaster, including the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission (NAIIC) whose controversial report I quoted in the introduction of the thesis, had already been dissolved. These events add to a widespread perception that everyday experiences after the Fukushima nuclear disaster are imbued with erasures and forgetfulness, despite its historical significance growing ever greater seven years after its occurrence.

The aim of this thesis was not to conduct a systematic review of archiving praxes of the Fukushima nuclear disaster, nor to discuss the generic diversity regarding the organisation of different online archives. The empirical materials I have brought together and analysed are a part of the complex media landscape that has variously constructed the disaster from multi-faceted means and perspectives. In those archival repositories that articulate information about the unravelling disaster, institutions and individuals are given opportunities to assemble their knowledge and memory. I have analysed five digital archives that are still "alive" and show a continuous commitment

[86] <https://www3.nhk.or.jp/news/html/20180904/k10011608441000.html> However, an English version of the same article was still available on the company's international platform <https://www3.nhk.or.jp/nhkworld/en/news/2018090> weeks after the removal of the Japanese article. But it too disappeared by the end of December, 2018.

to archiving the consequences of the disaster. However, these archives cannot and should not be understood to represent any "trends" of archiving the event in the digital domain. Instead, they employ different measures and actors to keep/store the records of the disaster from a wide range of informational sources, including multimedia materials, personal testimonies and annotations to (what appears to be) relevant literature. My rationale for exploring them derived from the processes in which the disaster has been reconfigured by means of the digital transaction and preservation of data that could dis/appear at any time. All these archives are inevitably incomplete, oriented towards the future and future revisions. The ongoing-ness of the incident simultaneously points towards the proliferation of the realms of remembering and forgetting, in the way that traverses temporal and physical boundaries. Thus, ironically, what I have referred to as "the Fukushima nuclear disaster" cannot be defined with precision – perhaps, except for a few key events involved, such as meltdowns and hydrogen explosions at the NPS, although their causes were unclear. Although causation was attributed to damage by the tsunami, some speculated that the aging facilities might also play a part in the technological breakdown. Consequently, the uncertainties surrounding the causes of the disaster have fed into the contingent emergence of digital archives, replete with traces of confusion, controversy and a sense of affinity.

The disaster could also be thought of as having *too many* origins, when considering a number of historical analogies and juxtapositions made after the incident. As Trinh T. Minh-ha (2015) remarks in relation to her own experience of the triple disaster, the stories about the Fukushima disaster are also imbued with "what if…s": what they could have done; what if it had not happened, with silent voices of survivors echoing on, after the gradual decline of media coverage and public attention. Digital archives contribute

to amplifying disaster-related discourses, including a number of "what if…s" as well as the worst case scenarios that could and *will* have happened. The Fukushima disaster thus stands at the crossroads of myriad potentialities that may never actualise in the future.

In this thesis, I have examined multiple modes of storytelling that emerge from the making of the digital archive, which create a number of temporal and spatial trajectories to make sense of the unravelling incident. The past, present and future of the disaster are entangled in the construction of ephemeral repositories to envisage its uncertain repercussions that have haunting resonance across time and space. With hauntology as the basis of my methodological and epistemological parameters, I have argued that the digital archive brings to the fore differential narrative framings to define the disaster in its flexible and transformative capacity as a vehicle of transient data. Specifically, Avery F. Gordon's (2008) notion of "ghost stories" has helped me investigate the forces that determine what can (not) be told about the past. The idea that the ghost is "not simply a dead person, but a social figure, and investigating it can lead to that dense site where history and subjectivity make social life" offers profound insight into the conflation of fact and fiction, human and nonhuman agencies in the making of the digital archive to contest "the structure of feeling of a reality we come to experience" as "a transformative recognition" (Gordon, 2008: 8).

I have encountered ghosts in my exploration of digital archives, or I might simply have a recognition of haunting forces that permeate through the practices of archiving the ongoing disaster. In this study, the digital archive is a generative site that keeps negotiating with the recent past-in-the-making, simultaneously redefining what the Fukushima nuclear disaster is and will be. The multivalence of haunting I have observed

in those archival repositories defies fixed temporal and spatial registers, and those archives too become haunting by what haunts them in their production.

Thesis Summary

This thesis revolves around the following research questions: 1) What are the roles of the digital archive in the production of knowledge and memory about the Fukushima nuclear disaster? 2) How does the practice of digital archiving contribute to creating multiple modalities of storytelling, regardless of the ephemerality of digital traces and the contingent dis/appearance of data? 3) How do such activities delineate the disruption of linear temporality in shaping our understandings of the unravelling disaster? I have employed hauntology as an analytic hinge to intervene to these questions, in relation to the digital archive's capacity to conjure multiple temporalities and a myriad of "ghost stories," stories concerning exclusions and invisibilities.

To approach these questions, I have investigated five digital archives that came into view after the disaster: TEPCO's online repositories of documents, statements and images as well as a "moving" timeline; the Japan Disasters Digital Archive (JDA); SimplyInfo.org, Nukewatch.org and Teach311.org. Except for SimpyInfo.org, dedicated to archiving up-to-date information about the Fukushima disaster, the other four online repositories cover a broader range of topics regarding the triple disaster. With a hauntological lens I elaborated as a methodological framework in Chapter Two, I examined how these archives articulate and bring together the fragments of the disaster, with regard to *how* and *why* certain stories become foregrounded or foreshadowed. This endeavour demanded levels of speculation as I eventually engaged with gaps, absences and erasures in the elusive processes of digital archiving. The Fukushima disaster often

brought forth an unexpected excess of the past, such as occasional references to other atomic incidents and the U.S.–Japan relationship, which turns the disaster into a part of the haunting legacy of atomic power. Throughout my empirical chapters, I have discussed the complex interplay of diverse temporalities and narrative modalities that these digital archives generate.

Chapter Three examines the structure of TEPCO's online repositories, as one of the biggest sources of official information. The company keeps updating the progress of decommissioning work, technical issues and long- and short-term plans for decontamination. Albeit institutional, the way in which TEPCO keeps the records of the disaster is fragmented and dispersed across different timelines. What is first encountered upon accessing their website "Fukushima Daiichi Decommissioning Project" is a "moving" timeline titled "Fukushima Daiichi Timeline after March 11, 2011," an interactive visualisation of key events on a linear timeframe. There are a number of categories that store documents, images, videos, official statements, etc., some of which are meticulously interlinked with one another. Yet, the various modes of indexing the records would often call into question both thematic and temporal disjunctions and ruptures with regard to what might (not) have been there: for instance, some events only appear years after their occurrence in the "Photo & Video Library," even though they belong to a category "1st week after March 2011." It also features exclusive materials such as the images taken by survey robots and the live-streaming by onsite cameras, which is indicative of the roles of technologies and nonhuman actors in mediating the information about the clean-up operations. It in turn contrasts with the limited accounts of incidents involving human workers, as partly listed in "Fatal Accident" and "Trouble" on the moving timeline. The thematic and temporal vacillations in recording the

changing status of the damaged power plant and the disaster as a whole suggest how the uncertain consequences of the Fukushima nuclear disaster are interwoven into the official practices of archiving.

My analysis of the Japan Disasters Digital Archive (JDA) in Chapter Four focuses on a distinctive user-oriented feature on the digital archive, in order to explore how digital data are "brought into life" through second-order archiving and users' partial but unique engagement with the past. As this institutional digital archive retrieves disaster-related information from selected official sources, "Collections" is a significant site where the traces of user participation become intelligible. The entries in these categories play a crucial role in re-processing and re-constructing archived objects on the JDA, which capture particular moments after the disaster through the aggregation of data and personal recollections. The thorough examination of entities uploaded to these categories showed that the integrity of the archival body has been challenged by user-oriented acts of archiving, in that they represent ruptures and interruptions, but simultaneously extend the afterlives of data by conflating the relations between the past, present and future. The constant and contingent "retelling" of the disaster opens up for narrative possibilities that could have been "buried" in the digital archive, for the archive itself can only be sustained or "alive" by otherwise disruptive activities of anonymous users, which conflate the domains of fact and fiction, remembering and forgetting.

Chapter Five focuses on two archival repositories based in the United States: SimplyInfo.org and Nukewatch.org. The former has developed from a blog run by Reuters to an informational hub for up-to-date information about the Fukushima disaster, scrutinised by experts in nuclear engineering. In exploring SimplyInfo.org I faced difficulties in identifying how anonymous contributors make a decision as to the

selection of archival sources and classificatory modes, especially after the repository would often become "dormant" in terms of the frequency of updates, and the exchange with its communication manager ended. Yet, the key findings include that it is purported to preserve every archival record on the website so that users will be able to "reverse-engineer" the consequences of the disaster, and that entries on the same topic often remain scattered across the archive, which leads to speculation about future reworkings on the issue. Unlike the JDA that allows for undifferentiated and anonymous uploading of external resources, its entries are summarised or annotated by the members of SimplyInfo.org. The complex structure of the repository makes archived objects suspended in a state of expectancy as "the missing piece," the absence that could be described as a promise from the future. Nukewatch.org, a non-profit organisation based in New Mexico with a history of activism for anti-nuclearisation and the safety of nuclear facilities, also creates a mode of suspending the Fukushima disaster, but in a different way. Albeit few in number, articles and videos archived in the repository show historical trajectories that circumscribe the disaster in the legacy of atomic power, specifically in relation to the invisible effects of radiation danger. Los Alamos, where this organisation is based becomes a node where those histories converge, of which the Fukushima nuclear disaster is a part. Respectively, both archival repositories designate the return from the past and the future, in the way that leaves the lingering presences of the nuclear age.

In Chapter Six, I examined Teach311.org, an ongoing interdisciplinary, transnational and multilingual project to accumulate disaster-related literature for educational purposes. As the number of entries are limited in this repository, I began looking at the entries tagged with "Fukushima," as well as with other places listed in the tag cloud at the bottom of the webpage. I discovered that the ones tagged with Fukushima are often

cross-tagged with Hiroshima and Nagasaki, while other annotated entries do not clearly mention their relevance to the triple disaster. The category "Books and Articles" contains the biggest number of entries, where contributors upload annotated articles that are felt to be useful in understand the triple disaster. Their ongoing research projects and fieldwork also show latent connections between the Fukushima disaster and other incidents, including references to the ferry disaster in South Korea in 2014 and the 2015 earthquake in Nepal. The structure of Teach311.org particularly encouraged me to use my own "archival imaginaries" in order to speculate upon the thematic formation of archived objects: for instance, the tag "radiation" is attributed to a number of annotated entries that do not necessarily relate to the Fukushima nuclear disaster, yet entail latent connections with the incident. Furthermore, my encounter with a promotional video that is no longer available was a key moment to further my arguments about the forces of haunting triggered by the Fukushima disaster.

Throughout the empirical chapters, I aimed to identify and explore how the digital archive produces ghost stories that articulate many different versions of the Fukushima nuclear disaster. My analysis showed that those archives that continue to record the unfolding of the disaster are enmeshed with divergent temporal and topical orientations to frame the incident, as sites where the past, present and future collide and generate new connections.

Hauntings

Throughout the thesis, I have argued that various modes of haunting are at work in the practices of archiving the Fukushima nuclear disaster in the digital domain. These "hauntings" include the uncertain, transgenerational effects of radioactive exposure and

the much broader historical implications of the development of nuclear technologies per se. Furthermore, the digital archive's flexible yet elusive capacity to re-move and re-enact past records becomes the predicament of haunting that generates multiple temporalities in relation to the contingent return of submerged and disavowed narratives in the form of absence and erasure. These different modalities of haunting permeate my analysis of digital repositories, whereby my use of hauntology has come to entail divergent meanings. In addition, a recognition of haunting or ghostly figures that appear in those archives has influenced my interpretive approach to the digital archive, in order to attend to the formation of "what can be neither forgotten nor fully remembered" (Cho, 2008: 53). Accordingly, I have argued that the co-constitutive relations between the archive and the archived (the Fukushima disaster) come to the fore through a myriad of juxtapositions and historical trajectories.

In the following sections, I summarise what I have found that haunts the production of digital repositories of the Fukushima disaster, from the following perspectives: the digital archive's potential to disrupt the temporal registers of the disaster; how the uncertain effects of radiation underscore the im/possibility of weaving coherent and intelligible stories about the incident; the ubiquitous repercussions of the past that thread through the post-disaster archival landscape in the digital realm. These haunting forces could be identifiable through various archiving practices, and would often converge to reveal the complex entanglement of "here and there, now and then" as well as "a ghostly sense of dis/continuity" that defies an overarching narrative to define the unprecedented disaster (Barad, 2010: 244). I suggest that the multivalence of haunting in the making of the digital archive points towards the constant reconfiguration of the ongoing present, threading together and bringing into life what (might) have been there

in the figure of return.

The construction of the digital archive of ephemeral data and memory demonstrates the forces of haunting through the proliferating web of connections and the modes of dis/appearance that may go unnoticed. The notion of "haunted data" (see Blackman, 2015; 2019) is particularly helpful to explore temporal tensions that emerge in the digital transaction of data, through which pasts are often "dragged out" of oblivion. Furthermore, submerged and subjugated voices from the past might appear from the future as a constitutive part of knowledge production about the Fukushima disaster. The digital repositories such as the Japan Disasters Digital Archive and Teach311.org are exemplary of the dynamic life of data that leaves ghostly traces across time and space: the former incorporates user-oriented archiving practices to reinvigorate archival objects hidden in the entire archive; the latter shares links to the objects that have been made unavailable, yet annotations from contributors give a clue to (partly) recuperate "what might have been there" in relation to the telling absence. One may encounter unexpected and sudden erasures and gaps in these online repositories, but the signs are not always obvious. They nevertheless evoke critical speculation as to what is missing and why, as in TEPCO's moving timeline that seems to exclude key post-disaster events and the strange lack of documents in several classificatory categories on SimplyInfo.org. It is thus important to reflect on Gordon's (2008) remark on the conditions of haunting that "a disappearance is real only when it is apparitional because the ghost or the apparition is the principal form by which something lost or invisible or seemingly not there makes itself known or apparent to us" (Gordon, 2008: 63).

In addition to the digital archive's ghostly power to re-stage and re-move the past, what makes a digital repository a haunted/haunting entity could also relate to the

elusive nature of what it attempts to archive. Specifically, the uncertain effects of radioactive exposure are at the centre of confusion in archiving the ongoing disaster. The introduction of a moving timeline, personal collections of disaster-related articles and images, and annotated entries on digital archives all become the sites that articulate submerged narratives and silenced histories. I would like to reiterate that the im/possibility of the nuclear apocalypse and the idea of the first and the last time being merged together (see Derrida, 1984; 2006) constitute my primary understanding of the haunting predicaments of the archive. The uncertainties surrounding the effects of radioactive exposure lead several online archives to invoke historical implications of the incident, whether explicitly or not, by generating latent connections between archived objects. For instance, annotated entries on SimplyInfo.org and Teach311.org provide critical insight into how the disaster will unfold in the future vis-à-vis past disasters. This archival gesture exemplifies a sense of anticipation in terms of how the disaster will be remembered, and that past's persistence in the present specifically appears in the archive's intervention to the pasts, memories and objects that do not appear to belong to the Fukushima disaster.

I have engaged with multiple modes of haunting throughout this thesis, with a specific focus on the intersection of the digital archive's transformative and ephemeral quality and the narrative modalities that archived objects produce. It is important to acknowledge that "[t]o get to the ghost and the ghost's story, it is necessary to understand how the past that flickered by a moment before, can be seized in an instant, or how it might seize you first" (Gordon, 2008: 164). The digital archives that I have analysed constitute an assemblage of flickering moments that would only allow for partial interrogation. As my intention was not to single out ghostly agencies that reside in

digital archives on the Fukushima nuclear disaster, I aimed to unpack how haunting forces lurk behind the construction of the digital archive on the event at different levels.

The Role of the Digital Archive

There has been very little research dedicated to the analysis of the storytelling capacity of the digital archive, while its flexible nature to store memory has often been the centre of attention. On the other hand, the notion of "the digital archive" has been under intense scrutiny because the introduction of digital technologies turns the archive into a metaphorical entity (see Chun, 2013; Ernst, 2013), and changes "[w]hat is considered a legitimate contribution to the archive" over time as "a function of the transformations of the disciplines and the shifting boundaries across them" (Manoff, 2004: 14). My engagement with digital archives revolves not only around archival content, but also around the differential classification, categorisation and indexing that constitute the archive's storytelling modalities. From the institutional archive of TEPCO to independent digital repositories, the ephemeral traces of digital data are constitutive of online archives that articulate information about the Fukushima disaster. I have examined how technological affordances of the digital archive including the modes of user participation affect what can (not) be archived or, what stories these archives could tell. Initially drawing on Mike Featherstone's (2006) definition of the digital archive as a fluid, processual and transformative apparatus and the notion of "an archive in motion (see Røssaak, 2010)," I have explored how the flexible aspect of the digital archive would play out in the production of divergent archival stories to be told.

From the outset of this research, I have specifically focused on the way in which the making of the specific digital archive I have assembled and examined contributes to the

dynamic reconstruction of temporality. The temporal indexing of online archives varies radically, depending on their unique archival measures and the range of data they collect. As I have outlined the specificities of each repository in terms of their ways of tagging, classification and user participation, one of the most striking aspects of digital archiving can be observed in the way in which their organisational processes and structures call into question linear explanations of the Fukushima disaster. Such distinctive structures include an extended timeline inscribed with selected events at the plant on TEPCO's website and the JDA's function to allow users to construct their own archival stories out of its collection consisting of multimedia objects. The ruptures in updating information also points towards the digital archive's capacity of indexing key moments of the disaster delineated by curious absences and erasures, or the complete renewal of its design as seen in the cases of TEPCO's online repositories and Nukewatch.org. The contingent changes made to these archives are hard to detect, yet are nevertheless a constitutive part of digital archiving I have struggled to identify: every time a change is made, it also affects the way in which the archived object – the Fukushima nuclear disaster – is framed or "moved" within the archive. The disappearance or displacement of materials would often occur without leaving traces. Consequently, the premise that the digital archive is always in motion, in the state of flux contributes to creating multiple hauntings as "lingering presences as distinct ways of knowing and feeling what has happened or is happening" (Lee, 2016: 39).

In addition, the way in which the digital archive aggregates archival objects is indicative of the archive's particular capacity of retelling the stories about the Fukushima disaster. Not unlike the traditional archive, digital repositories are the result of inclusion and exclusion, even though the existence of archiving agencies may become

foreshadowed in the process of archiving. The "moving" aspects of the digital archive also produce uncanny effects that designates the return of the past in unfamiliar ways. Consequently, while the aim of including or excluding specific objects often remains uncertain, the partiality of digital repositories enables the proliferation of our relations with the past. As Onaga and Teo (2018) describe the Teach311.org project as an evolving platform to generate "new consciousness" about the unfolding disaster, contradictions and tensions in the constant transaction of data in the digital archive are inextricable from our lived experiences of remembering and forgetting the disaster.

Albeit ephemeral, the survival of an archival object often depends on user participation, including the involvement of the researcher herself that contributes to re-articulating and re-possessing the object, in that "[t]he virtuality of an object's properties – they only become realised when put to use – allows them to perform in contradictory ways and so anchor different narratives simultaneously" (Mussell, 2012: 80). The archive's capacity of engaging users, whether directly or not, brings into life those objects in a haunting manner: the return of archived entities would be intelligible every time they are re-contextualised and then "told differently" (see Cho, 2008), which often accompanies temporal transgressions. Regardless of the differential installation of tagging or other classificatory modes, the flexibility and ephemerality of digital archives affords users the possibility to move between archived objects, and the reciprocal movements – just as the archive is moving, it allows users to wander around within the repository – turn out to enable multiple ways of reading the relations between the archive and the archived.

Methods of Reading

As I noted in the preface, I experimented with different methods of attending to

archival stories and objects. In my initial use of co-word mapping, I recognised limitations in analysing topical issues by means of this method of digital cartography. A methodological contribution of the thesis lies in my attempt to read and interpret the multimodal stories that the digital archive conveys. However, the process was not straightforward, because of the difficulty in comparing the different structure of those archives. For instance, tracing the information on TEPCO's online repositories involved moving back and forth among interlinks across the company's website; the JDA as one of the biggest digital archives on the triple disaster kept an archival free space unmonitored, where users collect, edit and delete their personal archives; the interdisciplinary and transnational approach of the Teach311.org project foregrounds contributors' different academic backgrounds and orientations towards the triple disaster. It is thus significant to take into consideration various contradictions and vicissitudes in the practices of digital archiving as the factors that account for archival stories, and for the archival imaginaries to discern them as "ghost stories."

Discursive and temporal fluctuations and dissidence that emerge in the making of those archives disclose the way in which certain stories become privileged over others, indicative of archival power at work based upon devices of inclusion and exclusion. To reiterate, my "reading" practices have been inspired by feminist literature on disavowed figures in history and the im/possibility of recuperating the past (see Arondekar, 2009; Cvetkovich, 2003; Love, 2007), in order to engage with the contingent absences, gaps and displacements of archival objects that leave ghostly traces. My unexpected encounter with such absences led me to employ archival imaginaries to interrogate the constructedness of what we are directed to remember and forget, which opens up for possibilities for "something more" hidden in the constellation of informational fragments.

Accordingly, I have discovered that the unravelling disaster created voids and empty spaces which are also constitutive of possible stories those digital repositories could tell. The discrepancies in TEPCO's repositories regarding the description of human casualties, and the JDA's user-oriented collections and testimonials are exemplary of an archival field that demands speculative intervention and the employment of archival imaginaries, in terms of what might have been missing and/or erased. However, reading the margins and traces of erasure in the digital archive also foregrounds the contingency and unexpectedness of archiving practices, represented by the ghostly return of a video that was once deleted from the web on Teach311.org, or a number of absent archival categories on SimplyInfo.org. My attempt at reading archival stories generated by digital archiving praxes has been hindered and interrupted by these absences and discontinuities, while dispersed archival objects may be brought together to create startling and alternative narratives in "the intricate web of connections" (Gordon, 2008: 20). The making of these unexpected connections engenders archival stories full of inconsistencies, contradictions and ambivalences.

At the same time, I insist that the possibility of reading archival work does not necessarily complement or fill archival gaps and absences. On reading practices of the archive, Anjali Arondekar (2009) illustrates lucidly our desire to write a history that is (not) absent as well as our obsession with the possibility of recovery. She argues that the idea of the archive "is freighted with transformative hopes," and that "[t]he turn to the archive may carry futurity as its promised overture, but the break between what it desires and what it otherwise (re)covers renders its promise inevitably incomplete" (Arondekar, 2009: 5). In other words, focusing on erasures, absences and silencings in the archive may also end up in privileging them on the premise of recovery and

recuperation.

I argue that it is important to go back to Arondekar's claim that "[t]he return to the archive […] both fuels and empties reading practices: archival absence serves as the motivation for our hermeneutics, while archival presence paradoxically threatens the status of that hermeneutics itself" (*Ibid.*, 16-17). My analytical strategy of reading archival stories is therefore suspended between the hope for an intelligible and complete narrative and the failure of recuperating the missing moments of the disaster. Thus, the contingent coming together and falling apart of archival data would only proliferate what can (not) be remembered about the incident, or the potential plotlines to illustrate the Fukushima disaster. Consequently, the im/possibility of recognising narrative patterns that underpin the construction of the digital archive would in turn help me focus on latent connections between dispersed archived entities: SimplyInfo.org's engagement with deaths and injuries at the plant shows the traces of the repository's anticipation for more grave consequences of radiation exposure to unfold, even though it includes events described as "suspicious" or "mysterious," whereas the JDA's collections are the prime example of narrative ruptures that do not always testify to the thematic and temporal coherence or accuracy.

Therefore, the implicit modes of weaving stories in the digital archive calls for archival imaginaries in order to attend to the complex patterns of dispersal and conversion of archived entities. I argue that they do not necessarily envisage the promise of future recuperation – they might be submerged, erased or remain "free-floating" in an expansive repository. The position of the user/researcher is also challenged in making sense of relations among disparate archival objects. These fluctuations would underscore my reading based upon unexpected encounters and findings, because the narratives they

create "determine the structure and pertinence of evidence, much like the present determines how one reads the past" (Dib, 2012: 62). Just as SimplyInfo.org demonstrates its capacity of "reverse-engineering" the consequences of the Fukushima disaster from the future, the digital archive's affordances are one of the decisive factors that condition the modes of archival storytelling. The fictive aspects of annotations attributed to archival entities should also be taken into account in the formation of possible stories, because "the fictive" could mean "the ensemble of cultural imaginings, affective experiences, animated objects, marginal voices, narrative densities, and eccentric traces of power's presence" (Gordon, 2008: 25). I thus have argued that the lack of thematic organisation or coherence too becomes a field of inquiry, where several intersections with past events emerge for further interpretation. Through the reading practices that did not always come across successful in identifying intelligible stories, I have instead addressed the constellation of fragmented realities – including those not yet actualised, which affects the way in which the Fukushima nuclear disaster is construed.

Gaps, Absences and Erasures

In "reading" digital archives, I have specifically focused on the production of gaps, absences and erasures in the making of digital repositories of data. These ephemeral objects are indeed hard to capture, but an absence often becomes the storyteller. To reiterate, I do not take for granted the capacity of archival voids to disclose or supplement the purported loss and disappearance of information. Rather, my discursive approach has been inspired by Cho's (2008) remark that telling the ghost stories that haunt her family is also a failure to tell them in its entirety, because there are too many uncertainties in their articulation. Instead of "smoothing over the gaps" of history, she

attempts to "enter these empty spaces to find out what emerges, what one can learn from listening to silence" (Cho, 2008: 17). Similarly, following ephemeral traces and fragments of archived objects in the digital archive is not a straightforward venture, because the distinction between what has been erased and what has never existed could be reduced to a matter of speculation.

For instance, users may encounter "blank" categories on SimplyInfo.org, where there is neither relevant information nor any indication of whether documents, articles, images, etc. have ever been stored in those repositories. The difficulty in identifying data traces that underscore the digital archive led to temporal and discursive discontinuity that would often fail to tell coherent stories. In Chapter Six, I accidentally "bumped into" annotated entries that neither have a topic-specific tag "Fukushima" nor a reference to the disaster. One such encounter included a "dead" link to the old film for the promotion of nuclear energy, which is no longer accessible. Another example involves the limited number of surviving resources on Nukewatch.org's new archive, but the traces of erasure may not always be visible, and can only accidentally emerge in scrutiny. To reiterate, contemplating "what might have been there" does not necessarily indicate the alleged loss of archived entities, but often gestures towards the failure and "the inability of archival practices to account for the meanings and sentiments that might be attributed to or incurred by such absence" (Gilliland and Caswell, 2016: 55).

The recurrent remarks on historical events expand to encompass how the Fukushima disaster is to be remembered in relation to, not in contrast with selected pasts that are cut out from official discourses. A recognition of lack and absence in the digital archive thus leads to the formulation of archival imaginaries in the way that "imagined-but-unavailable records can serve as fertile sources of personal and public affect that is not

only a significant human and ethical consideration in itself but also can be activated and manipulated for a variety of political and social ends" (*Ibid.*, 55). Attuning to purported absences, therefore, has proven to be the projection of one's imaginaries constrained by existing cultural, political and social milieu, which account for the possibilities of reading otherwise. As they draw trajectories between disparate objects, these traces of information produced in digital archiving praxes correspond to Derrida's (1995) definition of "the archiving trace" that "no longer distinguishes itself from its substrate," whose "immanent divisibility, the possibility of its fission [is] haunted from the origin" (Derrida, 1995: 55). Put differently, ruptures are always already imbricated in the construction of the archive, whereby the implosion of fiction and reality, of the past, present and future takes place.

Additionally, the power of disappearance could also function in a way that "involves controlling the imagination, controlling the meaning of death, [and] involves creating new identities, […] haunting the population into submission" (Gordon, 2008: 124). What I described as "porous" archives of Nukewatch.org and Teach311.org, for instance, nevertheless demonstrate how their understandings of the disaster have extended to include historical references, revealing the disaster's relation to the Los Alamos National Laboratory, atomic bombings and natural and industrial disasters that inflicted many sites in history. They not only guide users to arrive at multiple historical crossings, but also demonstrate underlying meaning-making practices that determine the epistemological situatedness of the Fukushima disaster.

Drawing on the purported absence regarding the records of radium extraction in the indigenous land at Library and Archives Canada, Peter van Wyck (2012) claims that such an absence constitutes "the blind field" that is "a ghostly intrusion, a disturbance,

a return of the dead" (van Wyck, 2012: 60). As he goes on to argue that approaching the history of the nuclear is dealing with a blind field of culture, he indicates the collapse of temporal continuity in the advent of the nuclear age and the un/translatability of the impact of radioactive contamination. When the invisible fear of radiation spreads without the knowledge of citizens and their capacity to comprehend the situation, according to van Wyck, memory may come "under siege by a knowledge that had the power to rewrite and resignify," which makes pieces (of memory) remain apart, rather than making them fall into place (*Ibid.*, 61).

It is worth noting that the confusion and discrepancies in different archival repositories derive from the uncertain consequences of the Fukushima nuclear disaster, especially from (the fear of) the effects of radioactive exposure that will unravel in the future. The digital archive accommodates the power of rewriting and re-editing the past, whereby memory and knowledge about the disaster are perpetually suspended. Henceforth, the way in which the digital archive produces (what appears to be) absences and gaps is not an invitation to "smoothing over" fractured memory objects. On the contrary, the objects in the digital archive tend to become so fragmented and dispersed that they acquire dynamic life over time as "haunted data (see Blackman, 2015; 2019)" that can be moved and re-moved, submerged and displaced – in that they are accidentally conjured within encounter, without a promise of retrieval or recovery. It is through the process of bringing them together that the fragmented pieces of information "buried alive" become animated. My methodological approach based on the employment of hauntology has come to embody the re-enactment of archival objects by means of discursive and imaginative intervention. Therefore, attending to these "empty spaces" in the digital archive proliferates the versions of the Fukushima nuclear disaster: they are indeed the

spaces inhabited by the ghost, but not the dead spaces left abandoned.

The Time and Place of the Disaster

In attending to "ghost stories" that digital archives produce throughout the thesis, I have explored and challenged the production of divergent temporalities that operate in the practices of archiving the Fukushima nuclear disaster. The ways in which different temporalities come into play in those digital repositories are intertwined with specific technological affordances that allow for the rapid transaction and storage of data. As Ina Blom (2016) suggests, the production of divergent time is a significant feature of digital archiving, because the increasing dominance of technologies "expose[s] us not only to a multiplicity of temporalities and measures but, even more pertinently, to a sense that time and events are a matter of technical production" (Blom, 2016: 15). Furthermore, I have examined the recurring ghostly figures of history that come back to attribute meanings to the Fukushima nuclear disaster. To reiterate, that a nuclear event is regarded as a matter of irreconcilable uncertainty and controversy collides with a myriad of temporal registers that the flexible and transformative archive enacts. However, this is not to conclude that the "times" of the disaster proliferate without limitation. Rather, I have observed that there are epistemological predicaments and constraints that "bind" the incident to particular historical narratives.

In addition, temporal displacements also signify spatial displacements with regard to the question of multiple places where the Fukushima disaster belongs. For instance, Teach311.org's transnational approach excavates a wide range of historical literature to be associated with the triple disaster, and the places referenced in their collection include the United States, Korea, Hiroshima and Nagasaki. The allusion to the places of

historical significance reveals how a nuclear incident has been told in relation to the limited number of reference points. As a U.S.-based repository, SimplyInfo.org plays an active role in educating citizens by publishing independent reports and its contributors appearing on local radio, whereby "US" is one of the biggest tag categories used to sort information in the archival repository. Such a displacement of the place of the disaster is indicative of the workings of "rememory" (see Gordon, 2008), the ghostly imprints that may have belonged to the experience of others. As I have discussed throughout the thesis, there are several "reference points," or sites and incidents used to contextualise the Fukushima disaster. The evocation of memory embedded in these places testifies to the re-enactment of the scenes of the disaster. Moreover, it helped me formulate a mode of patter recognition in exploring narrative frameworks of the digital archive, especially when systematic analysis of digital data could ignore such subtlety among archived entities (see Chun, 2014).

Importantly, I argue that the juxtaposition of events across time and space does not necessarily entail the desire for the whole, or the logic of linear progress, given that new information about the Fukushima disaster has constantly been "found" years after the incident. Rather, it signals the epistemological predicament that "the past takes form of something already fragmented, 'split,' and decaying[87], to which the present and the

[87] Freeman refers to the monster's body in Mary Shelly's *Frankenstein* and its historicity, through which erotic contact with the past occurs as bodily encounters. However, it is also worth noting that the words used here such as "split" and "decaying" resonates with those used to describe the state of the atom. As I quoted in the Introduction, Robert J. Lifton (2011) claims that the "splitting of the atom" underlies the prevalent discourse that relates the Fukushima disaster to atomic bombings. Karen Barad's (2010) argumentation of ghostly/ghastly figures in quantum physics revolves around Schrödinger's cat experiment, in which the atom's indeterminate fate (decay) creates a superposition of cat's being alive *and* dead, as an example of ghostly matter that only comes into existence through observation. Although the conflation of the language might be coincidental, the failure to achieve the integrity of the body and memory is prevalent in the discourse surrounding nuclear technologies. In conceptualising the notion of the

future are somehow porous in an analog way, and for which bodies are both metaphor and medium" (Freeman, 2010: 116). Time is inevitably made "out of joint" in the making of the digital archive, which opens up to multiple temporalities and histories. In addition to the prevalent gaze at the past afforded by specific features of the archive, the assertion that futurity is always already imbricated in the construction of the digital archive also threads through the practices of archiving in the digital. One of the evolving shifts that the digital archive has brought about is a tendency "to chase memory before experience, to focus not on the was [sic], but on the proliferating might be, to rebut teleology, to see life not as pieced and stitched into an ordered, determinable, and necessary whole, but as unavoidably porous and multiple […], meshed in continually and rapidly diversifying, never finally coalescing, always contesting discourses" (Koltun, 1999: 120). That is, the

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nuclear sublime, which is to think about the unthinkable and to exist in one's own nonexistence after mass destruction of species, cultural theorist Frances Ferguson (1984) draws on American author Jonathan Schell's (1974) account of nuclear annihilation. With regard to Schell's remark on "the generations of the unborn" that would be prevented from ever existing in a nuclear holocaust, Ferguson claims that the figure of "the unborn" comes to resemble "*the undead*" that compromise the position of the living. The uncanny conflation of birth and death leads her to reflect on Frankenstein's monster, in terms of Frankenstein's failure of becoming an omnipotent creator as she discusses: "[I]n Frankenstein the notion of overextension comes to be something like the sign of the monster's monstrousity. His skin is too tight. […] The monster, in other words, is stretched too thin, as if his skin represented an unsuccessful effort to impose unity on his various disparate parts" (Ferguson, 1984: 9). The underlying irony is that the monster that blocks the unhindered path to the future of scientific progress also destroys the Frankenstein family in the end. This thin skin of the monster also entails the boundary breakdown between human and nonhuman, subject and object, living and dead, which resonates with Haraway's (1991) famous question "Why should our bodies end at the skin, or include at best other beings encapsulated by skin?" (Haraway, 1991: 178) These references to the paradoxical monster appear to converge when the hope for the future promised by technological breakthrough collapses amidst the production of multiple temporalities. As I pointed out in relation to the porous coverage of human and nonhuman casualties in TEPCO's archives in Chapter Three, and the description of "humanoids" in Chapter Five, the inversion of life and death is prevalent in telling stories about the illegitimate child of modern scientific endeavour. Or, this favourite trope might have more to do with the novel's original title *Frankenstein; or, The Modern Prometheus* – in that the wisest Titan in Greek mythology that gave fire to mankind has been associated with nuclear technologies as in NASA's Project Prometheus in 2003 to develop a nuclear-powered spacecraft.

focus on futurity instead of "past-ness" in the digital archive is indicative of the proliferation of potential realities articulated by constant reconfigurations of, and renegotiations of the complex relation between the archive and the archived. Consequently, the unstable yet flexible engagement with the past calls for us to "find the occluded, but nevertheless present, marginal voices, to locate the many borderland regions where the new global mainstream […] exposes its constructed artificiality, and hence reveals and defines its sphere of acceptance" (*Ibid.*, 120).

The temporal and spatial reconfiguration of the Fukushima nuclear disaster is prevalent in the digital repositories I have examined. But, it takes multiple forms, depending on the sudden dis- and re-appearance of archival objects. It is not surprising that the Hiroshima and Nagasaki bombings are referenced in the resources on Teach311.org, but the allusion to atomic power also surfaces in Nukewatch.org's collection of videos and articles that situate the Fukushima nuclear disaster in the continuing history of nuclear facilities in Los Alamos. They respectively create haunting sites that encapsulate the Fukushima disaster, by "taking the place" of juxtaposed events. Undoubtedly, such spatial replacement and displacement accompanies the emergence of different temporal registers. As I argued in the previous sections, this temporal and spatial reconfiguration of an ongoing incident also becomes the source of absence and erasure, because the new epistemological space emerging from archiving praxes would often negate historical specificities of different times and places. It is a process of making the unfamiliar familiar through the act of return, in that the place opened up in negotiation with the past "is neither an origin nor a final destination, keeping [one] suspended between a failed remembering and an incomplete forgetting" (Cho, 2008: 79).

It is thus significant to attune to, and pay careful attention to the modalities of

storytelling at work that are stretched across time and space. In addition, the uncertainties of the Fukushima disaster have also been associated with the places where humans cannot enter – the inside of the reactor units and exclusion zones. All these juxtapositions and affinities are employed to account for the construction of archival frameworks to pass down the knowledge and memory of the disaster, whereas the ephemeral and moving features of the digital archive accommodate further interrogation of what falls off the web of connections.

Openings

So far, I have indicated that the practices of digital archiving generate myriad modalities of storytelling that produce a number of "versions" of the Fukushima nuclear disaster, which call into question the differential temporal and spatial registers of the event. Hauntological analysis of those archives testifies to the multivalence of ghostly forces that formulate our understandings of the Fukushima disaster, in the way that discloses the binding of the past, present and future. However, a deep sense of distance – physical, temporal and epistemological – has underscored this research from the beginning. Having spent more time abroad than in Japan since the Fukushima disaster, I knew that this study in the field of humanities would neither be a part of a body of scientific literature that has pursued the truth behind the unravelling of the disaster, nor based on fieldwork and close observation of the incident. This sense of distance might be pertinent to what Gordon calls "the proximity of the remote (the past is in the present, the childhood that is in adulthood, the dead that are in the living)," or feminist theorist and artist Bracha L. Ettinger's (2006) notion of "distance-in-proximity" in relation to the (co-)emerging of the Other that serves as both subject and object (Gordon, 2008: 52).

Ettinger conceptualises the ambivalent production of difference, in which "[b]orderlines between subjects and objects become thresholds, borderlinks between partial-subjects are transgressed, and traces of diffracted objects are shared between, and are transferred among, several partial-subjects with-in active-passivity in metamorphosis" (Ettinger, 2006: 72). At the same time, what the Fukushima disaster entails keeps expanding to encompass the legacy of atomic power and possible futures to unfold.

The struggle over a threshold haunts the thesis both literally and figuratively, given that the construction of the digital archive is inextricable from that of the interface as a boundary object between human and machine, material and epistemological traces of the past (see Ramsay, 2018), and that the "non-linear threshold" model has been implemented by scientists to measure the impact of radioactive dispersal, which means that there is no "safe" level of exposure to radiation. Nevertheless, the official threshold for radioactive exposure has been arbitrarily defined and redefined after the Fukushima nuclear disaster, as the Ministry of Health, Labour and Welfare temporarily lifted the emergency dose limit from 100 mSv to 250 mSv per year in 2015[88]. The disaster that refuses to be buried in the past also confounds the distinction between subjectivity and objectivity, raising a question about who possesses the memory and knowledge about the event, as seen in the various modes of participation in the making of the digital archive. A number of references to historical events that emerge in digital archives would also challenge where/when the Fukushima disaster belongs. The disruption of boundaries echoes with Joseph Masco's (2006) speculation that "the nuclear uncanny" proliferates the realm of imagination, creating a temporal ellipsis and a rupture in the cognitive

[88] <http://www.world-nuclear-news.org/RS-Japan-to-raise-worker-emergency-radiation-exposure-limits-2101154.html>

frames of orientation to the world. This "most profound" effect of the nuclear age keeps resurfacing in the practices of digitally archiving the Fukushima disaster, in the way in which "individuals either numb themselves to the everyday threat, or are conditioned to separate themselves from their own senses, losing themselves in a space that is simultaneously, real and imagined, both paranoid and technoscientific reality" (Masco, 2006: 32). Thus, this research is a result of analysing constant negotiations and reworkings of the ongoing present that bears the burden of such irreconcilable contradictions, as well as the traces of the past and the future.

However, to claim that inherent uncertainties surrounding the effects of radiation exposure might open up for possible futures is a risky business, even though the flexible and fluid capacity of the digital archive gestures towards temporal multiplicities to reconfigure lived experiences of the disaster. I am aware of a weird fascination with the effects of radiation as an omnipotent force of transformation: for instance, scholar in comparative literature Gabriele Schwab (2014) discusses that a recognition of those who live in the invisible danger of radiation (e.g. the survivors of the Chernobyl disaster in the exclusion zones) might open up for "new makeshift assemblages between humans, animals and technological objects" in transnational relations between life and death (Schwab, 2014: 96). She calls the new logic of death worlds "nuclear necropolitics," in which the psychic effects of terror, death and fear are transformed into a new freedom and conviviality of living with nonhuman others. It is these new intensities, Schwab insists, that turn nuclear catastrophes such as Hiroshima, Nagasaki, Chernobyl and Fukushima into the predicament of "an incredible resilience" to hold onto life. Furthermore, scholar in American literature and environmental humanities Stacy Alaimo (2016) refers to the Fukushima disaster as a trans-corporeal event that "flooded

the Pacific Ocean with radiation," and the flows of radiation circulated through "water, marine life, and terrestrial human bodies" that eventually led back to nuclear weapons testing in the past (Alaimo, 2016: 128-129). Her interpretation of the disaster relates to the production of diverse material agencies that circulate and constitute the conditions of living in the present.

The romanticisation of technological transformations of the body and the environment, as well as the rise of new relations between human and nonhuman could be a way of reading the catastrophic event for productive ends. I understand the urge for connections – physical, emotional and historical – in order to overcome the recurrent fear of radiation that the Fukushima disaster brought into everyday lives. At the same time, its implications are often appropriated to account for a bigger environmental crisis we are facing now. For instance, a group of scholars attempt to define the Fukushima nuclear disaster as "a singularity of absolute territorialization, as a moment when life escapes formations of categorical or territorial capture," because it accidentally ended "the world as we know it and made in its wake both an *un-world (immonde)* as well as the possibility of a new Earth [emphasis in original]" (Cole, *et al.*, 2016: 211; 215). It is somehow startling that, even though they discuss that the Fukushima (or referenced as "Fukushima" in brackets in this article) is an event that realises the age of the Anthropocene, its space and time are constrained in the framework of Japan's post-war political economy that both demonises and glorifies the implementation of nuclear technologies. In situating the Fukushima disaster as a point of departure, and as a "shock of the new," the three humanities scholars appear to agree on the power of the disaster that creates disruptions in social, political and material strata in order to envisage the breakdown of the Western (and what they call "Eurocentric") dualism

between nature and culture, human and nonhuman – but with the colonialising gaze that emphasises the historical and geographical uniqueness of the event. The rhetorical inversion of causality is particularly insidious when it is based on the hypothesis that there is an epistemological shift pre- and post- Fukushima.

The findings in my analysis of the digital archives on the Fukushima disaster run counter to such a reductionist vision. At the same time, the contemporary shit in the conceptualisation of the archive would often fall into their place of extreme inclusivity. Media theorist Jussi Parikka (2016) reflects on the planetary forces and the apocalyptic vision of the Anthropocene that produce the multiplicities of time or chronoscapes. His argument about the imagined futures in the joining of human and natural history extends to the redefinition of "the archive" as something that "pertains to discussions of geology, the earth, its natural history, and hence this scale of the supra-historical," whereby the archive – mediated by both human and nonhuman actors becomes "emblematic of a social memory that increasingly finds itself bound in and by nature" (Parikka, 2016: 132; 145). Despite the importance of discussing the multiple axes of temporality, it needs to be emphasised that "Fukushima" is not *the* idea, it is an actual place where people live and used to live, where the worst nuclear disaster in the 21st century happened and is unfolding, and is never a representative of the manmade geological epoch or a very useful stage prop to contemplate the immanence of environmental crises. Even though digital archives enact multiple temporalities to frame the unravelling incident, what they encompass is not an unconditional praise of future possibilities: they delineate cruel continuity among disparate events distributed across time and space, rather than indifferent or wilful detachment from the past.

It is ironic that the aforementioned paper on the Fukushima nuclear disaster and the

Anthropocene concludes with a story of kizuna, raising a question "How does one become a friend of radiation and embrace the *kizuna*, or friendship of the irradiated territory [emphasis in original]?" (Cole, *et al.*, 2016: 227) Kizuna is the word I started this research with, and they dream of utopian futural becomings through this friendship with nonhuman actors. How delightful is it to assume that they have experienced this ground-breaking event as a moment of awakening, which entails every possible change: geological, epistemological, psychological, etc.? But the bond is also something that confines us, gets us stranded in the middle of confusion, but generates unexpected connections every now and then.

In the course of this research and outside digital archives, I have seen the Fukushima nuclear disaster referenced many times as a critical turning point to reformulate our epistemological framework. In developing the notion of "the posthuman predicament," Rosi Braidotti (2013) refers to the Fukushima disaster as one of the "natural" disasters that call for the importance of human-nonhuman unity based on shared vulnerability and mutual dependence. She claims that the proximity to death and threat enables sustainable and affirmative ethics for future generations in the way that creates "the chaotic and generative void of positivity" in the process of becoming within interspecies relations (Braidotti, 2013: 136). "A faith in future" is required in this new formation of subjectivity, which is the last thing I had expected from my own research, probably because I see the unravelling disaster as an impasse, haunted by multiple ghosts that have always already been there.

Even though the digital archive gestures towards the future with the possibility of the return, it remains a battlefield in which matter and meaning constantly get made. I am also cautious about Barad's (2017) current theorisation of "an unending dynamism of the

opening up of possibilities" and all possible histories in relation to the world-making capacity of the void that subsumes the various forms of violence and erasures (Barad, 2017: 76). She too argues that the Fukushima disaster incorporates all the bodies inflicted by atomic bombings and the Trinity Test, as a threading through of living and dying. Although the juxtaposition of the Fukushima disaster with other atomic incidents is inevitable in the assessments of the effects of radioactive contamination, how would it be possible to focus on the specificities of the incident – such as in the fragmented accounts of on-site workers' deaths and injuries in TEPCO's repositories and an anonymous person's gaze at the representations of flowers in the JDA's Collection? Thinking about alternative futures may be possible, but they are also entrapped by the historical sedimentation of values and meanings that cannot be undone. This is exactly why the word *kizuna* became simultaneously encouraging and confining in the "crisis-shaped present," in the way that confirms "our attachment to the system and thereby [confirms] the system and the legitimacy of the affects that make one feel bound to it, even if the manifest content of the binding has the negative force of cynicism or the dark attenuation of political depression" (Berlant, 2011: 227).

I am increasingly ambivalent about the idea of distance-in-proximity, when the Fukushima nuclear disaster is used as a backdrop of contemporary theoretical debates such as these. Indeed, the future-oriented aspects of the digital archive proliferate possible stories to tell in the rapid transaction of data, but it requires one's commitment to, and accountability for the modalities of storytelling instead of the investment of hope to the future unknown. The digital archive functions as a lively conveyor of embodied memory and experience, which articulates what can (not) be remembered and told about the ongoing disaster. For me, the Fukushima disaster is, has been and will be the

business of the present, even though this ongoing present is shaped by constant negotiations with the past and the future. What is rendered possible from multiple temporalities generated by digital archiving praxes, if any, will be myriad ways of reading their implications because "there is always agency at work as the remembered takes precedence over the forgotten" – and what is called out as the agency inevitably includes *us* (Mussell, 2012: 80). But, whether the omnipresent ghosts that disrupt temporal and discursive boundaries dis/appear is far beyond our control and mastery. And yet, future possibilities are the byproduct of this endeavour, not the outcome.

Conclusion

To my recollection, an exhibition that took place at the 21st Century Museum of Contemporary Art, Kanazawa from 27 April to 1 September 2013 had a poignant impact on the inception of this research. The exhibition, on which I wrote a paper for a 2013 conference *Affective Experiences in Art, Design & Research* was aptly titled "Visceral Sensation: Voices So Far, So Near," capturing the ambivalences and contradictions with regard to boundary-making practices in the aftermath of the disaster. The phrase "so far, [yet] so near" perhaps most appropriately describes the sense of entrapment I have had for the last four years. The exhibition shed light on the "visceral system" different from the brain and "body-wall system," which "harbours memory of life itself and the rhythms of the universe" in relation to sensations, perceptions and emotions. It was inspired by the Fukushima nuclear disaster, as the curator Emiko Yoshioka explains in the catalogue. She further adds that "[i]n the months following the 2011 Tohoku Earthquake and nuclear power plant accident, as society fell into chaos around us and we grew anxious over the invisible threat of radiation, I felt my instinct to impose self-restraints and

exercise self-control go to work unconsciously" (Yoshioka, 2013). The "visceral" in the English title originally translates as "organs (内臓)" in Japanese, and I was struck about the exhibition's intention of bringing to the fore the intensities that emerge from the core of the body. As Yoshioka conflates sensation, perception and emotion with primordial corporeality that emerges as a voice from internal organs, the body becomes inside-out without stability, dissolving rigid borders and demarcations that matter and materialise. Here, organs, the organic and the inorganic, and organism altogether comprise a playful and friendly lexicon.

The exhibition succinctly demonstrates the troubled boundaries in the face of a nuclear crisis in terms of temporal and spatial reconfigurations of the body. It is as if, "society was not sufficiently mature to make technology its *organ* [emphasis added]," which is Walter Benjamin's (1968) description of the aesthetics of modern warfare (Benjamin, 1968: 242, quoted in Freeman, 2010). The Fukushima nuclear disaster exemplifies the shift in conceptualising the body's open relation to the world, for what counts as a body has become radically challenged. As the title of the exhibition suggests, there was a conflation of different sensory perceptions such as voice, vision and touch, in the way that Henri Bergson (2002) theorises the mutual transformations of tactility and vision. Indeed, the Fukushima nuclear disaster has become a synesthetic experience because of its imperceptibility. To give a few examples: Japanese performance artist Ei Arakawa's installation *Iwaki Odori* (2013)[89] invites the audience to eat soup made from vegetables produced in Fukushima, which is in ironic contrast with the government-led campaign "Food Action Nippon" with a slogan "Support them by eating!"; technologically-mediated vision inside the damaged disaster also offers artistic inspiration (see Chapter Three);

[89] <https://www.youtube.com/watch?v=vvQUCaDAtjU>

Nobel laureate Elfriede Jelinek's play *Kein Licht* (2012) inspired by the Fukushima disaster revolves around a dialogue between A and B to be performed by more than three actors – the fear of not being heard in the face of a crisis is transformed into an obsession with the skin. "Making sense" of the disaster involves everything *sensus* (the Latin word origin for "sense") means – perception, feeling, undertaking and meaning.

These troubled sensory experiences are too elusive to contain. As the body was increasingly inscribed with contradictions and uncertainties, I sought *bodies* of knowledge and memory production, which are nevertheless permeable and even more volatile. Jamie A. Lee (2016), scholar in archival studies develops the idea of "the archival body" that "exists in the liminal and porous space and time between past and future," allowing us to communicate across generations (Lee, 2016: 38). The shape-shifting body of the digital archive has become a vehicle of multiple temporalities and embodied experiences that keep articulating both collective and individual recollections of the disaster. Yet, such an archival body is co-constituted by the constant re/workings of archival imaginaries to interpret the dynamic and ephemeral forms of storytelling it yields. The digital archive is, and has a body that transforms. Its haunting forces afforded by the elasticity of digital technologies and the complex historicity that archival objects convey are thus oriented towards possible futures to be written and overwritten.

And, indeed, the possible futures are haunted and bound by what precedes them.

Gordon (2016) begins her article "Some Thoughts on the Utopian" by saying that she "had hoped to have a really good story to give you," and "to give you an engaging narrative with characters, setting and a plot" to delineate utopian consciousness that is imbued with the weight of loss and our longings (Gordon, 2016: 2). The utopian ironically encompasses a radical refusal of the world as we know it in the present, and a search for

an otherwise and *an elsewhere* in the historical here and now, rather than positivist investment in progress and collective political projects. It is not surprising that the utopian is indebted to hauntings in that "[g]host or haunting is a way we are notified that what's been contained or repressed or blocked is very much alive and present, messing with the variety of ways we have to keep the troublesome from rattling around the house or appearing at inopportune moments, like at work" (*Ibid.*, 14). In other words, the utopian haunts in the way that makes the present waver, because the alternatives the utopian promises are already imbricated in the fabric of everyday. Ghosts are the sign of a breakdown, of modern systems of power that fails to function, contain and block social violence that makes itself known and visible through haunting.

I too had hoped to have a good story. The Fukushima nuclear disaster is a breakdown of the systems that failed to contain – the promises of modern technological enterprise and, quite literally, radiation as a ghostly matter. *What contains* the memory and knowledge of the incident is as fragile as the damaged facilities at the Fukushima Daiichi NPS, but perhaps it is its porous boundaries that sustain the thought that there is something to be done and said. The digital archives I have examined exemplify how we are living the ongoing-ness and historical transformation of the disaster, in relation to fragmented, partial forms of memory and knowledge production, as the consequences of the Fukushima nuclear disaster have been so meticulously incorporated into the fabric of everyday life that they would often slip away from the dominant discourse.

During the decommissioning process, thousands of bags filled with radioactive soil are left in temporary storage across the Fukushima prefecture. There have been plans to recycle and reuse the soil to construct new roads, seawalls, railways, etc., and the

Ministry of the Environment issued a plan to build a new road in May 2018[90], with the city of Nihonmatsu in Fukushima as the testing ground. The government further intended to use the contaminated soil for the development of agricultural land, setting the maximum radiation of 8,000 Bq per kilogram, which is more than eight times higher a level of radiation than the average soil used for construction. Where the soil is used will be kept confidential. This is one of the small stories that constitute a bigger story of the Fukushima nuclear disaster. The implication is that the source of fear produced as a result of an unprecedented technological breakdown will be distributed across the country, to form the material ground of where people live. This is not a metaphor, and we will walk on the irradiated soil, on the memory object of the Fukushima disaster buried alive, at a depth of 1.6 feet (which does not sound deep enough for a proper burial). We are bound to live on a secret archive.

The digital archive is akin to a burial chamber in that the act of archiving would performatively mean that something is buried, yet with a potential of reappearance or of being brought back to life. Its boundaries are leaky, and it is far from a repository that keeps everything secure inside, especially when there is no "outside" the nuclear imaginary that the Fukushima nuclear disaster has triggered. The repository is the problem in the first place, because we only have temporary ones for objects, memories and thoughts until we are aware what has been contained is very much alive and present. Not to mention, the digital archive that generates unexpected encounters with the recent past never resembles a normative trope of women's bodies as "the repositories for generational logics of being and becoming," which "then become the transmitters of that

[90] <https://www.newsweek.com/fukushima-radioactive-soil-might-be-used-build-new-roads-and-residents-are-not-906184>

logic to the next generation" (Halberstam, 2011: 70). The consequence of digital archiving is mutation, not reproduction. It neither carries hope nor complete void. Yet it is entangled in a complex web of connection as suffocating as *kizuna*, the ties that cannot be undone. The haunting repercussions of nuclear technologies become merged with the ephemerality of digital repositories, which multiplies the temporal and spatial registers of the Fukushima disaster, instead of reducing the event to a mere historical reference point.

On my visit to Copenhagen for a PhD workshop *Matter, Sensation and Meaning* in 2015, I went to the Niels Bohr Institute where I took a picture of the plate commemorating scientists who worked at the laboratory. The phrase "suspended in language" is one of the most famous quotes by Bohr on the limitations of subjectivity and objectivity, which also became a title of his biography by Jim Ottaviani (2016), writer and former nuclear engineer. At that time, I did not realise that the phrase and Bohr's legacy would profoundly loom over my work on digital archives on the Fukushima nuclear disaster. In exploring the stories of ghosts in digital repositories, I have seen a myriad of realities unfold from multiple vantage points. The boundary between reality and fiction blurs just as we often fail to distinguish the Fukushima disaster from past atomic incidents. Perhaps, my frustration of not being able to identify how and why certain archival objects create ghostly effects might be because I am also suspended in language, devoid of appropriate words to tell stories about the archive and the archived. Now that the memory of my brief visit to Copenhagen comes back to haunt me, I seem to have come to terms with the ghostly repercussions of the Fukushima nuclear disaster and those of digital archiving practices that generate temporal and discursive ruptures, but this could also be a delusion. Because the disaster could belong everywhere and

nowhere, I cannot distinguish between my attempt to chase ghost stories and being chased by the ghosts of the disaster.

Nevertheless, I hope that the thesis has demonstrated a partial but critical intervention into how the digital archive shapes our understandings of the Fukushima disaster, by shedding light on its capacity to articulate memory and knowledge in the form of ghostly storytelling. Those ghost stories that I excavated, or encountered in digital archives are destined to be overwritten, because they are the "stories that tell stories" (see Haraway, 2016). In weaving these archival stories that refuse to fall into place, I came to a conclusion that is slightly different from Margrethe Bohr's line that I quoted at the beginning of the preface: indeed, it is not *a* story but stories one has to be accountable for reading – and certainly without a beginning and an end, because we are suspended in the middle of unfinished stories. The digital archive embodies painful, yet convivial relations with the past, and ultimately, brings forth a reckoning that we are haunted by the ghost of our own making – and if it has the body open for various transformations, it must be the one with so many sutures and stiches like Frankenstein's monster, some on the way to healing, others still bleeding.

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Figures 15-22, 25 and 26: <http://jdarchive.org/en>

Figures 28, 30-33: <http://www.fukuleaks.org/web/>

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Figures 39 and 43: <https://www.teach311.org/>

Figure. 2 was retrieved via the Wayback Machine. <http://wayback.archive-it.org/>

Figure. 23: <http://fukushima.archive-disasters.jp/infolib/id/M20130326115358043 87>

Figure. 24: <http://search.shinrokuden.irides.tohoku.ac.jp/shinrokuden/uuid/3b27dc50-5ef6-11e2-91ca-000c2923bf22#entity>

Figure. 27: <http://agora.ex.nii.ac.jp/earthquake/201103-eastjapan/311memories/>

Figure. 29: From the list of tags by courtesy of SimplyInfo.org.

Figure. 34: <https://www.ploughshares.org/about-us>

Figure. 40: From "Kumamon leads Japan's mascot craze, but don't mention Pluto-kun." *The Guardian*. 12 May, 2013. Web. 16 September, 2017. <https://www.theguardian.com/world/2013/may/12/kumamon-japan-mascot-plutokun>

Figures 41 and 42: Search results for "Pluto-kun" via Google Trends. <https://trends.google.com/trends/?geo=US>