

The Information Needs of Mobile Searchers: A Framework

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ABSTRACT

The growing use of Internet-connected mobile devices demands that we reconsider search user interface design in light of the context and information needs specific to mobile users. In this paper the authors present a framework of mobile information needs, juxtaposing *search motives*—casual, lookup, learn, and investigate—with *search types*—informational, geographic, personal information management, and transactional.

Categories and Subject Descriptors

H.3.3 [Information Search and Retrieval]: Search process;
H.3.5 [Online Information Services]: Web-based services

General Terms

Design, Human Factors, Theory.

Keywords

Search, information retrieval, information needs, user experience, HCI, mobile, design principles.

1. INTRODUCTION

We live in a post-desktop era. In the UK alone, 45% of Internet users used a mobile phone to connect to the Internet in 2011 [7], and Morgan Stanley predicts that by 2014 there will be more mobile Internet users than desktop Internet users globally [6]. Not only are more people connecting with mobile devices, but they're also consuming more and more data. Mobile data usage more than doubled every year between 2008 and 2011, and is predicted to grow from 0.6 exabytes per month in 2011 to 6.3 EB/month in 2015 [3]. The numbers are impressive, but all it really takes is a quick glance at the people around us to recognize that mobile Internet is pervasive.

Yet the practice of designing search experiences for mobile users is still in its infancy. The challenge is much more sophisticated than simply reworking existing user interfaces to fit on the smaller screens of mobile devices, which would be to ignore the vast situational differences between desktop and mobile search. Mobile search user interfaces must be based on an understanding of the contextual factors specific to the mobile user.

Chief among those contextual factors are the information needs that give rise to mobile search activities in the first place. In this paper we propose a framework for describing the diverse range of information needs observed in mobile users. Of particular relevance to the *Search 4 Fun!* workshop is our inclusion of the *casual* category alongside traditional classifications of information needs.

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2. TWO DIMENSIONS OF INFORMATION NEEDS

Mobile information needs can be assessed by two criteria: search motive and search type.

2.1 Search Motive

The *search motive* describes the sophistication of the information need, along with the degree of higher-level thinking it involves and the time commitment required to satisfy it (see Figure 1). The lookup, learn, and investigate elements of motive shown below are derived from Gary Marchionini's work on exploratory search [5], while the casual element has been more recently studied by Max Wilson and David Elsweiler [9]:

- **Casual.** Undirected/semi-directed activities with a hedonistic rather than task-driven purpose.
- **Lookup.** “Known item” searching.
- **Learn.** Iterative information gathering that requires moderate interpretation and judgment.
- **Investigate.** Long-term research and planning that demands significant high-level thinking.

While lookup, learn, and investigate are informational in nature, casual activities are more experientially and hedonistically motivated, “frequently associated with very under-defined or absent information needs” [9]. Though it may be possible to describe some casual activities in terms of other motives (e.g. casual information needs that share qualities of lookup or investigation), we believe that differentiating casual from the other three motives provides both clarity and legitimization.

2.2 Search Type

The *search type*, on the other hand, is concerned with the genre of information being sought (see Figure 2). Broder is often cited for recognizing the informational and transactional nature of many needs [1], while the geographic and personal information management goals identified by Church and Smyth are especially significant for mobile users [2]:

- **Informational.** Information about a topic.
- **Geographic.** Points of interest or directions between locations.
- **Personal Information Management.** Private information not publicly available.
- **Transactional.** Action-oriented rather than informational goals.

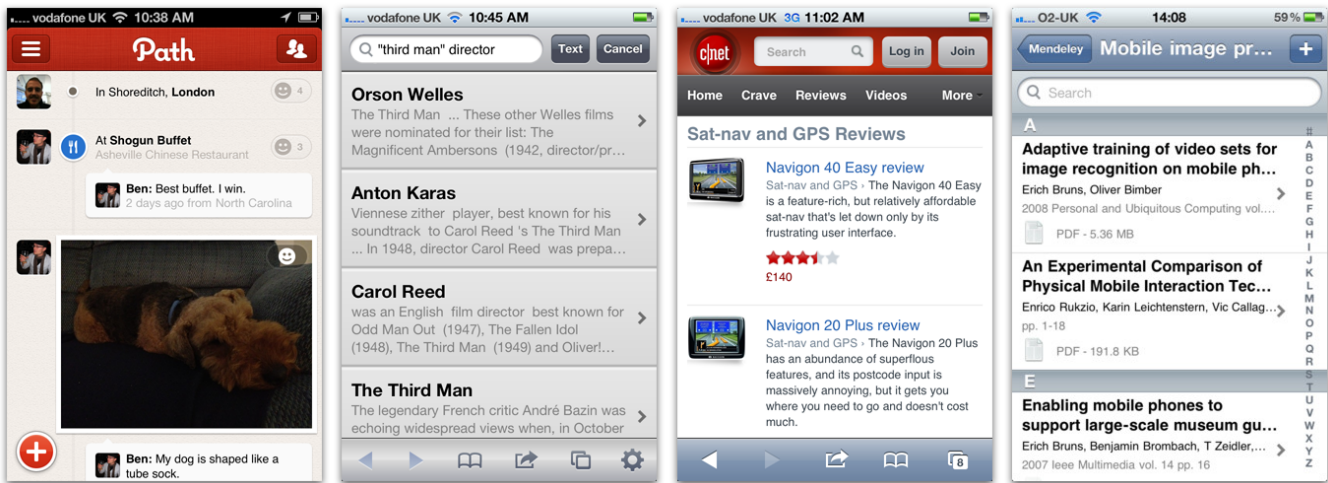


Figure 1: Path's notification screen, Wikibot's search results, product reviews on CNET, and Mendeley's personalized library of academic papers represent the casual, lookup, learn, and investigate motives, respectively.

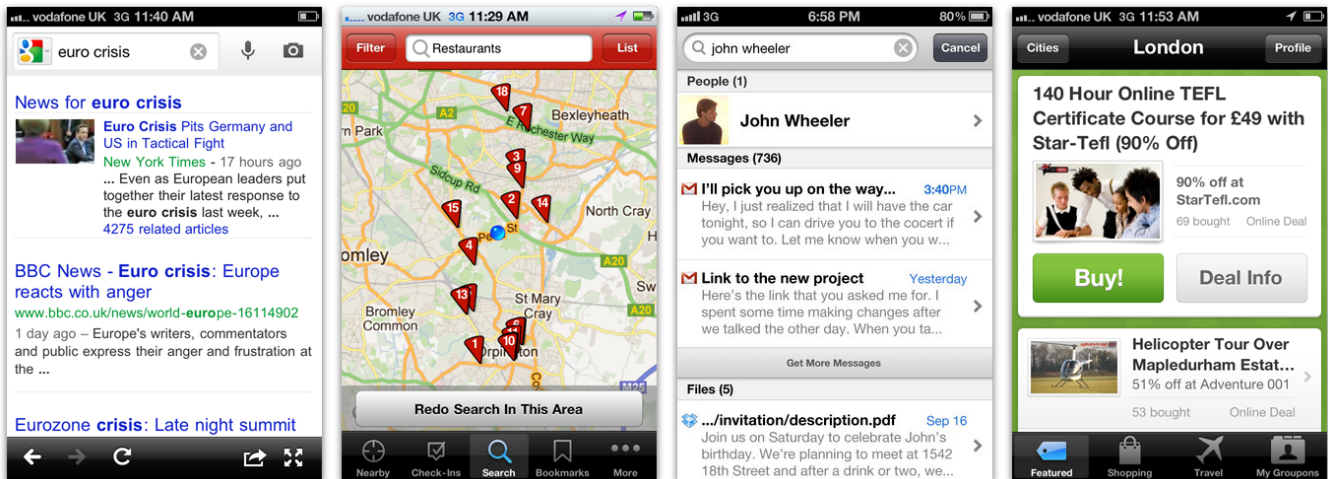


Figure 2: Google Search, Yelp, Greplin, and Groupon demonstrate the informational, geographic, personal information management, and transactional types, respectively.

3. A MATRIX OF MOBILE INFORMATION NEEDS

While the dimensions of motive and type provide a framework, they don't tell us about the information needs themselves. Fortunately, Sohn *et al.* [8] and Church and Smyth [2] have each conducted diary studies in which smartphone-equipped adults spread across the globe were instructed to record every information need that arose over a period of weeks. In addition, Cui and Roto [4] have performed a contextual inquiry study of mobile Web usage. This research enables us to construct a matrix of mobile information needs based on the motive and type dimensions (see Table 1).

The majority of the information needs in the matrix were explicitly identified in the diary studies, though we added a few of our own in order to fully populate the framework. Below are examples of each information need, with quotation marks denoting statements recorded in the original diary studies.

3.1 Informational

- **Window Shopping.** I don't know what I want. Show me stuff.
- **Trivia.** "What did Bob Marley die of, and when?"
- **Information Gathering.** "How to tie correct knots in rope?"
- **Research.** What is Keynesian economics and is it sustainable?

3.2 Geographic

- **Friend Check-ins.** "Where are Sam and Trevor?"
- **Directions.** "Directions to Sammy's Pizza"
- **Local Points of Interest.** "Where is the nearest library or bookstore?"
- **Travel Planning.** Flights, accommodations, and sights for my trip to Italy.

Table 1: A matrix of mobile information needs

	Casual	Lookup	Learn	Investigate
Informational	Window Shopping	Trivia	Information Gathering	Research
Geographic	Friend Check-ins	Directions	Local Points of Interest	Travel Planning
Personal Information Management	Checking Notifications	Checking Calendar	Situation Analysis	Lifestyle Planning
Transactional	Acting on Notifications	Price Comparison	Online Shopping	Product Monitoring

3.3 Personal Information Management

- **Checking Notifications.** “Email update for work”
- **Checking Calendar.** “Is there an open date on my family calendar?”
- **Situation Analysis.** “What is my insurance coverage for CAT scans?”
- **Lifestyle Planning.** What should my New Year’s resolutions be this year?

3.4 Transactional

- **Act on Notifications.** Mark as read, delete, respond to, etc.
- **Price Comparison.** “How much does the Pantech phone cost on AT&T.com?”
- **Online Shopping.** I want to buy a watch as a gift. But which one?
- **Product Monitoring.** I know the make and model of used car I want. Alert me when new ones are listed.

4. DISCUSSION

This framework of mobile information needs originated out of an attempt to synthesize top-down HCIR concepts with bottom-up empirical data. We hope that future investigations of mobile behavior will use this framework as a conceptual point of reference when both constructing their studies and analyzing the results, which will would undoubtedly bring about iterative improvement to the framework.

While the specific information needs that we have identified are unique to the mobile context, the dimensions of search motive and search type are themselves generic. We envision future studies applying this same framework to desktop information needs, as well as comparing and contrasting desktop vs. mobile information needs.

5. CONCLUSION

In this paper we have proposed a framework of mobile information needs in order to inform the design of mobile search user interfaces.

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