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# Interacting with eHealth – Towards Grand Challenges for HCI

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**Abstract**

While health records are increasingly stored electronically, we, as citizens, have little access to this data about ourselves. We are not used to thinking of these official records either as ours or as useful to us. We increasingly turn to the Web, however, to query any ache, pain or health goal we may have before consulting with health care professionals. Likewise, for proactive health care such as nutrition or fitness, or to find fellow-sufferers for post diagnosis support, we turn to online resources. There is a potential disconnect between points at which professional and lay eHealth data and resources intersect for preventative or proactive health care. Such gaps in information sharing may have direct impact on practices we decide to take up, the care we seek, or the support professionals offer. In this panel, we consider several places within proactive, preventative health care in particular HCI has a role towards enhancing health knowledge discovery and health support interaction. Our goal is to demonstrate how now is the time for eHealth to come to the forefront of the HCI research agenda.

**Keywords**

eHealth, preventative health care, grand challenges

**ACM Classification Keywords**

H5.m Information interfaces and presentation (e.g., HCI): Miscellaneous.

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### **Introduction**

Digital Health is a broad topic. Within medicine and health informatics, eHealth is usually understood as professional-to-professional interaction and patient to professional interaction to support "care," where care is also determined via professional prescription [3]. Increasingly, with the availability of vast on-line information resources, other interpretations of eHealth are evolving as people proactively seek out information for what may be considered self-determined, proactive and preventative care. Examples include seeking out weight loss or fitness approaches, or information on treating minor illnesses. Some physicians fear not only potential wrong actions taken via misinterpretation of online sources but the increased number of questions some patients present to their doctors because they have done considerable homework prior to a visit.

The increasing availability of health information to all of us challenges traditional approaches to personal health records. We may begin to think less about these records as "the doctor's" or "the hospital's" that must be mediated for us, but as our information (too) to explore, compare with others and question.

In the following sections we outline the topics/challenges the panel has been asked to consider towards an interaction design agenda for proactive, preventative health care.

### **Health Records in Context & Translation**

Interest from HCI in eHealth has worked on both sides of this division of ownership: there has been ongoing work to help make health records more informative for physicians [7], for example, while persistent peripheral awareness of one's participation in fitness activities has

been used on the other as a way to help one stay on a self-determined workout program [2].

While both these approaches have obvious value, a core opportunity for HCI in eHealth may be in leading interdisciplinary efforts to bridge professional and private preventative and proactive health care practices towards integrated support for health care [5]. In other words, how might we think about interaction that supports a nexus of information flows, from personal, social, public and professional data sources – that may, for example, blend health records on past treatments and family history with current heart rate monitor and eating information towards a fitness and nutrition plan.

Challenges in such a research/design agenda are numerous: where is the personal data held? How is it accessed? By whom? Under what circumstances? What does this blended and blendable information look like? What does it mean to interact with it? How is it to be represented and queried? How might these records be augmented by the individual to combine personal health monitoring – say for diet or fitness – with their global records, their extended family's past and present? Who would hold that information? How would the design of the interface convey location of information storage and access rights?

### **Sensors & Representation**

There are numerous devices on the market already that people use to monitor and/or record various attributes of their health. These include devices to calculate calories burned, activity level, heart rate, steps walked, speed and even contextual information such as route taken and weather information. Some of these devices not only record the data for personal analysis but for

social participation. The Nike+ system enables runners to upload their runs in order to participate in large public events or their own social runs.

While these sensors have focused on physical responses like pace and pulse, other interfaces are making it possible to record neurological activity like brain wave function. Neurological interfaces may enable us to better understand optimal times to engage in creative activities for instance, or how to be aware of respond to our own stress levels.

Currently there is a cost in terms of size and inconvenience of devices to wearing these devices. How do we begin to think about design opportunities to capture, reflect and integrate this data in meaningful ways for proactive, preventative ehealth?

### **Awareness**

Sensors are one means of capturing data. People still use manual logging to record a range of health data, from daily food intake, to workouts, to drug use, to insulin injections. We have seen that peripheral awareness of workout participation has helped people stick with a workout plan[2]. What other ways can we make available and present sensor and/or log data to support health goals?

### **Search, Association and Community**

Adaptations of lifestyle to new practices mean change of habits. Changing habits is well known to be hard [6]. While the will to change comes from within, mechanisms to support that change can be fundamental to success. The effect of support has been shown especially in 12 step programs, support mirrored at least partially in online topic-based forums. And yet,

when people search for information on a health topic, they may not encounter related support mechanisms like forums. How might search or new discovery mechanisms become informed not just by keyword matching alone but by domain knowledge being triggered by that search: searches on AIDS or nutrition may trigger models about these domains being presented to help refine exploration of a domain. This more ontological exploration of information is part of both the semantic web and human computer information retrieval research agendas, and would only benefit from more HCI input.

Another version of the Search interaction may be to integrate personal context (for instance, from utilizing data in health records) and domain knowledge (weight loss searches connecting with information on diet and on support forums around nutrition). We might imagine a revised kind of search interaction resulting that supports not queries for particular information alone, but that enables exploration of goals, that helps provide support for the question "what do you want to do"?

Imagine someone being able to go to such an interface and type simply "I want to feel better." Based on an awareness of personal monitoring, extant health records, and awareness of knowledge sources being interrogated, a model of what "feeling better" may mean can be used to support knowledge building, such that with some iteration, a more relevant set of resources can be provided to support that quest. Such an interaction requires the effective representation and integration of data sources beneath the interface, along with light weight context and domain models. While in the past these kinds of integrated interactions have seemed to be in the realm of science fiction, we have

so much data now, from so many sources, all using web services for delivery, we have an unprecedented opportunity to support richer and more effective interaction with information for knowledge building.

### Platforms for Access & Support

Currently, the most ubiquitous global computing platform is the mobile phone. As of 2005, 90% of East Asian households had mobiles compared with 80% in Western Europe [8]. Some see the imminent demise of laptops in favour of phones as primary computing devices [1]. There are still significant sectors of the population - some most in need of health support intervention - who do not have access to mobile phones or do not have the resources to maintain them [4]. So we have at least two significant challenges with the shift towards mobile devices: enabling rich interaction of multi-faceted information resources on small screens, but perhaps especially designing with

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consideration for the technological ecosystem of various populations that may challenge the conventional assumption that "everybody has a cell phone."

### Conclusion

In this panel, we propose that HCI may help build a transformational bridge in eHealth between professionally mediated health information and individually or socially developed health strategies. Towards this goal, we seek to identify key interaction/design challenges in this interdisciplinary space from data representation to access to that data. The topics listed here are not exhaustive, but are meant to be a starting point in bringing eHealth to the foreground of HCI research and illuminating potential HCI Grand Challenges in eHealth.

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