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# Multidisciplinary Team Collaboration Builds Creativity and Synergy among HCI Researchers

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**Abstract**

This position paper focuses on “forward-thinking proposals on how to build synergies and sustainable collaborations among researchers from both HCI communities.” We propose a multidisciplinary research team consisting of members from various HCI communities and other disciplines is the optimal team structure to achieve results in designing and developing the best possible, highly usable computer application solutions for “wicked” problems. Further, multidisciplinary teams that include various members from HCI communities that are highly collaborative will be successful in integrating the best theories, research study designs and solutions from both disciplines.

**Author Keywords**

Multidisciplinary HCI Research, HCI Team Dynamics, Usability, CHI

**ACM Classification Keywords**

Human-centered Computing: Human computer interaction (HCI)

**Introduction**

A multidisciplinary research team consisting of members from various HCI communities is the optimal

team structure to achieve top results in designing and developing the best possible, highly usable computer application solutions for “wicked” problems. In the context of this position paper a multidisciplinary team is defined as a team whose membership consists of various HCI community researchers, MIS researchers, CS researchers, and problem domain experts/researchers.

### **Discussion**

In an on-going research project for the Department of Transportation focusing on minimizing the impact of hazardous materials exposure to first responders when a hazardous material (HAZMAT) incident occurs a multidisciplinary research team has been employed. The multidisciplinary team plans to use biosensors and other Internet of Things (IoT) technologies to monitor first responders’ biomarkers and safety to increase the commander’s situational awareness knowledge. The team consists of a diverse group of researchers in the areas of: HCI/CHI, computer science, electrical engineering, “environmental, agricultural and occupational health and safety”, “biosecurity, biopreparedness, and emerging infectious diseases”, and special operations HAZMAT chiefs and first responders.

As we uncover the challenges first responders have during HAZMAT incidents and research and evaluate possible technology applications and solutions the exchange among team members is stimulating, invigorating and amazing. Clever ideas are formulated and possible ways to build these solutions are shared. The creativity is enhanced through the interactions discussing the usability and viability of the proposed solutions from many different perspectives. For

example, each researcher presented different sensor solutions to the team and we identified the advantages and disadvantages of each sensor as well strategized how we could integrate the sensor into the personal protective equipment (PPE) and clothing the HAZMAT first responders wear and test the usability. We also discussed the technical aspects of the sensor communication integration and potential designs for an integrated dashboard for the incident commander.

As discussed in the example above, some of the best ways to optimize the strengths of usability experts and researchers from various HCI/CHI perspectives is to integrate their research interests to focus on challenging, forward thinking complex research problems that are not traditionally business or computer science oriented such as healthcare, public health, environmental safety, transportation safety, emergency management, etc. These different perspectives can help propel innovative and creative ideas to solve “wicked” problems that are especially challenging in the realm where humans are interacting with emerging hardware and software technology. And as in the case discussed above realize innovations that could potentially be used during HAZMAT emergencies where lives are at stake.

In order to reap multidisciplinary team synergies, it is important to appreciate some of the differences of the HCI and CHI perspectives. A logical place to begin is to reach back to the professional research organizations and special interest groups to understand their origins. First, we will examine the HCI perspective starting with the HCI definition posted on the HCI SIG homepage. They state, “**HCI** (human-computer interaction) is the study of how people interact with computers and to what extent computers are or are not developed for

successful interaction with human beings. The goal of the AIS SIGHCI is to provide a forum for AIS members to discuss, develop, and promote a range of issues related to the history, reference disciplines, theories, practice, methodologies and techniques, new developments, and applications of the interaction between humans, information, technologies, and tasks, especially in the **business, managerial, organizational, and cultural** contexts. Notice the domain emphasis is on **business.**" [2] Thus, HCI focuses more on *applying* technology to a *business* solution. The **business problem drives the solution.**

Now, let's examine the CHI perspective by reviewing the mission of the ACM SIGCHI. "The ACM Special Interest Group on Computer-Human Interaction is the world's largest association of professionals who work in the research and practice of computer-human interaction. We are an interdisciplinary group of computer scientists, software engineers, psychologists, interaction designers, graphic designers, sociologists, multi-media designers, and anthropologists, just to name some of the domains whose special expertise come to bear in this area. What brings us together is a shared understanding that **designing useful and usable technology** is an interdisciplinary process, and when done properly it has the power to transform persons' lives." [1] Notice the emphasis is first on designing useful and usable technology (minimum emphasis on problems that technology can solve). CHI is more scientific-oriented and invention-oriented. This group focuses more on first inventing new and novel technology and then identifying relevant applications. New **technical capabilities and inventions drive** the development of **new products** (solutions).

In general, HCI is more focused on human behavior interaction usability issues whereas CHI is more focused on technology/human interaction usability

issues. These two communities often conduct research in very different domains (e.g. business versus laboratory). They often have different approaches when designing a usability study. HCI relies on behavioral theories when designing usability studies whereas CHI may focus more on experiments on how to build better, faster, smaller, ubiquitous devices.

A multidisciplinary team is most innovative when the research problem is from an unfamiliar domain such as medical, healthcare, emergency management, etc. Ultimately, an optimized solution will result from the synergistic exchange of scientists and technologists working towards a solution from various HCI directions.

There are several benefits of a multidisciplinary team structure. The strengths from each member's perspective can fill the gaps where the other perspective lacks. A multidisciplinary team creates a check and balance among the member to stay focused on a "user-centered" solution. Sometimes researchers get so enthralled in the technology they forget about the end user and get off-course. Multidisciplinary teams provide a natural and cultivating environment to share theoretical and practical knowledge from different disciplines (e.g. IS, CS, Engineering, and Psychology). For example, there are several advances in HCI where HCI researchers on the peripherals are presenting overlapping theories and models to bridge the different HCI perspective particularly in the health informatics. Examples include the TURF Model [5], the Human Centred Design Process [3], and an integrated heuristics framework [4]. Finally, a very important benefit of employing a multidisciplinary structure is that often the team members learn from each other and conduct much richer studies and deliver extraordinary results.

## **Conclusion**

In this position paper we propose a multidisciplinary research team consisting of members from various HCI communities and other disciplines is the optimal team structure to achieve results in designing and developing the best possible, highly usable computer application solutions for “wicked” problems. Further, multidisciplinary teams that include various members from HCI communities that are highly collaborative will be successful in integrating the best of both disciplines’ theories, research study designs and results.

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