

# Planes, Pains, and Phosphorane: Usability Studies in Non-Traditional Environments

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We present case studies and methodology for designing usability studies for non-traditional environments. Conducting classical usability studies in non-traditional environments is both impractical and insufficient. We present cases and approaches to the non-traditional usability environment, e.g. medical, aircraft maintenance, and emergency response.

## 1. Introduction

Would an ill person interact with an application the same way as a healthy person? Could a simulation of a chemical spill provide the same stressful environment for emergency response workers to give realistic feedback about the usability of a chemical spill assistant application? Researchers have noted [1, 2] that traditional laboratory usability studies are insufficient for mobile applications. New field study evaluation techniques are being explored for mobile computing [3, 4], but we would argue that these techniques still do not capture the needs of users in non-traditional environments.

Non-traditional environments often change rapidly without forewarning and have other environmental and operational constraints. Examples of non-traditional environments include, but are not limited to, healthcare facilities, emergency response, and maintenance areas (especially for military maintenance areas during times of war). Current field study evaluation techniques can not be used in these environments because they do not account for the limited space, testing equipment, privacy concerns, safety, and stress associated with non-traditional environments. During this special interest group (SIG) meeting, we will present case studies and methodologies for designing usability studies in non-traditional environments. The purpose of the SIG is to discuss how we can create a framework for conducting usability studies, deploy applications, and monitor applications in non-traditional environments.

## 2. Motivation

At Indiana University, we are developing a Dietary Intake Monitoring Application (DIMA) to assist end-stage renal disease (ESRD) patients monitor their fluid and sodium consumption [5]. We conducted user studies during patients' dialysis sessions as this time was most convenient for the patients. ESRD patients spend four hours every other day receiving dialysis treatments. Our user study space was small, stressful, and the amount of recording equipment we could use was limited due to the Health Insurance Portability and Accountability Act (HIPAA).

Georgia Tech is developing a chemical companion decision support to be hosted on PDAs for emergency responders. This user group is dispersed through the nation, has specialized knowledge of the content and use, requires specialized equipment (hazmat suits) and operates under various policies. In situ testing allows us to test the interface in the user environment, which yields more accurate feedback on system usability and could influence future designs and enhancements.

In a recently developed performance support system designed for maintainers, Georgia Tech designed the interface by conducting real-time usability studies in the work environment. Conducting the usability test in situ had a tremendous impact on the overall design of the system interface [6].

### 3. Challenges

There are many challenges associated with all mobile field studies. One of the major challenges encountered by all three case studies presented above is maintaining the safety and health of the people involved. Researchers working in healthcare environments have an added responsibility to ensure that the applications developed produce correct output and that the devices do not pose additional health hazards. Field studies for emergency response and maintenance applications could be hazardous for the participant and field observer if necessary precautions are not taken. Everyone involved in the study must wear appropriate clothing and know how to react to certain environmental changes. The applications that are integrated into these environments cannot distract the participants and must allow them to properly complete their responsibilities while giving sufficient feedback to field observers.

Another challenge is how observers are allowed to record information during studies. In the United States, HIPAA has strict guidelines protecting the privacy of patients; thus standard methods of in situ data collection such as videotaping or voice recording are not possible. Increasing the number of observers to help record information is not practical due to space constraints.

Ethical issues must also be considered in the design of mobile field studies. Is it in the best interest of the patient to participate in a user study or receive training for an application during uncomfortable medical treatments? Should emergency response professionals spend any additional time in a potentially hazardous environment to test a chemical spill application? Finally, time and financial resources must be considered. Field studies are expensive and time consuming – non-traditional field studies are no exception.

### 4. Importance and Contribution

We believe that developing a framework for conducting usability tests in non-traditional environments will positively impact the creation of useful technology developed for such environments. The contribution of this SIG will be to establish a baseline for field usability testing.

### 5. Conclusion

Researchers need field study methodologies for non-traditional environments because current mobile field study methodologies do not account for the challenges this domain presents. In this SIG, we will brainstorm how to design usability studies, deploy applications and monitor applications in non-traditional environments. Conference attendees interested in usability evaluation techniques, interdisciplinary research, mobile and ubiquitous technology, and interaction design would be interested in this SIG.

### References

- [1] S. Brewster, "Overcoming the Lack of Screen Space on Mobile Computers," *Personal and Ubiquitous Computing*, vol. 6, pp. 188-205, 2002.
- [2] G. Abowd and E. Mynatt, "Charting past, present, and future research in ubiquitous computing," *ACM Transactions on Computer-Human Interaction*, vol. 7, pp. 29-58, 2000.
- [3] J. Kjeldskov and J. Stage, "New Techniques for Usability Evaluation of Mobile Systems," *International Journal of Human Computer Studies*, vol. 60, pp. 599-620, 2004.
- [4] J. Scholtz and S. Consolvo, "Towards a Discipline for Evaluating Ubiquitous Computing Applications," Intel Research, 2004.
- [5] K. H. Connelly, et al., "Designing a PDA Interface for Dialysis Patients to Monitor Diet in their Everyday Life," presented at HCI-International, Las Vegas, NV, 2005.
- [6] V. Lafond-Favieres, et al., "Designing Innovative Electronic Performance Support Systems for Maintenance Tasks," presented at Society for Applied Learning Technology Conference, Orlando, Florida, 2003.

## **Interest and relevance of the SIG to Interact 2005**

Our SIG is highly relevant for the Interact community because laboratory and field user studies are necessary when developing usable applications. Non-traditional environments propose many challenges that are not addressed in current usability methodologies. The SIG can start a dialog between conference attendees about alternative in situ evaluation methodologies. Conference participants interested in usability evaluation, interdisciplinary study, interaction techniques, and mobile or ubiquitous technologies would be interested in our SIG.

## **Assumed Attendee Background**

SIG attendees should have a background in users study evaluation methodologies.

## **Format of discussion including informal list of topics and time allocated for each (roughly)**

Total time: 90 minutes

10 minutes: Introductions

10 minutes: Discuss differences between traditional computer field evaluation techniques and mobile computer field evaluation techniques. Discuss challenges proposed by field evaluation studies in non-traditional environments.

30 minutes: Discuss our case studies

- How to deploy applications in non-traditional environments?
- How to conduct user studies in non-traditional environments?
- How do we monitor the application or technology in non-traditional environments?

20 minutes: Solicit examples from audience to compare with our studies [could be small group break out sessions or larger audience participation depending on the size of the audience]

20 minutes: Framework and future research requirements

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