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SCHOOL OF HEALTH INFORMATION SCIENCES

Design of Health Information Management System Interfaces Using Human-Centered Decision Principals

Austin Dains[1], Cesar Gracia[2], Adol Esquivel, MD, MS[1], Kim Dunn M.D. PhD[1]

[1]The University of Texas School of Health Information Sciences – Laboratory for Telehealth
[2]Escuela de Medicina, Instituto Technológico y de Estudios Superiores de Monterrey, NL, México

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Objective

Describe how we applied the **Human-Centered Distributed Information Design Methodology** (HCDID) to develop a series of interfaces for a particular user's interactions with a Health Information Management System

- **Analyze** the interviewer's interactions with the system
- **Develop** a series of user interfaces based on HCDID methodology
- **Evaluate** and **improve** the prototype

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Background

- **User Interface Engineering (UIE)** is the process of designing the interfaces for the interactions of a human (user) and a machine
- UIE focuses on the way the user inputs and retrieves information, and efficiently navigates the system
- This is the foundation of HCDID
- **Health information management** was a challenge during the **relief efforts** of U.S. hurricanes Katrina and Rita
- Multiple systems, both electronic and paper, were implemented in an effort to collect, distribute and share information about the victims

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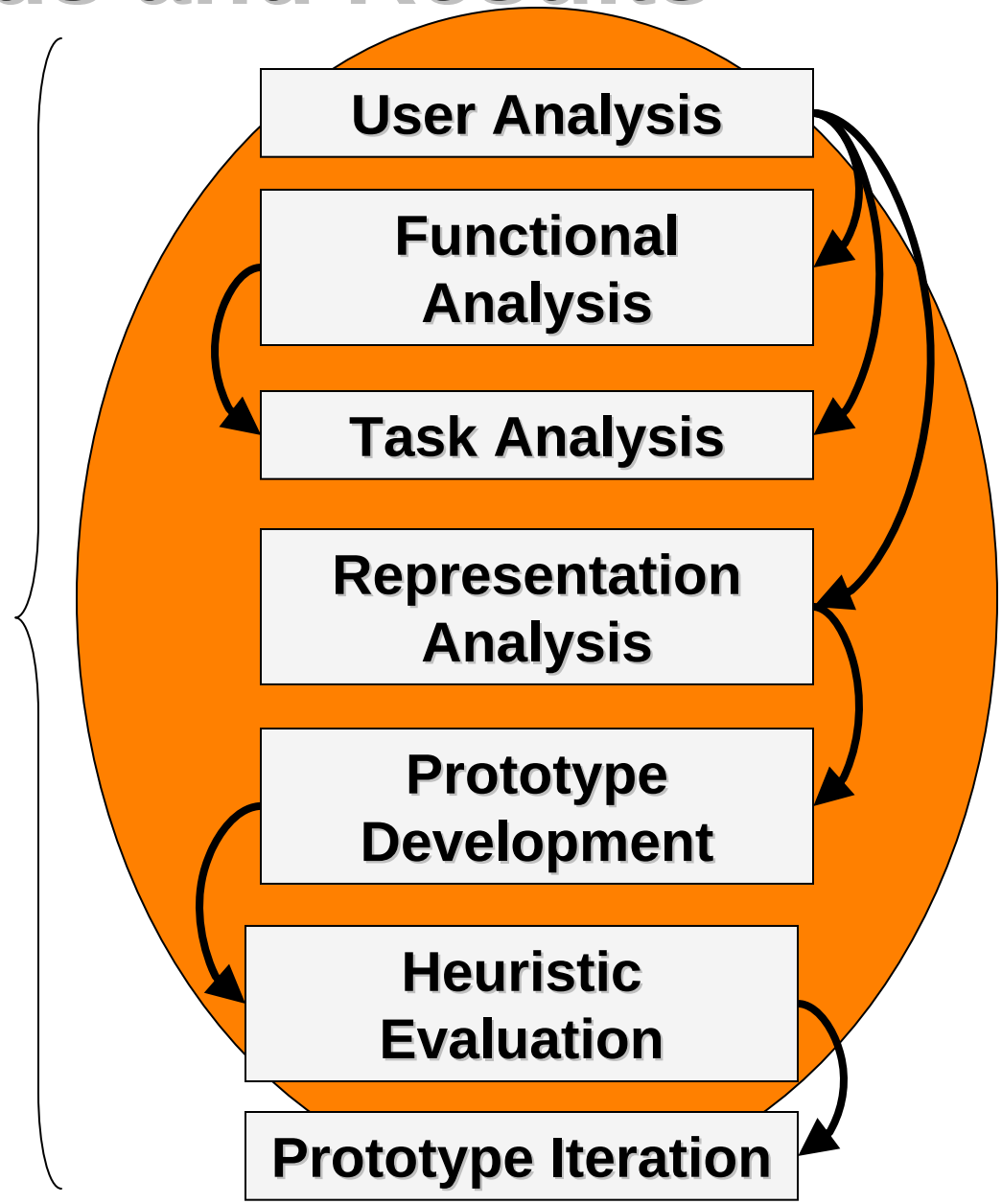
Background

- The integration of these systems was impossible due to the lack of standards and inconsistencies in the data
- In response to the information challenges, The UT-School of Health Information Sciences developed a web-based system to assist during major Disaster's Relief Efforts: **HIMS-DRE**
- HIMS-DRE allows the creation and use of web-based forms
- An interviewer is the HIMS-DRE user who utilizes such forms to enter data into the system

Methods and Results

HCDID

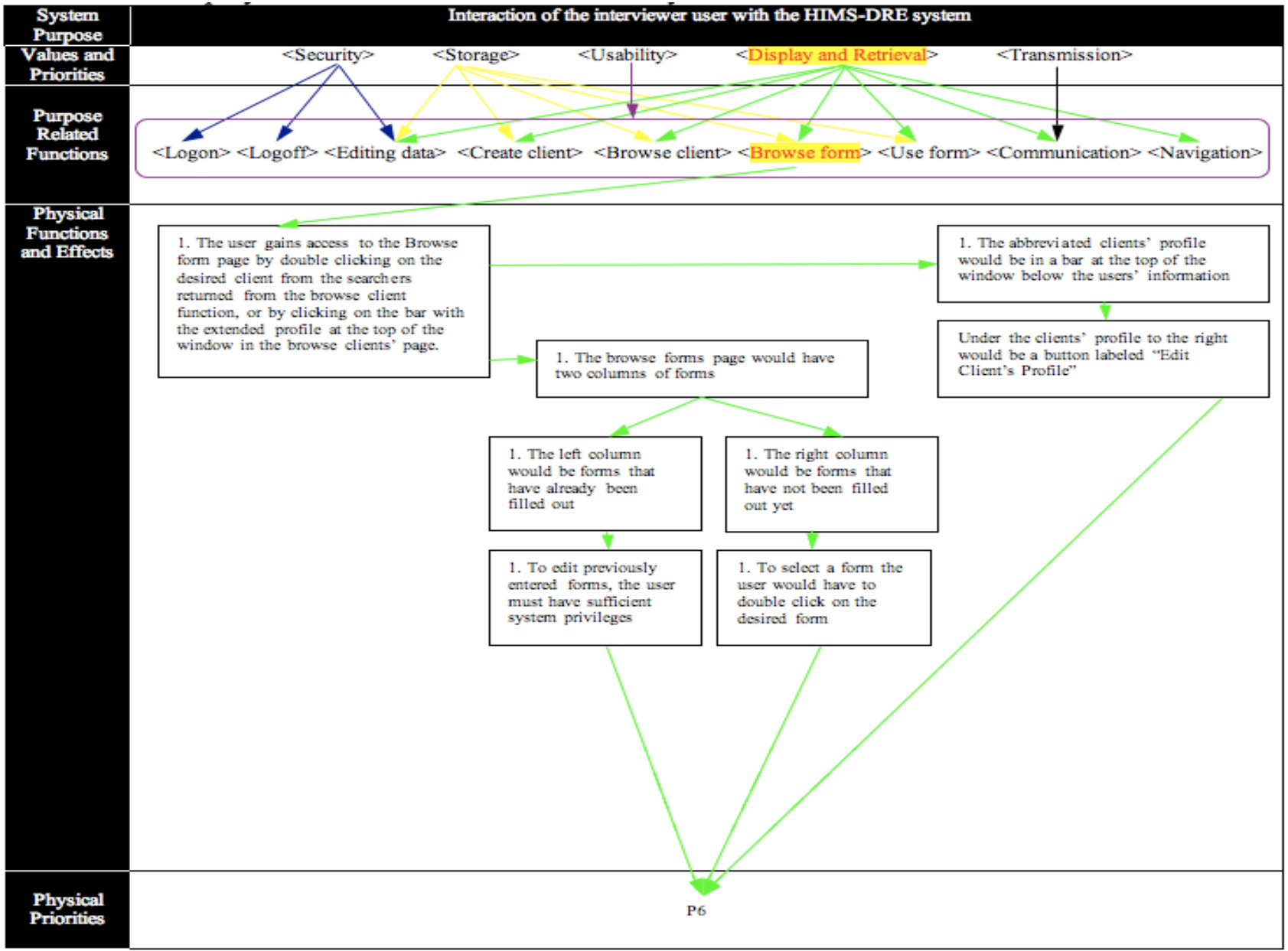
Multiple Levels of Analysis



Results: User Analysis

User	Location Profession Life Style	Education	Gender	Expertise	Age	Skills	Physical Abilities
Interviewer	Any	High School at minimum	Either	Basic Word Processing	18 Until not physically able	Interview	Motor control
							Speech
							Vision
						Able to work under pressure	Not depend on medications
							Cognitive awareness
				Basic Web Browsing		Language	Mobility
							Extended time outdoors

Results: Functional/Task Analysis



Results: Initial Prototype

Navigation Bar

Home Button

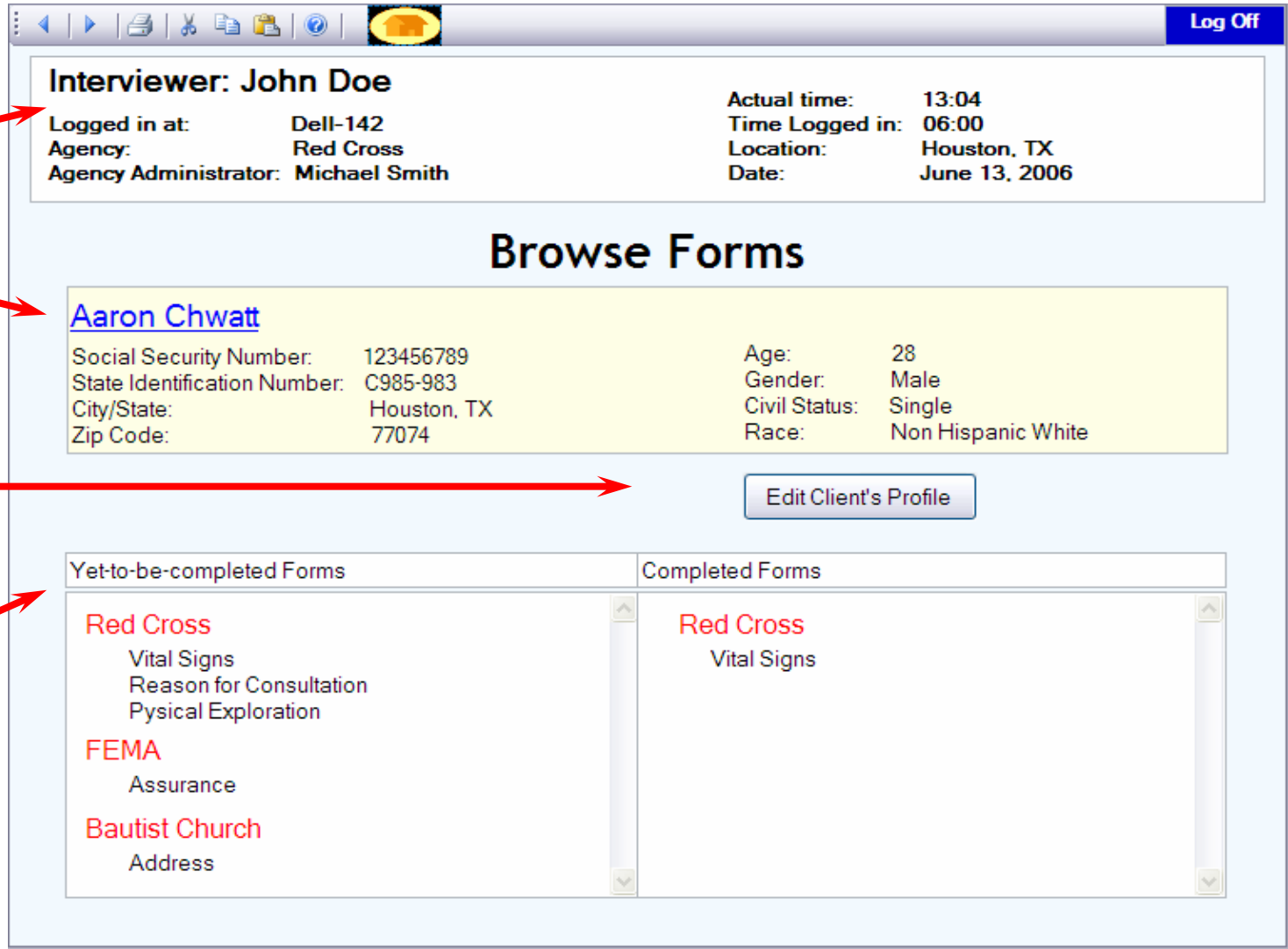
Log Off Button

Interviewers Information

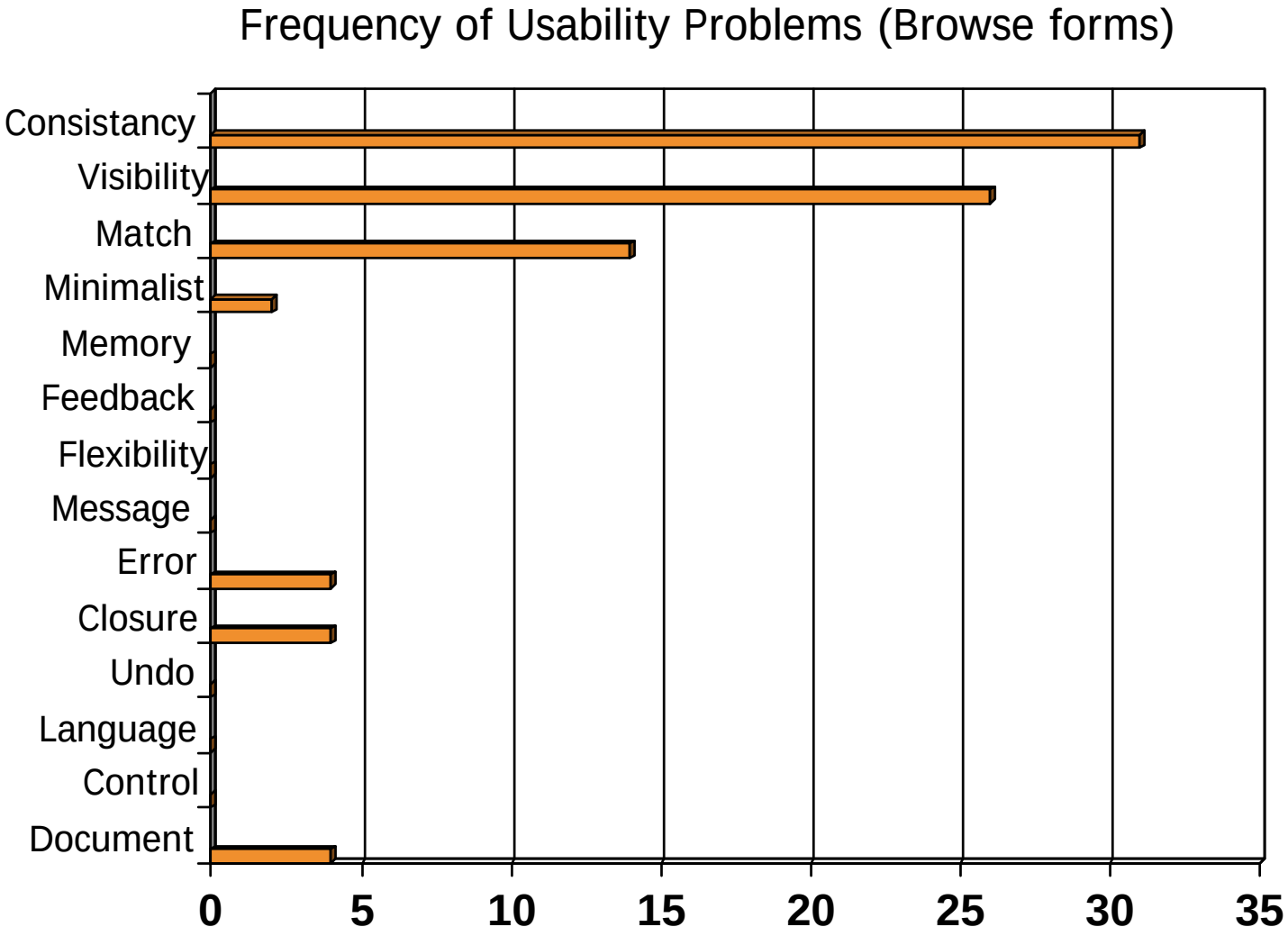
Clients Information

Edit Profile Button

Organized Forms



Results: Usability Violations



Results: Improved Prototype

Notification of Entry to System

Event Name

Standardized Dates

Agency Name

Tabbed Browsing

Buttons for Functions

Links for Navigation

Health Information Management System During Disaster Relief Efforts

Hurricane Katrina

01-Jun-06 14:34

Log off

Interviewer: John Doe (edit) **Agency:** Red Cross

Home | **Clients** | Forms | Message

Browse Clients | Create Client

Client: Jean Doe (edit)

Social Security Number:	123456789	**Age:**	28
State Identification Number:	C985-243	**Gender:**	Male
City/State:	Houston, TX	**Civil Status:**	Single
Zip Code:	77074	**Race:**	Non Hispanic White

Browse Forms

Select the form you want to review or edit

Completed Forms

Agency	Form	Date	Time	Interview by
Red Cross	Vital Signs (edit)	23-May-06	09:34	Sarah Clarkson
Red Cross	Soup Note (edit)	23-May-06	11:56	Ken Kidd
Red Cross	Medical Record (edit)	26-May-06	07:09	Steve Smith
FEMA	Employment (edit)	31-May-06	12:45	Aaron Mckie
FEMA	Housing (edit)	31-May-06	21:32	John Doe

Select the form you want to use for the interview

Not Completed Forms

Agency	Form
Red Cross	Vital Signs
Bautist Church	Address

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Conclusions

- HCDID was a useful methodology in determining the structure of our user analyses and to construct a framework for our interface development.
- WDA greatly assisted in the interface design process. It helped identify the purpose, priorities, values, functions, and it drew connections between them that facilitated the graphical representation of our interface.
- Heuristics evaluation was an effective and time-efficient method of evaluating user interface prototypes.
- During every step of the design it was important to focus on the users' needs rather than on the system's developers so that the final product would be based on the users.

References

Contact Information: Austin Dains adains@gmail.com

1. Anwar, S., A. Esquivel, and J. Zhang, *Your Doctor Program Interface Design: Starting from Scratch*, University of Texas Health Science Center School of Health Information Sciences: Houston p. 2.
2. Lintern, G. *Work Domain Analysis: Tutorial*. [cited 2006 07/05/06].
3. Zhang, J., et al., *Using usability heuristics to evaluate patient safety of medical devices.* J Biomed Inform, 2003. **36**(1-2): p. 23-30.
4. Wood, L.E. *User and Task Analysis for Interface Design*. SIGCHI Bulletin [PDF] 1999 [cited 2006 6/30/06]; Book Review]. Available from: http://bulletin2.sigchi.org/archive/1999.3/pubs.pdf.
5. Lintern, G. and N. Naikar. *The Use of Work Domain Analysis for the Design of Training System*. in *14th Triennial Congress of the International Ergonomics Association/ 44th Annual Meeting of the Human Factors and Ergonomics Society (HFES/IEA 2000)*. 2000. San Diego, CA.
6. Nielson, J., *Usability Engineering*. 1993, San Diego: Morgan Kaufmann.
7. Ferre, X., et al., *Usability Basics for Software Developers.* IEEE Software, 2001. **18**(1): p. 22- 29.
8. Welie, M.v., *Task-Based User Interface Design*. 2001, Vrije University: Amsterdam. p. 217.
9. Landay, J.A. and B.A. Myers, *Sketching Interfaces: Toward More Human Interface Design.* Computer, 2001. **34**(3): p. 56-64.
10. Burns, C.M., D.J. Bryant, and B.A. Chalmers. *Scenario Mapping with Work Domain Analysis* in *Human Factors and Ergonomics Society 45th Annual Meeting*. 2001. Canada.
11. Welie, M.v. *Patterns as Tools for User Interface Design*. 2000 [cited 2006 07/08/06].
12. *How to volunteer, where to donate*. [Newspaper Article] 2005 [cited 2006 6/3/06]; Available from: http://www.chron.com/disp/story.mpl/special/05/katrina/3332401.html
13. *Disaster Volunteer Information: Hurricane Katrina*. 2006 [cited 2006 6/3/06]; Available from: http://www.valleyredcross.org/KatrinaVolunteerInfo.html.
14. Zhang, J., et al., *Designing Human-Centered Distributed Information Systems.* IEEE Intelligent Systems, 2002. **17**(5): p. 42-47.
15. Miller, C.A. and K.J. Vicente (2001) *Comparison of Display Requirements Generated via Hierarchical Task and Abstraction-Decomposition Space Analysis* International Journal of Cognitive Ergonomics 5 **Volume**, 335-355
16. Chen, M., P. Sanderson, and M. Watson. *Cognitive Work Analysis of the Command and Control Work Domain*. [cited.
17. Cummings, M.L. *Can CWA Inform the Design of Networked Intelligent Systems?* 2006 [cited 2006 07/05/06]; Available from: http://web.mit.edu/aeroastro/www/labs/halab/papers.html.
18. 18.Tang, Z., et al., *Applying heuristic evaluation to improve the usability of a telemedicine system.* Telemed J E Health, 2006. **12**(1): p. 24-34.