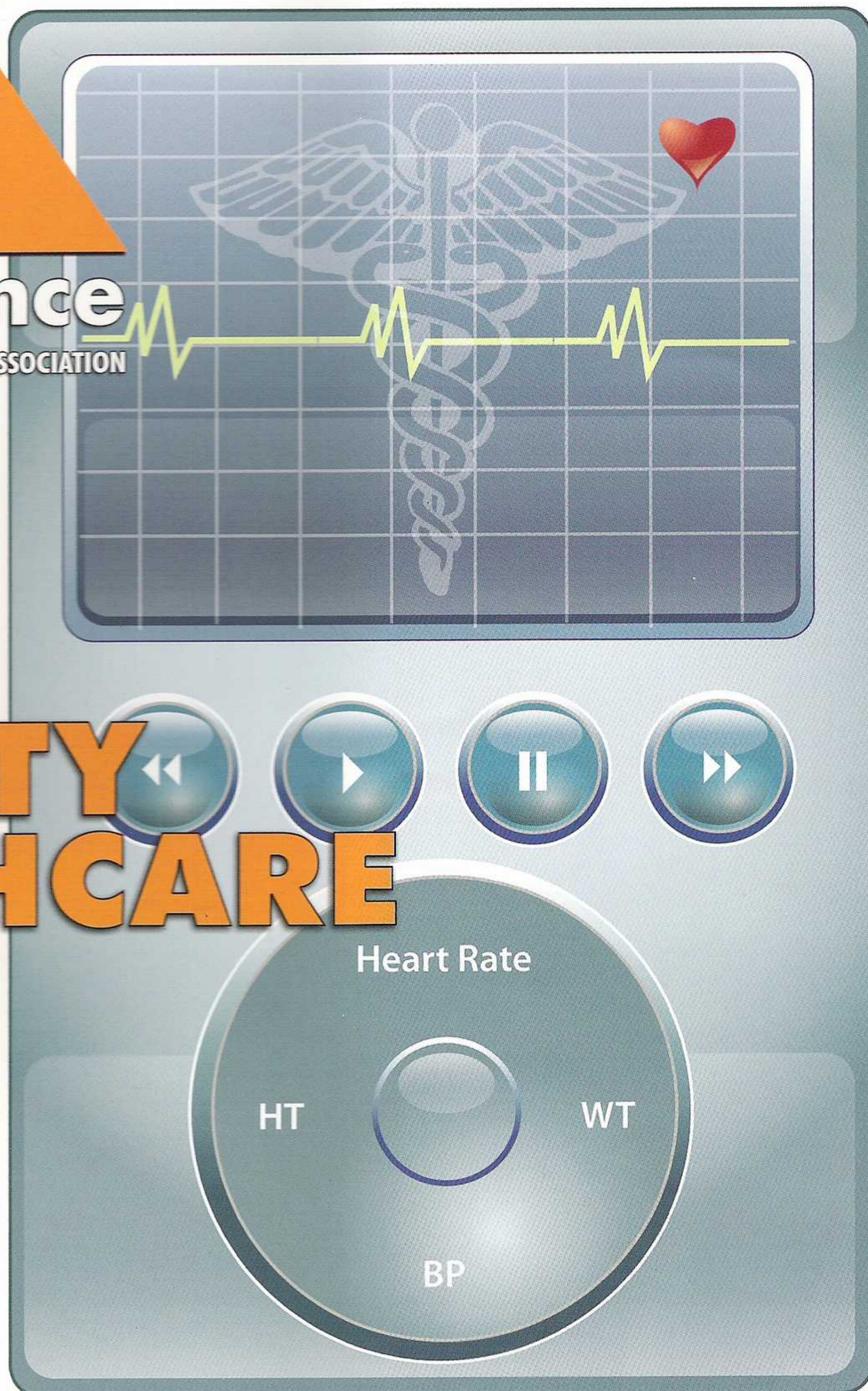


UX

user experience

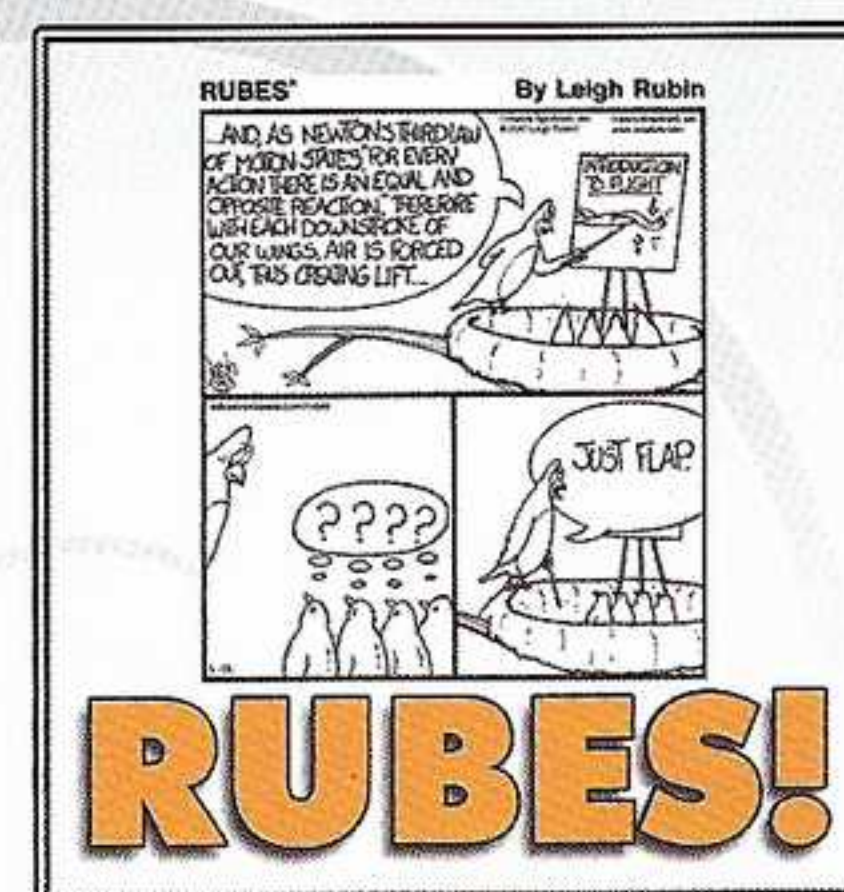
THE MAGAZINE OF THE USABILITY PROFESSIONALS' ASSOCIATION

Volume 6, Issue 4, 2007



USABILITY in HEALTHCARE

- Designing a Medical Records System for Fire and Rescue
- Clinical Trials — the Importance of Viewpoint
- A View from Intensive Care



Features

- 4 Social Health Networking**
By Leah Rader and Beth Toland
- 8 Resuscitating the User Experience**
By Theo Mandel, Ph.D.
- 12 Learning about Clinical Trials**
By Whitney Quesenbery
- 18 Patient Safety and Usability**
By Janine A. Purcell, M.S.I.E.O.R.
- 22 Capturing User Requirements in Health and Social Care**
By Isobel Frean, RN, MS, Ph.D.

Departments

- 2 EDITOR'S NOTE**
Usability and Medical Systems By Aaron Marcus
- 3 WHAT'S NEWS**
Demonstrating Usability of Electronic Medical Records By Tema Frank
- 3 RUBES** By Leigh Rubin
- 26 BOOK REVIEW**
Seeing the World through a Differently Wired Brain Susan L. Fowler
- 28 THE VIEW FROM HERE**
A Perfect Storm in the ICU Simon Hillier

More information about these articles is available at
http://upassoc.org/upa_publications/user_experience/current_issue/index.html

ABOUT THE COVER: Cover illustration by araucaria design, www.araucariadesign.com.

The UPA Mission

The Usability Professionals' Association, founded in 1991, today has some 2,000 members in thirty-nine countries. The UPA supports those who promote and advance the development of usable products, reaching out to people who act as advocates for usability and the user experience. Members come from across the broad family of disciplines that create the user experience.

The UPA goals are to:

- Provide an international network through which usability professionals can share information about the techniques and methodologies in the profession.
- Create an inclusive community for those interested in usability, whether it is their primary focus or a related discipline.
- Change new product development processes to include a concern for the people who use them by presenting the business case for usability in product development to colleagues, customers, the public and governmental agencies.
- Increase the body of knowledge about usability and user-centered design through professional education, meetings and conventions and other professional interchanges.

For more information, visit www.usabilityprofessionals.org.



User Experience (UX) is published four times a year by the Usability Professionals' Association (UPA), 140 N. Bloomingdale Rd., Bloomingdale, IL 60108-1017. (630) 980-4997. Fax (630) 351-8490. office@upassoc.org; www.usabilityprofessionals.org. UX magazine is a benefit of membership in the UPA.

Copyright © 2007 by the Usability Professionals' Association. All rights reserved. ISSN: 1540-4668. Inquiries regarding reprints or permission to photocopy should be made to the UPA. Opinions expressed in UX articles and advertisements are those of the authors and advertisers, respectively, and should not be considered as expressions of official policy of the UPA.



EDITOR-IN-CHIEF

AARON MARCUS
ux@upassoc.org

MANAGING EDITOR

GERRY GAFFNEY
gerry@infodesign.com.au

ASSOCIATE MANAGING EDITOR

LAURA HARLEY
lharley@designinteractive.com

CONTENT EDITOR

MARTHA SIPPEL
azuwrite@comcast.net

ASSOCIATE CONTENT EDITOR

MICHAEL BEASLEY
michaelbeasley@michael-beasley.net

ART EDITOR

PATRICK OLIVARES
patrick@araucariadesign.com

FOUNDING EDITOR

CHARLES B. KREITZBERG, Ph.D.
charlie@cognetics.com

EDITORIAL BOARD

ALAIN ROBILLARD BASTIEN
arbastie@cesart.com

AGA BOJKO

abojko@usercentric.com

CATHERINE BRY

catherinebrys@yahoo.co.uk

J.O. BUGENTAL

bugey_2000@yahoo.com

AMIT DESHPANDE

amitdeshpande@gmail.com

TEMA FRANK

tema@webmysteryshoppers.com

SUSAN FOWLER

susan@fast-consulting.com

BOB GOODMAN

bob@bobgoodman.net

CHRISTOPHER KOSTER

mcrk@yahoo.com

MASAAKI KUROSU

masaakikurosu@spa.nifty.com

ZHENGJIE LIU

liuzhj@dlmu.edu.cn

ALICE PRESTON

apreston@ithaka.org

WHITNEY QUESENBERRY

whitneyq@wqusability.com

ABHIJIT RAO

aby_rao@yahoo.com

ELIZABETH ROSENZWEIG

eliz@ziffgroup.com

DAVID SIEGEL

david.siegel@acm.org

TOMER SHARON

tsharon@gmail.com

MICHELE VISCIOLA

michele@michele.visciola.name

DIRECTOR OF PUBLICATIONS

SUSAN DRAY
dray@acm.org

Publishing

CUSTOM PUBLISHER



LEXICON GROUP

PRODUCTION MANAGER

SUZANNE MANNING
suzanne@trevari.com

PRODUCTION EDITOR

ANN MCGUIRE
ann@spitfiredup.com

ART DIRECTOR

RYAN SWANSON
swanncreative@yahoo.com

Business & Advertising

UPA EXECUTIVE DIRECTOR

JOHN KASPER, Ph.D., CAE
executive-director@upassoc.org
(630) 980-4997

ADVERTISING SALES DIRECTOR

NICOLE TAFOYA
publications@upassoc.org
(630) 980-4997

MEMBERSHIP DIRECTOR

NICOLE TAFOYA
membership@upassoc.org
(630) 980-4997

RESUSCITATING User Experience

Zoll Data Systems makes a touch-screen electronic medical record program for fire and rescue and Emergency Medical Services (EMS) professionals working in the field. Their previous version was outdated and difficult to use. When the company followed a user-centered design process for the first time, the new version fixed a number of critical usability issues and resulted in an extremely successful user experience and a financial success for the company.

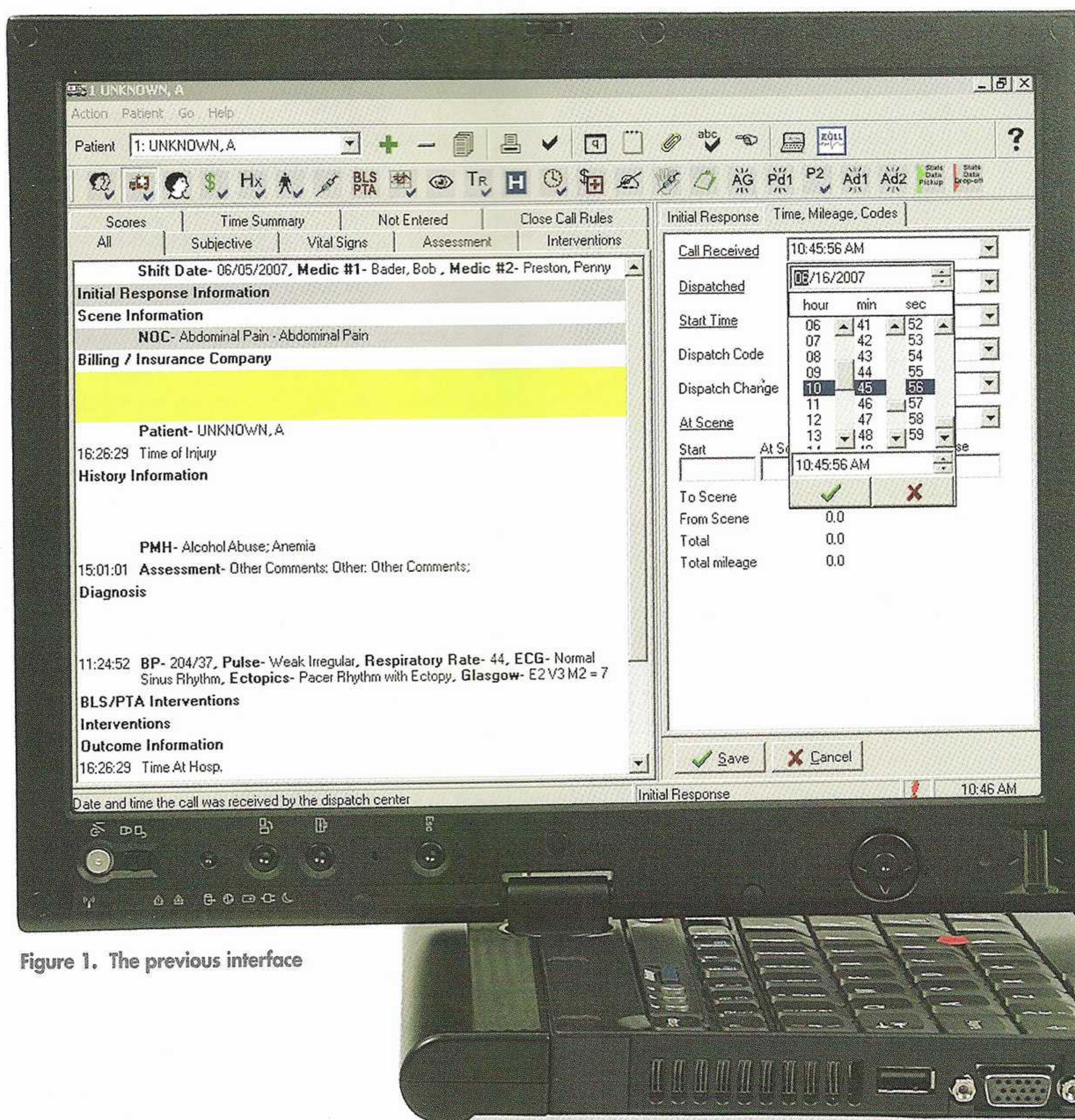


Figure 1. The previous interface

A Touchscreen
System for
EMS and Fire
and Rescue
Professionals

BY THEO MANDEL, PH.D.

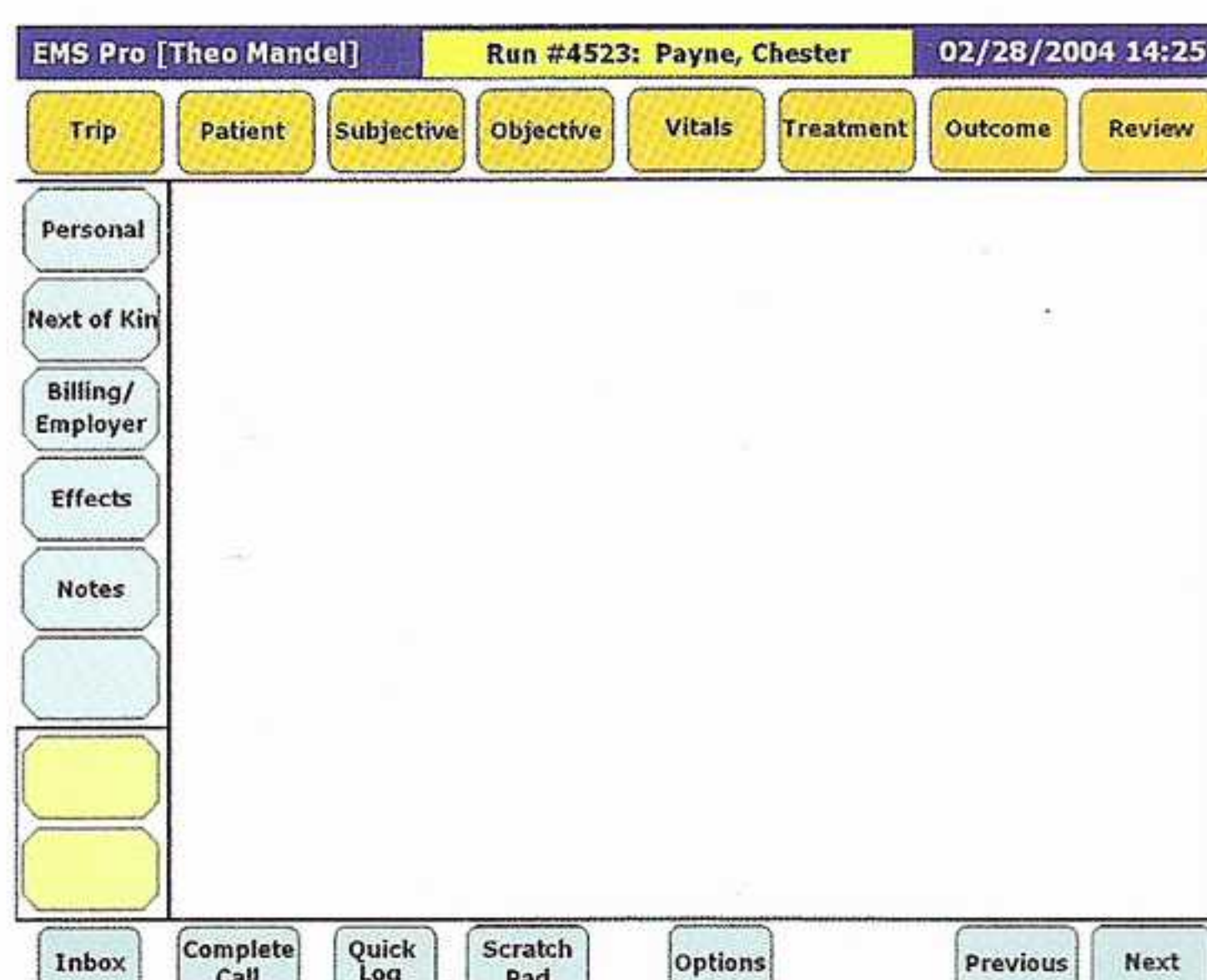
The software runs on Windows-based touch-screen tablet and notebook computers. The previous version was successful, but was built on old architecture and technology. The interface was an old-style Windows desktop application, with no workflow. It was not conducive to touch-screen use in emergency vehicles by users wearing gloves and caring for patients, often with severe medical situations.

The previous user interface (shown in Figure 1, opposite), used standard Windows desktop interface elements that were inappropriate for a touch-screen interface. Many of the interface elements were difficult to use.

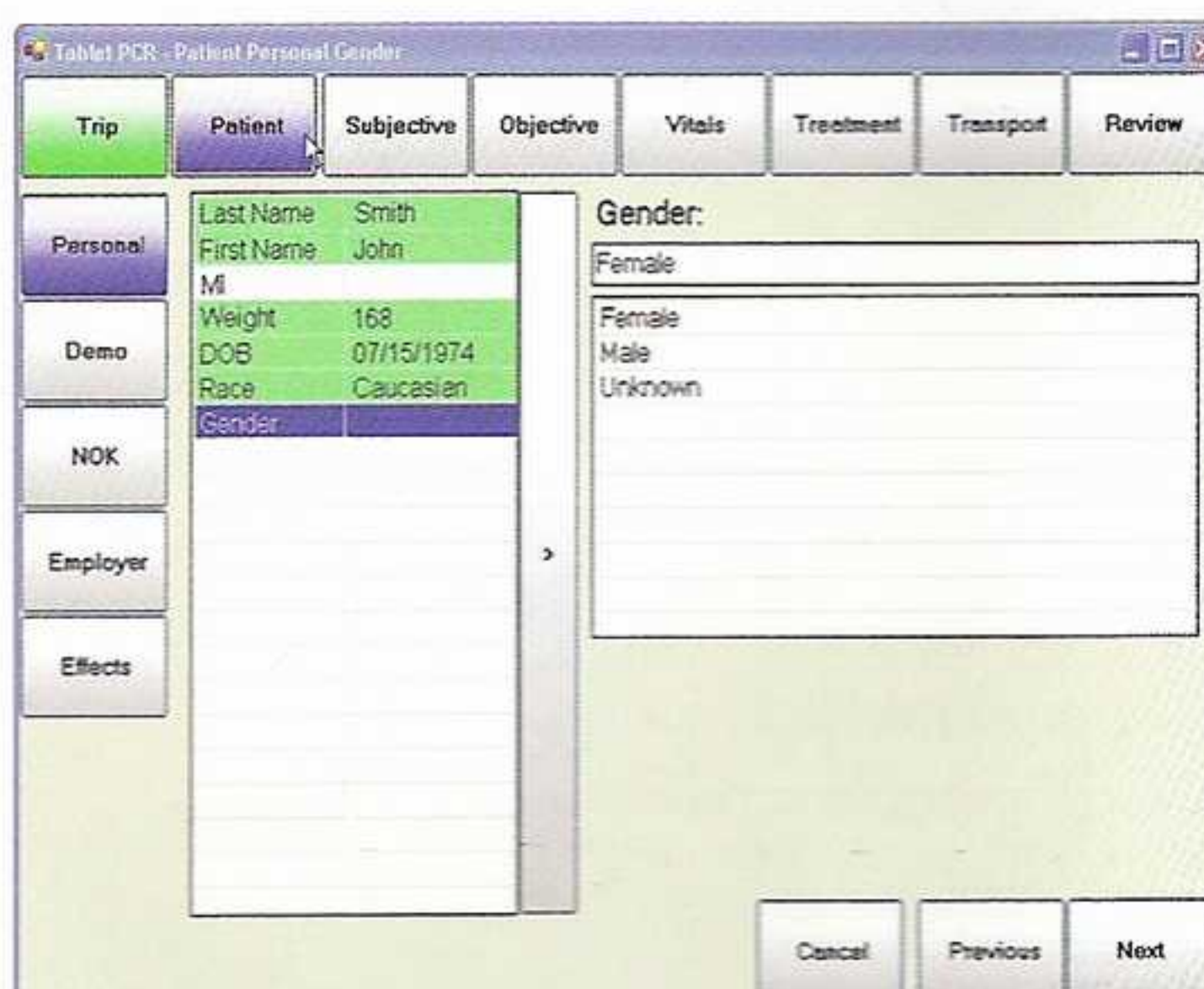
For example, there were over thirty icons in the toolbar, making it difficult to remember the functionality associated with each icon. Two rows of small tabs also made it awkward to navigate through the interface, especially using the touch-screen. The text area was also very small. Finally, many non-standard, custom controls were created for common data-entry UI elements, such as dates and times. These custom controls caused many usability problems.

Phase 1 – Field Observation and Requirements Gathering

As a usability consultant, I acted as usability team lead for the new user-centered design process. We started by collecting functional and usability requirements from existing and new customers and users. The project manager and I rode in ambulances and fire and rescue vehicles in Florida and Texas for four days. We observed EMS and fire and rescue professionals using the product in the field, and gathered their feedback on the user inter-



1.



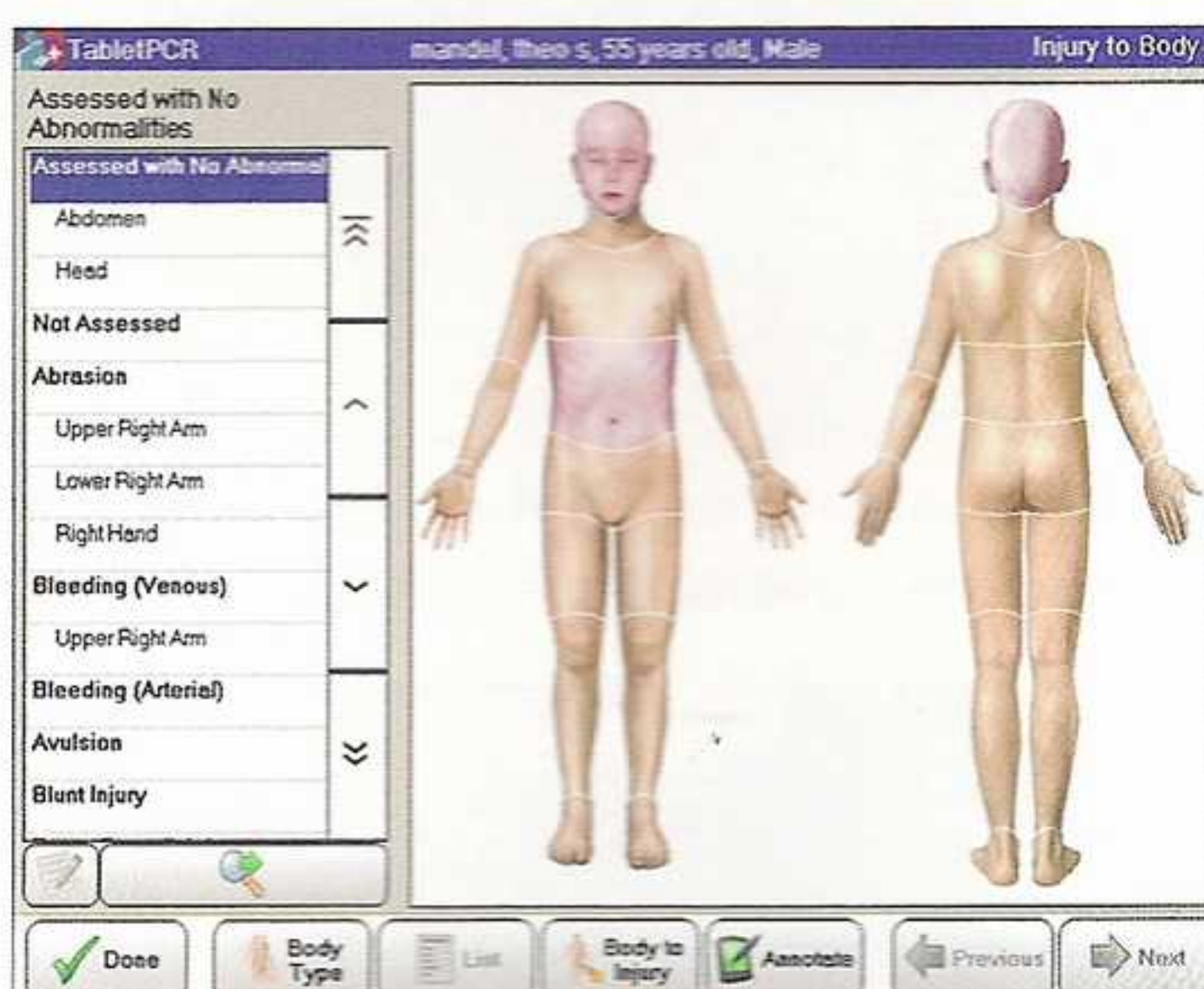
2.



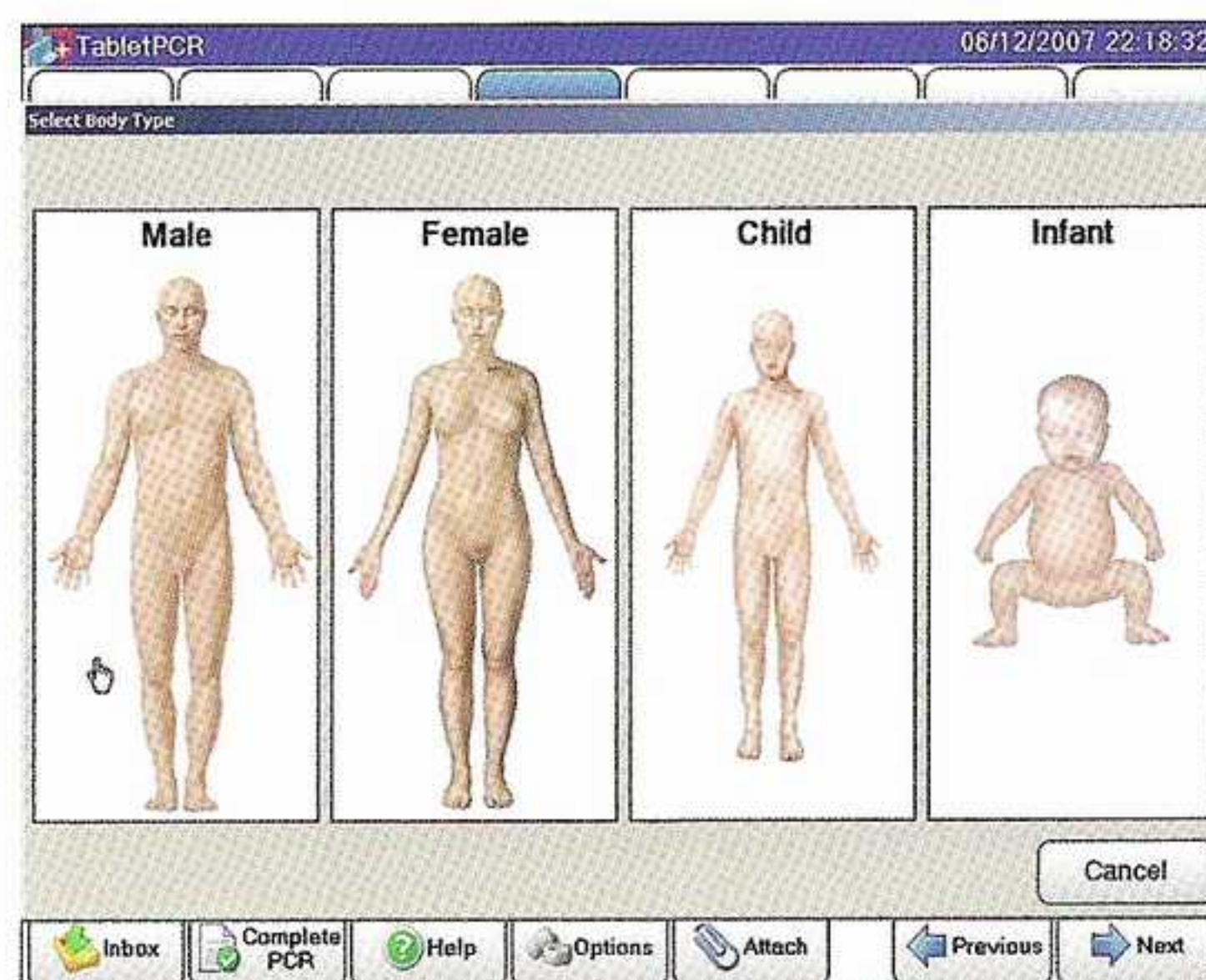
3.



4.



5.



6.

1. High-level screen layout and navigation area prototype

The new design introduced a new page layout with navigation areas designed to provide consistent and intuitive button location and interaction, while maximizing the main work area of the application.

- Top-level navigation buttons across the top
- Sub-section buttons displayed down the left side
- Application navigation to the inbox and to major actions, such as completing a call, accessing the Quick Log, Scratch Pad, and Options on the bottom of the screen
- Page navigation in the bottom-right corner

2. Prototype screen for specifying the patient's gender

The vertical area in the left on the main area displays a summary of the data fields in the particular section. Color highlighting helps users see the status of the data.

plays a summary of the data fields in the particular section. Color highlighting helps users see the status of the data.

- Green fields indicate already entered data
- White shows fields that had not been entered
- Blue highlights the current field.

Selecting a value for the field automatically advances to the next data element in the workflow.

3. Inbox Screen

The first screen shown after logging in displays the Crew's Inbox, detailing a list of their current assignments. Double-tapping an item or pressing the Open button opens that patient's documentation screens.

4. Data Entry Screen

In this typical screen, the user is filling in the name of

the state where the patient was picked up. A list may default to the appropriate state if the company works in one state. A long list, such as state, displays an on-screen keyboard for users to enter letters to more quickly navigate than using the scroll bar area.

5. Graphical Body Navigation

Users were most excited about the new design's use of body illustrations for graphical assessment, navigation, and selection. Users can touch a specific body area to navigate further or to select that area.

6. Body Type Selection Screen

Users were able to select the appropriate body type for their assessment. Touching the Body Type button displayed a pop-up window showing male, female, child, and infant body types.

face. The results from this phase were used to further refine functional and user requirements.

One key observation was that a large number of EMS and fire and rescue professionals, like many others in healthcare fields, are not comfortable with computers and electronic data collection. Their primary role is to care for and transport patients in emergency situations. Many are used to using paper documentation rather than electronic data collection systems (see Figure 2). This observation led us to define additional user requirements regarding training, intuitiveness, and directed workflow navigation.

Phase 2 – Interface Design and Prototyping

The project's design phase involved iteratively creating and reviewing conceptual and functional prototypes. We also achieved tremendous end-user input and involvement through conferences, blogs, and design reviews. The new design incorporated these key interface design and usability concepts:

- System-driven UI for common tasks (wizard). The new design allows users to enter data in a customer-customizable, field-level and screen-level workflow. Users can also navigate the UI independent of the workflow.
- Auto-advance to the next field or screen when appropriate for tasks. Single-selection fields allow users to enter data and to quickly and automatically navigate to the next field or screen.
- High-contrast color palette (for daylight use). We conducted extensive research on interface design colors, fonts, and contrast for use in extreme indoor and outdoor lighting conditions.
- Buttons, icons, controls, and selectable items are large enough for easy touch-screen access.
- All list selection is made using large-font lists with custom scroll buttons (no drop-down lists). All lists are displayed with large, selectable targets. Large scroll buttons allow page up/down and top/bottom of list navigation.
- Data entry can be delayed until a more convenient time. A customizable "Quick Log" screen allows medics to time-stamp procedures with one click. Then, at any time, users can go back and complete the required information for each entered procedure.



Figure 2. Paper-based data collection

- Immediate validation with hyperlink to error fields. When a patient record is completed, a validation screen displays a list of errors or incomplete fields. By clicking on an item in the list, the user is taken directly to the appropriate field for action.
- Configurable screens and a database-driven UI.

Phase 3 – Final Product Design

After prototyping each functional area of the application and each type of documentation data entry, we turned the prototype and a functional specification over to the development team. As the usability team lead, I worked closely with the developers to review the application interface and interaction as development



Figure 3. The new product in use

progressed. We also asked existing customers to review the new application as it was built.

The product has received rave reviews and exceptional user acceptance. Training time and costs have been greatly reduced, which is a major selling feature for products in this field where there is high employee turnover. Training time was reduced from

one week to three hours. One large customer could not get a competitor's product up and running for a year. With Zoll's new product design, the customer went "live" in two weeks without any training.

The interface redesign project cost approximately one million US dollars. Within two years, the new product design enabled the company to gain new and larger clients. They doubled the product's customer

base, more than doubled the number of licenses, and more than tripled the product's revenue for the company. This success also allowed Zoll to increase the product's price and offer additional product modules that contributed to the overall product revenue.

While usability improvements often improve a product's acceptance, the company actually closed many new deals specifically because of the product's usability and user interface.

Because of the success of this project, new major products or product redesigns within the company follow the user-centered process described here, and incorporate ongoing end-user involvement. **UX**

ABOUT THE AUTHOR



Theo Mandel's background includes over twenty years in the field of user interface design and usability. He earned an M.A. and Ph.D. in Cognitive and Quantitative Psychology from the

University of Colorado. He spent eleven years at IBM conducting software interface research, establishing industry-wide guidelines in graphical user interfaces and object-oriented user interfaces (OOUIs), and conducting hardware and software usability evaluations. He's written two well-respected books in our field. The most recent is *The Elements of User Interface Design* (Wiley & Sons, 1997). Since 1992, he's worked as an independent software usability consultant. He was also a co-founder and the chief usability officer for an electronic medical records software company in the late 1990's. He serves as the healthcare chairman for World Usability Day 2007 and kicked off WUD 2007 at the UPA conference with the case study described in this article. He has worked in healthcare usability for the past ten years.