Designing an Open Source Presentation Layer for the Patient-Centered Medical Home

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ABSTRACT

The Parsons Institute for Information Mapping (PIIM) through funding provided by the Telemedicine & Advanced Technology Research Center (TATRC) is developing a widget-based prototype for the Patient-Centered Medical Home (PCMH) environment. Through a collaboration with the Walter Reed National Military Medical Center (WRNMMC), the prototype provides both a patient and provider portal. This presentation layer is streamlined for easy access to medical information and interaction between patients and healthcare providers. We hope to show how through an Open Source environment and a better mapping of data sources and providers, better design can contribute to more manageable EHR environment. This presentation will show some results of our recent usability testing efforts and demonstrate the prototype. The designs, code base, and documentation are planned for an Open Source release in December 2012 through the OSEHRA framework.

INTRODUCTION

The Parsons Institute for Information Mapping (PIIM), of The New School is developing a widget-based prototype for the Patient-Centered Medical Home (PCMH) Environment. The prototype, Healthboard, is being developed in Flex/Flash and will serve to provide a one-stop visual dashboard for patients and providers. Developed specifically to enhance the communication of information through better visualization of medical data, the tool strives to make difficult data much easier to understand by utilizing best-practice design principles and standardization of information provided through the system.

Healthboard is scheduled for a planned release within the Open Source Electronic Health Record Agent (OSEHRA) platform. We hope to establish Healthboard as an alternative presentation layer for electronic medical records (EMR) or for use directly within the PCMH environment. The prototype and design documents will be provided to assist developers in providing an enhanced level of support, better user experience and a streamlined interface between patients and their healthcare providers. Because the system follows a modular structure, some or all of Healthboard may be implemented depending on
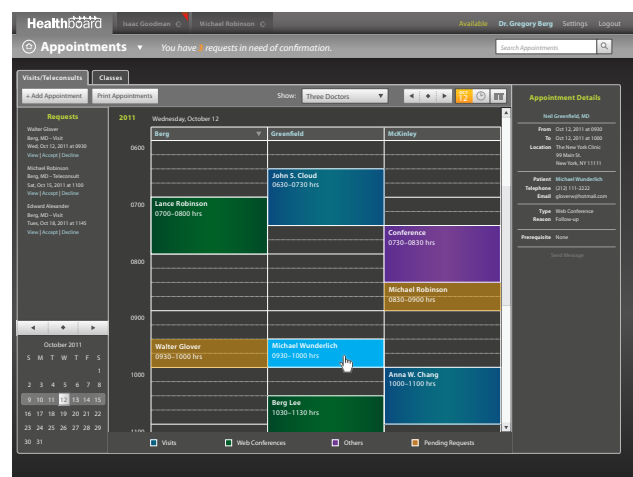

FIGURE 1: *Screen shots from Patient Portal and Providers Portal of Healthboard*

the need of the particular program.

BACKGROUND

In 2008, PIIM began a project with the Telemedicine & Advanced Technology Research Center (TATRC) to develop an enhanced graphic user interface (GUI) for the Armed Forces Health Longitudinal Technology Application (AHLTA).[1] PIIM's work was to identify opportunities to improve the GUI and the overall visualization of medical information available in AHLTA. PIIM was also responsible for performing a review of the usability of the system and provide recommendations for improving the system's use amongst end users. Finally, PIIM developed a prototype that represented all of these areas to demonstrate the effect that a redesigned GUI could have on the system.

In 2009, PIIM began working on the Visual Dashboard and Heads-up Display of Patient Conditions award, which ultimately created the Healthboard system described herein. The project involved developing a visual style for the patient and provider dashboards used within a Patient-Centered Medical Home Environment, developing a user experience strategy, engineering a prototype, and finally performing usability testing and redesigning the interface based on user feedback.

DEVELOPMENT OF THE HEALTHBOARD PROTOTYPE

The goal of Healthboard was to ultimately provide a way for active duty military personnel and their spouses to interact with their own personal health information and electronic medical records. Furthermore, Healthboard was to provide a streamlined mechanism for patients and providers to interact. Our development effort began with the following high-level requirements:

- To enhance communication between the patient and providers

- To allow the patient to gain easy assess to his/her own health records

- To enable heath data self-reported by the patient

- To help the patient gain health literacy and awareness

By integrating best-practice design principles and data visualization strategies, the enhanced GUI design and its attention to user friendliness and usability targets should provide a better overall user experience for patients as they interact with medical information. As a result,
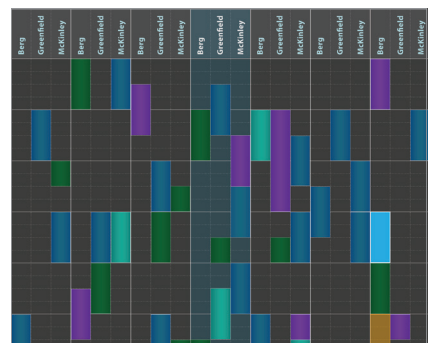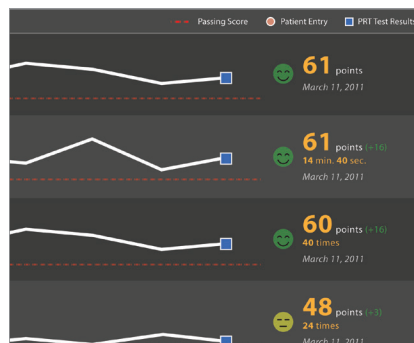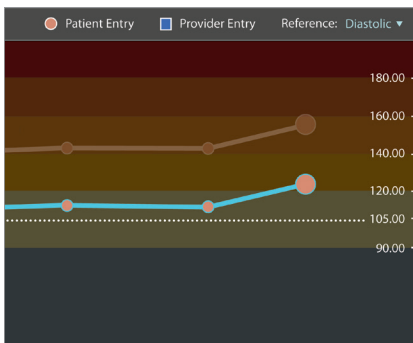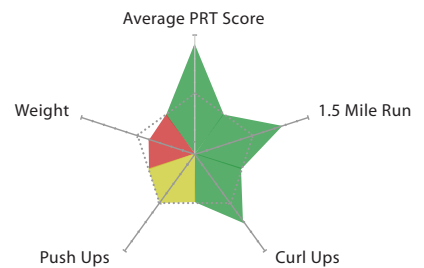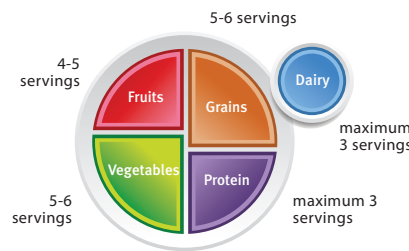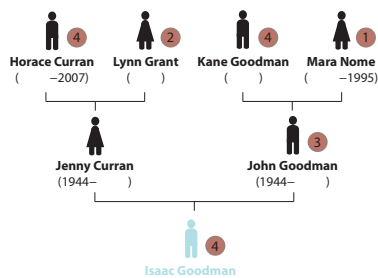

FIGURE 2: *UI components related to data visualization*

medical information could be streamlined. To some degree, the intimidation factor of viewing such information could be partially mitigated for non-medically trained users.

COLLABORATION

Working with project stakeholders and Military Health System (MHS) representatives, PIIM developed a Product Requirements Document (PRD) and Project Management Plan (PMP). Developing iterative versions of three primary documents, the *Detailed GUI Design Volume,*[2] *Information Strategy Volume,*[3] and *Engineering Volume,*[4] these projects served to provide the basis and backb one for the eventual prototype.[5] As the Patient-Centered Medical Home Environment within Walter Reed National Military Medical Center (WRNMMC) was identified as the primary use case for the development of the Healthboard prototype, PIIM worked with the medical home program at WRNMMC and Telemedicine & Advanced Technology Research Center (TATRC). The following experts in each organization have contributed towards the successful completion of this project:

Parsons Institute for Information Mapping (PIIM)

    GUI *Designers*

    UX *Designers*

    Information Designers

    Usability Specialists

    Medical Informatics Specialists

    Engineers

Walter Reed National Military Medical Center

    Physicians

    Nurses

    Dietitians

    Pharmacists

    IT Specialists

    Hospital Administrators

Telemedicine & Advanced Technology Research Center

    MHS *Subject Matter Experts*

    Program Mangers

    Grant Managers

PIIM developed user requirements and use cases based off of feedback from collaborators. In addition, feedback was received through weekly teleconferences held with a team of reviewers, where the iterative GUI designs and other works were shared. Each module was presented as it was being developed, and additional medical expertise was consulted as necessary to inform the design team.[6]

DESIGN OUTCOMES

PIIM successfully delivered GUI/UX models satisfying the high-level requirements listed above through the design iterations. The following modules/UI features have been identified and designed *to enhance communication between the patient and providers:*

- Messages

- Live Chat (video, audio, text)

- Appointments
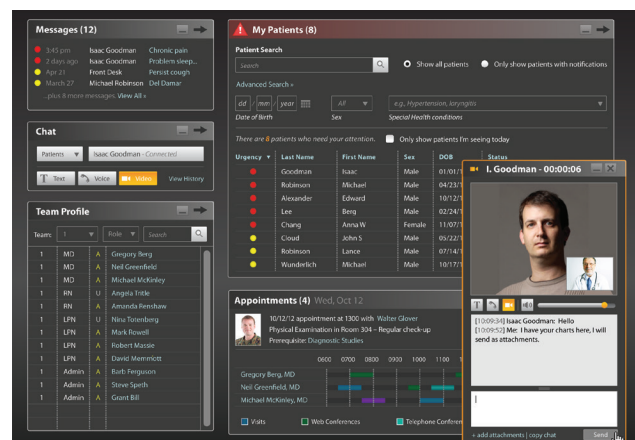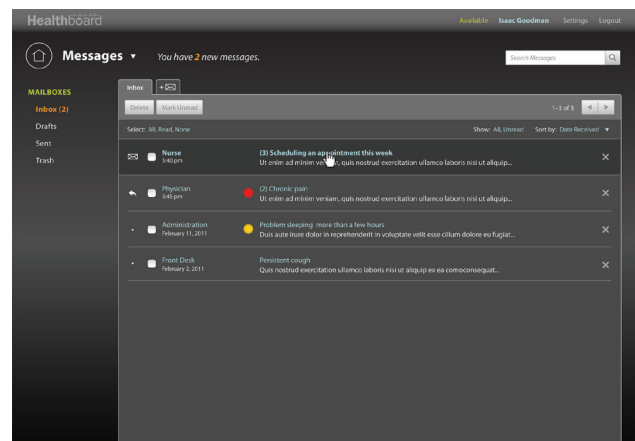
- Reminders

- Medications (requesting renewals)

FIGURE 3: *Examples of modules and components designed to enhance communication between patients and providers*

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The following modules/UI features have been identified and designed *to allow the patient to gain easy assess to his/her health records:*

- Medical Records (visit summary, test results, procedure/surgery records)

- Immunization

- Medications (prescription medications)

- Vital Signs (taken during visits)

The following modules/UI features have been identified fied and designed *to enable heath data self-reported by the patient:*

- *Vital Signs (taken by the patient)*

- *Nutrition*

- *Medications (over-the-counter, supplements, herbal medicines)*

- *Exercise*

The following modules/UI features have been identified and designed *to help the patient gain health literacy and awareness:*

- *Educational Resources*

- *Nutrition (provider-entered recommendations and nutrition guides)*
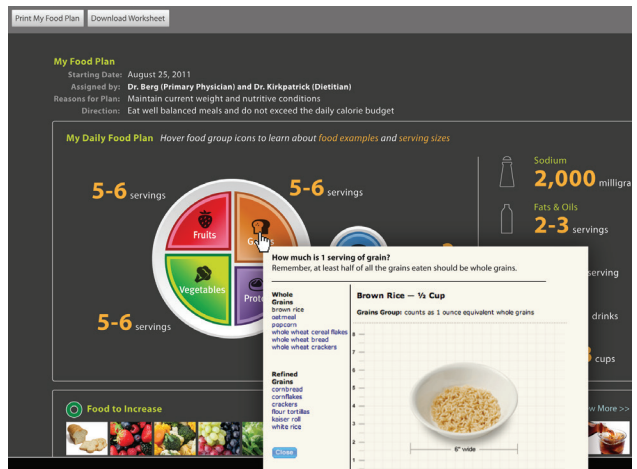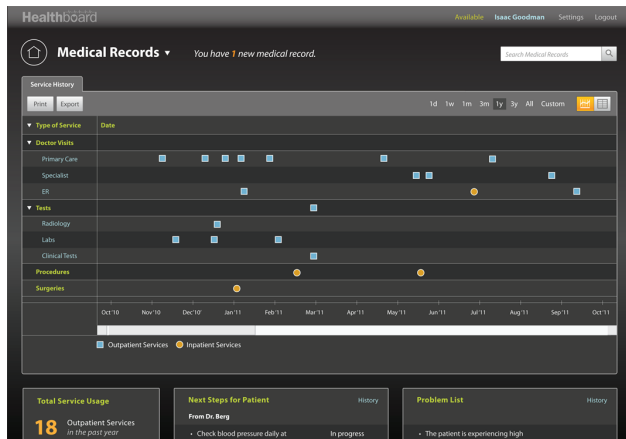
- *Context-sensitive help and tips*

FIGURE 4: *Screen shots from modules supporting self-reported data and context-sensitive help and tips*

MOVING TOWARDS AN OPEN SOURCE ENVIRONMENT

Following conversations with project stakeholders, PIIM made a decision in early 2012 to begin planning for the eventual move of the Healthboard prototype to an open source environment. In August 2012, PIIM began conversations with representatives of the Open Source Electronic Health Record Agent project (OSEHRA). OSEHRA is built on the notion of facilitating the development, improvement, and maintenance of EMR platforms, making them freely available for medical beneficiaries.[7]

In December 2012, PIIM plans to release the prototype and design documents through the OSEHRA framework, making them available as an alternate presentation layer. This presentation layer may ultimately prove useful as an informative tool to the development and designs of future MHS systems and initiatives, as well as to the development of systems outside the U.S. Military.

CONCLUSION

Healthboard is a unique system designed to serve both patients and providers with a better user experience among other things through intuitive interface, data visualization (for better comprehension of information and decision-making), and end-user support while respecting the workflow of the remote patient-care process. As PIIM continues with the usability testing and related research on Healthboard, we hope that the final prototype and its supporting documents will help establish a benchmark for how patients and healthcare providers can interact through better design by December 2012. The system has met most of the requirements that were defined at the initiation of the project, as well as the requirements stated during the iterations. We expect the health professionals will continuously provide quality healthcare while limiting the number of doctor's visits once this system is successfully deployed and utilized in reality. The system would help patients stay healthy, prevent illnesses, gain health literacy and awareness, and monitor their own health records, as well as allow them to self-report health-related activities and educate themselves through online resources. The key to achieving such meaningful goals is a collaborative effort; the designers play a significant role in an EMR system's design or redesign, they cannot take the task alone, and neither can the engineers nor the clinical experts. It was successful only through the successful formation of a team of clinical experts, designers, usability experts, engineers, IT experts, and administrative experts. Ultimately, we hope that the collaborative effort contributed by PIIM, WRNMMC, and TATRC will become a major precedence for the practice of designing the EMR system.

NOTES

1 Award No. W81XWH-09-1-0456: Leveraging the PIIM Process to Advance Health IT. The Telemedicine and Advanced Technology Research Center (TATRC).

2 Jihoon Kang et al. The Visual Dashboard & Heads-up Display of Patient Conditions: GUI Design Volume. New York: Parsons Institute for Information Mapping, The New School, 2012.

3 J Kang and D Bendersky. The Visual Dashboard & Heads-up Display of Patient Conditions: Information Strategy Volume. New York: Parsons Institute for Information Mapping, The New School, 2012.

4 D Bendersky and J Kang. The Visual Dashboard & Heads-up Display of Patient Conditions: Engineering Volume. New York: Parsons Institute for Information Mapping, The New School, 2012.

5 B. Willison. "Quarterly Report: Leveraging the PIIM Process to Advance Health IT." Quarterly Report, Parsons Institute for Information Mapping, New York, NY, June–September, 2009.

6 J Kang, S Yoshida, A Ina. The Visual Dashboard & Heads-up Display of Patient Conditions: Assessment Volume. New York: Parsons Institute for Information Mapping, The New School, 2012.

7 OSEHRA, "About OSEHRA," About Us, http://www.osehra.org/page/about-us, 2012.