# The Computerworld Honors Program

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## Final Copy of Case Study

**Status:**
Laureate

**Year:**
2013

**Organization Name:**
University of Tennessee Health Science Center Office of Biomedical Informatics

**Organization URL:**
http://uthsc.edu/research/research_resources/biomedical_informatics/

**Project Name:**
Scientific Laboratory Information Management and Patient-care Research Information Management (Slim-Prim)

**Please select the category in which you are submitting your entry:**
Health

**Please provide an overview of the nominated project. Describe the problem it was intended to solve, the technology or approach used, how it was innovative and any technical or other challenges that had to be overcome for successful implementation and adoption. (In 300 words or less.)**

The Slim-Prim project unites a disparate and enthusiastic team of scientists, engineers and programmers with the goal of applying technology to advance healthcare in Memphis and beyond. The paradigm of research has traditionally been to work independently in isolated silos with little communication outside formal research collaborations. As technology has advanced in other areas, so its adoption has lagged in research except for developing faster and more powerful tools for large-scale analysis (for example, genomics technologies). An increasing number of junior clinicians and researchers are seeking to change this paradigm and forge careers in the forefront of technologically advanced and collaborative research. They wish to make use of information technology to provide excellent healthcare research. We saw the possibility of developing a truly collaborative tool that would break down these silos and offer powerful technologies to this user base. This project involved the development of a customized biomedical informatics application facilitating data integration and mining

from disparate sources into a centralized system for research purposes, and also the development of custom-built analytics for day-to-day data oversight and data validation. Slim-Prim's user-driven development allows researchers and clinicians to design and administer complex relational databases for their studies with little or no technical training. The Slim-Prim system is a secure PHP-based web application with an encrypted relational database mounted on an Oracle 11g server, providing a robust, scalable enterprise database engine. Slim-Prim is highly versatile and user-friendly, enabling researchers to securely gather, manage, maintain, report and share their data. All customizations with broad applicability are made available through the core of the system allowing all to benefit from this rich collaborative environment. We serve dozens of studies in many diverse fields.

**When was this project implemented or last updated? (Please specify month and year.) Has it incorporated new technologies and/or other innovations since its initial deployment? (In 300 words or less.)**

Slim-Prim was conceptualized and developed in 2008. The original system was launched in late 2008 and has been significantly revised and re-issued twice since then, with our next release due in Spring 2013. On a core-system level we have primarily taken advantage of the added security and stability offered by new releases of the PHP programming language. Most recently these have allowed global flags to be set in the database to complete encryption of all transmission. Other notable additions have been via the adoption of script.aculo.us JavaScript libraries (December 2010). Vitally, since a constant concern in this endeavor is the quality of data being gathered, the BMI team designed and implemented an add-on tool to ensure quality of research data in March 2012. This feature helps in the detection of invalid entries that are not possible to write rules for, such as misspelling in text fields, mismatched data codes, and unforeseen data errors. The errors exposed during post-hoc data validation processes are used to improve the accuracy of the ad-hoc data validation process. This idea was also presented at the American Medical Informatics Association (AMIA) Joint Summit on Clinical & Translational Biomedical Informatics in November 2012. In August 2012, this tool was further advanced with an intuitive graphical interface allowing large amounts of data to be visually scanned very rapidly. Such tools can be employed across different healthcare research domains. For example, scanning for outlying data points in a patient data registry vs. examining medication compliance logs in a clinical trial.

**Is implementation of the project complete? If no, please describe the project's phases and which phase the project is now in. (In 300 words or less.)**

Yes, but development of new and exciting analytical tools, improvements to the GUI and other essential user-feedback-driven modifications and upgrades are constantly ongoing.

**Please provide at least one example of how the technology project has benefited a specific individual or organization. Feel free to include personal quotes from individuals who have directly benefited from the work. (In 300 words or less.)**

The scope of the Slim-Prim system can be seen in the following four examples of ongoing projects: 1. Methodist LeBonheur Healthcare, a major hospital system in Memphis. Slim-Prim supports several research projects for the MLH system. These include a high-risk pediatric asthma database with community outreach and information modules aimed at lowering the costs of healthcare services to Medicaid recipients via community interaction with families of children with asthma. We are also beginning a collaboration on a breast cancer disparity project aimed at creating a data warehouse for the MUH system. 2. Customized multi-site clinical data management system. A UT faculty member was a co-awardee of the National Institutes of Health's largest ever pain clinical trial grant. We developed a patient recruitment, tracking and logging system that links seamlessly with a clinical trial data management tool and statistical analysis framework. Colleagues at other sites (University of Rochester, NY & University of Medicine & Dentistry of New Jersey, NJ) rely heavily on the BMI and invited us to collaborate on other projects because few services like ours exist in academic healthcare. 3. BLUES Project, an initiative providing intensive counseling and interventions to pregnant women in Memphis and Chattanooga aimed at lowering the appalling infant mortality rates that our area faces. Working closely with a team of counselors and obstetricians we developed a subject tracking and data collection system. This work has spun into other projects to expand the scope of these interventions for further healthcare disparities research. 4. The Perinatal-Neonatal database, a 20-year longitudinal and retrospective database of births at The Regional Medical Center in Memphis. We maintain over 20 million data points on almost 50,000 mothers and their babies. Data are used to improve health outcomes for Memphis families.

**Would this project be considered an innovation, a best practice or other notable advancement that could be adopted by or tailored for other organizations and uses? If yes, please describe that here. (In 300 words or less.)**

Yes, the Slim-Prim system and the UTHSC BMI offer a unique and powerful tool to our community. Our system, although currently modest in scale and ambition, offers a completely customizable web, Internet and database research experience to our users. Importantly, we operate under a not-for-profit paradigm, which dramatically reduces front end and back end costs to our users and allows us to offer services to small groups, community groups, unfunded researchers etc. These tools are no longer just for the rich and powerful researchers! While we are focused currently on the UTHSC faculty research portfolio we are expanding our network with community healthcare partners and local hospital groups. In addition to being able to share functionality within the system, each module can be separated, or instantiated, from the main system and adopted by any organizations that share the same research interests. Within the project, each individual research study has its own customized application called a module which is tailored to meet with the study's unique specifications and requirements. Module specific functions can be easily adapted to any other module within the system. For example, the "Audit Log" feature (which captures users' access to sensitive data sets) was modified and used to capture patient compliance in filling daily questionnaires for a

clinical trial! In addition to contributions directly to the health industry, the University of Tennessee Health Science Center also employed the system as a teaching aid for a knowledge management course for health professional students from 2009-2012. This gave students experience with applying concepts of knowledge management and the ability to demonstrate the use of advanced information and data analysis techniques. The project has become an invaluable new asset to our medical, scientific and research communities.