Using Process Modeling and Analysis Techniques to Reduce Errors in Healthcare

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ABSTRACT

As has been widely reported in the news lately, healthcare errors are a major cause of death and suffering. In the University of Massachusetts Medical Safety Project, we are exploring the use of process modeling and analysis technologies to help reduce medical errors and improve efficiency. Specifically, we are modeling healthcare processes using a process definition language and then analyzing these processes using model checking, fault-tree analysis, discrete event simulation, and other techniques. Working with the UMASS School of Nursing and the Baystate Medical Center, we are undertaking in-depth case studies on error-prone and life-critical healthcare processes. In many ways, these processes are similar to complex, distributed systems with many interacting, concurrent threads and numerous exceptional conditions that must be handled carefully.

This talk describes the technologies we are using, discusses case studies, and presents our observations and findings to date. Although presented in terms of the healthcare domain, the described approach could be applied to human-intensive processes in other domains to provide a technology-driven approach to process improvement.

SHORT BIOGRAPHY

Lori A. Clarke is chair of the School of Computer Science at the University of Massachusetts, Amherst and is co-director of the Laboratory for Advanced Software Engineering Research (LASER). She is a Fellow of the ACM and IEEE, and a board member of the Computing Research Associations Committee on the Status of Women in Computing Research (CRA-W). She received the 2012 ACM Special Interest Group on Software Engineering (SIGSOFT) Outstanding Research Award, the 2011 University of Massachusetts Outstanding Accomplishments in Research and Creative Activity Award, the 2009 College of Natural Sciences and Mathematics Outstanding Faculty Service Award, the 2004 University of Colorado, Boulder Distinguished Engineering Alumni Award, the 2002 SIGSOFT Distinguished Service Award, a 1993 University Faculty Fellowship, and the 1991 University of Massachusetts Distinguished Faculty Chancellors Medal. She is a former vice chair of the Computing Research Association (CRA), co-chair of CRA-W, IEEE Publication Board member, associate editor of ACM Transactions on Programming Languages and Systems (TOPLAS) and IEEE Transactions on Software Engineering (TSE), member of the CCR NSF advisory board, ACM SIGSOFT secretary/treasurer, vice-chair and chair, IEEE Distinguished Visitor, and ACM National Lecturer. She has written numerous papers, served on many program committees, and was program co-chair of the 14th and general chair of the 25th International Conference on Software Engineering. She has been a Principal Investigator on a number of NSF, DoD, and DARPA projects.

Dr. Clarkes research is in the area of software engineering, primarily focusing on verification and requirements engineering for human-intensive systems. She has been investigating techniques for detecting errors and safety and security vulnerabilities in complex processes in domains such as healthcare and digital government. She is also involved in several efforts to increase participation of underrepresented groups in computing research.