

Industrial & Systems Engineering and Health Care: Critical Areas of Research Workshop

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Summary: Since the 1970s, the concept of better integrating engineering principles and practices into health care system design has held great allure and promise. Although there have been instances of successful collaboration, it has been challenging to bridge the conceptual and practical divides between disciplines. A 2005 report from the Institute of Medicine and the National Academy of Engineering titled, *Building a Better Delivery System: A New Engineering/Health Care Partnership*, outlined broad research activities needed to improve health care delivery.

The Health Information Technology (IT) Portfolio at the Agency for Healthcare Research and Quality (AHRQ) and the Service Enterprise Systems (SES) Program at the National Science Foundation (NSF) seek to strengthen partnerships between the health services community and the industrial and systems engineering community to achieve the portfolio and program goals set for AHRQ and SES. Therefore, AHRQ and NSF co-funded a workshop to identify potential projects or topics of mutual benefit, and to define a research agenda for how industrial and systems engineering may support health services research and health care delivery redesign, with a focus on health IT.

The primary purpose of the developed research agenda was to provide guidance related to the type of research that should be prioritized at the intersection of Industrial Systems and Engineering (ISyE) and health care to realize the vision of an ideal health care delivery system. Completion of this research agenda should lead to: 1) improvement in the health of society by improving health care sector performance; 2) the creation of new ISyE knowledge that may be used to improve the health care industry, but also other manufacturing and service industries; and 3) a clearer understanding of the health IT resources required to achieve the vision of an ideal health care delivery system. This research agenda should be completed in the next five to seven years, in order to yield change in the next 10 to 15 years.

Project Objectives:

- Develop and publish a background report that summarizes and critiques past meetings and documents to guide the current effort. **(Achieved)**
- Host a workshop of national experts. **(Achieved)**
- Develop and publish a research agenda including a prioritized list of critical areas of research. **(Achieved)**
- Disseminate the research agenda. **(Achieved)**

2010 Activities: The project team primarily focused on concluding project activities by developing the final report titled, Industrial and Systems Engineering and Health Care: Critical Areas of Research--Final Report, which includes the research agenda, and disseminating the report to relevant audiences. The final report synthesizes and discusses the outcomes of the workshop within the context of the knowledge gleaned from the background materials. The report emphasizes that the project objectives call for a system-wide breakthrough change, and proposes a research agenda as well as an action agenda. The report was disseminated at the annual national conferences for the following organizations: the Institute of Industrial Engineers (IIE), AcademyHealth, the Human Factors and Ergonomics Society (HFES), the Institute for Operations Research and the Management Sciences (INFORMS), and the American Medical Informatics Association (AMIA).

Impact and Findings: As discussed by workshop participants and described in the report, an ideal health care system must be one that is new, patient-centered, and engineered as well as relies on research to accomplish three goals:

1. Stimulate innovation in ISyE methods better aligned with the complex, distributed, and stochastic nature of health care (Knowledge Innovation);
2. Accelerate knowledge transfer of ISyE methods to solve currently recognized health care challenges (Knowledge Transfer); and
3. Integrate overarching meta-knowledge lessons gleaned from purposefully targeted research projects (Meta- Knowledge Integration).

Investment in these three research themes will result in three types of benefits: sustainability improvements to the known health care delivery system; breakthrough, radical change leading to the vision of the new health care delivery system; and capacity building that expands the breadth and depth of ISyE knowledge relevant to health care.

Action items in five domains were identified to push the research agenda forward. These domains include:

- **Collaboration.** 1) Creating consortia of all stakeholders including government, providers, payers, consumers, the insurance industry, and vendors; 2) Promoting multi-stakeholder conversations through interdisciplinary projects; 3) Fostering partnerships among and between agencies, organizations, associations, academia, and industry; and 4) Identifying or forming a professional home at the intersection of ISyE and health care.
- **Education and Training.** 1) Creating and enhancing interdisciplinary higher education programs; 2) Expanding professional development and cross-training; 3) Initiating early and mid-career fellowships in health care for ISyE professionals; and 4) Compiling a library of case studies.
- **Funding.** 1) Investing in high potential research focusing on the knowledge innovation directions presented in the research agenda; 2) Supporting community-based, low technology, low cost research; 3) Providing capacity building start-up funding for organizations; 4) Creating centers of excellence; and 5) Requiring multidisciplinary grant teams.
- **Dissemination.** 1) Facilitating publication; 2) Fostering networking; and 3) Launching and supporting demonstration projects within real health care organizations.
- **Administration.** 1) Developing joint solicitations and collaborative funding to drive the research agenda proposed in this report; and 2) Accelerating the proposal cycle for grants relevant to the research agenda in the report.

Strategic Goal: Develop and disseminate health IT evidence and evidence-based tools to improve health care decisionmaking through the use of integrated data and knowledge management.

Business Goal: Synthesis and Dissemination