Regenstrief Center for Healthcare Engineering
Strategic Forum:
Reengineering Healthcare Delivery
September 21-22, 2016
SUMMARY REPORT
US healthcare is the largest sector in the largest economy in the history of the world. The stakes related to healthcare are big. Most people indicate that optimizing their personal health status is a very high priority. Healthcare is typically one of the largest expenses for employers. Despite the high expense of US healthcare, the health of our population is not commensurate with that in other wealthy countries. Over the last few decades, Americans have fallen behind citizens of other developed economies on several important health indicators. The high resource costs of the healthcare sector, combined with its relatively poor productivity, suggest that engineering and management solutions must be brought to bear. It is imperative that healthcare become better, faster, safer, and cheaper.

In response to this massive challenge, Purdue University, with support from the Regenstrief Foundation, established the Regenstrief Center for Healthcare Engineering (RCHE). RCHE coalesces the strengths of Purdue’s engineering, management, clinical, social, and basic science disciplines to probe the numerous and complex aspects of care delivery. The Center investigates care-delivery systems to assess their effectiveness. From determining the value of employer-supported on-site clinics, hospital-administered interventions and support programs to the analysis of root causes of compromised safety in hospitals and clinics, faculty synergize efforts to provide a rational and data-driven basis for effecting positive change. Now in its 12th year, RCHE is exploring new directions and has launched a new strategic planning effort. To initiate the planning process, RCHE invited a group of national experts to campus for a discussion held September 21-22, 2016. The agenda for the Strategic Forum is included as Appendix 1. Appendix 2 provides biographical sketches of the presenters. Appendix 3 lists the Purdue participants in the second day’s strategy session, and includes a listing of the working group assignments.

Recurring Themes from Presentations

Several recurring themes emerged from the Forum presentations. Perhaps the most consistent theme was a national paradigm shift away from an exclusive focus on improving care delivery to a broader focus on improving and maintaining health. A number of the speakers (Freund, Kaplan, Jordan, Brady, Jimison, Burns, Dittus, and Ware) noted that health outcomes are measurable and that healthcare is only one of many determinants of outcome. Several of the speakers cited analyses indicating that only about 10% of the variability in health outcome is attributable to healthcare (see figure above). Behavioral and social factors, along with genetic predisposition are more potent determinants of health outcome. Moreover, in order to make interventions more coordinated, tailored, timely and continuous, there will be a shift to more virtual care with less of a dependence on hospital-centric solutions. Engineering a system that will improve health in communities must consider other determining factors. Efforts to utilize systems engineering to make healthcare better, safer, faster, and cheaper must examine the continuum of care:

![Diagram of how different factors contribute to health outcome]
from traditional establishments associated with healthcare (hospitals, pharmacies, long-term care facilities, urgent care, specialized centers, etc.) to institutions that can impact many of the other factors affecting overall health (such as schools, employers, exercise facilities, and homes). Already this is leading to a transition from a healthcare system emphasis to a broader “health” system approach that embraces the full range of health determinants. In addition to helping engineer the new system, major research-intensive universities like Purdue can contribute through programs like RCHE to the analysis of the evolving health system. Forum speakers offered several examples of the potential for improved outcomes at lower costs. For example, poorly controlled insulin-dependent diabetes mellitus is the leading cause of limb amputation in the United States. One cause of poor control of diabetes among homeless people is the lack of access to a refrigerator to store insulin. However, the cost for a refrigeration system for insulin storage is lower than the amputation cost of lower extremities. There are a number of opportunities to define how value may be improved as cost structures evolve and reduced costs with improved quality of care are incentivized through the threat of payment reduction.

A second theme that was articulated by several speakers (Tourassi, Dittus, and Moser) was the new opportunities offered by the emergence of personalized medicine. Identification of appropriate subgroups in the population allows individualized targeting of care to various biological, social, behavioral, and environmental factors. These targeted interventions might benefit from new technologies, ranging from cell phones to exercise trackers and smarter insulin pumps. Consumers demand an ever-increasing amount of engagement and real time information that is easily accessed and understood. This highly personalized form of medicine will increase the shifting trend in point of care treatment from hospitals/physician offices to the individual’s location of convenience. It is anticipated that this shift will result in additional consumer engagement. When individuals take ownership of their health and have accurate, actionable information regarding health decisions, they become active partners in improving their health as well as the health of their communities. Realizing the potential of personalized medicine will require advanced engineering, management and data-driven solutions.

A third theme that emerged from the presentations was that incentives are detrimentally misaligned at almost all levels. The sub-optimization of the health system with each contributing entity being influenced by “perverse incentives” undermines the effectiveness and efficiency of the health continuum. Misaligned incentives include reimbursement structures for care providers, affordability of medications, and a system focused on treating the sick rather than maintaining health. On the academic side, university-based research rewards discovery, but implementation by academics is not as highly valued by their peers. In healthcare, only about 14% of research findings are ever used in practice. Even for these few findings that find use, the average interval between discovery and implementation is 17 years. Aligned reward systems that speed the adoption of the most effective new technologies and treatments are needed. Engineering science could help inform this research translation process.

A final theme centered on the idea that many of the problems in healthcare result from the siloed nature of the data and the sub-optimization of complex systems. The need is for infrastructure that can repeatedly provide quality with continuous improvement. Most individuals do not have enough information about provider quality or treatment outcomes, nor do they know how to access this information. Similarly, most researchers neither know what data are available nor how to obtain it. Yet, future healthcare discoveries will largely be data-driven and data-intensive. Systems-thinking can help address overall communication and data barriers and help improve what many observers feel is a poorly performing healthcare system.
**Future Opportunities for Engineering-driven Impact on the Health Continuum**

Population health focuses on health as opposed to medical care. There are a number of non-medical barriers to health that need to be acknowledged. Taking a community perspective to optimize population health may require imbedded research to tear down existing silos and create a lasting impact. Academic research centers such as RCHE may be able to address these problems through expertise in three areas: systems perspectives, decision support, and misaligned incentives. A possible approach would be to identify local expertise and determine areas where additional capabilities are needed to define the space where technology, community-focused health, and implementation meet. A few directions that should be given further consideration include:

1. **System optimization** – Health and healthcare are systems problems. With a large number of factors contributing to overall health, and the aggregate of individuals contributing to community and population health, there are systems of systems that can be optimized which presents potential solutions and problems. If each system is approached individually as opposed to a part of the whole, the risk of sub-optimization increases. In keeping this research theme in line with being operationally focused, the researcher must be aware of the overall system.

2. **Purdue living laboratory** – Focus attention on a defined population, such as the cohort of Purdue employees. Purdue is self-insured and is motivated to have a healthy and productive workforce. The population insured through Purdue includes children, adults, and retired senior citizens and employees that span a wide range of incomes. The vision might include creation of core research services, such as a data analysis core, a privacy-protected database, an ethics oversight committee, and a biotechnology core. Investigators could propose ideas to study the population, and projects would be selected in peer-reviewed competitions. Studies envisioned include evaluations of new sensor technologies to monitor patients, improved diagnostics, and evaluations of social work support to reduce re-hospitalizations. Implementation science studies that emphasize methods for rapid deployment of evidence-based interventions also could be given priority.

3. **Safety of healthcare in the community** – Two very influential reports from the Institute of Medicine: *Crossing the Quality Chasm*, and *To Err is Human* determined that medical errors are the third leading cause of death in the United States. The “To Err” report estimated that there are nearly 100,000 deaths each year from medical errors and healthcare-acquired infections. Since the report was published, the estimate has been revised upward to between 200,000 to 400,000 deaths per year. The report stimulated extensive successful efforts to reduce errors in hospitals. However, as noted by one speaker (Jopling), there has been very little research on improving safety in ambulatory medical care settings. Efforts, perhaps through affiliated healthcare practices, might be devoted to designing industrial engineering interventions to help address this problem.

4. **Advanced decision support** – An area of potential high impact is the use of modeling and technology to develop new decision tools for medical diagnosis and treatment. Most individuals do not have adequate information about provider quality and treatment outcomes, nor do they know how to access this information. How can this be made easier and more accessible? This area combines designing readily accessible databases, visualization of data, modeling and simulation, sensors, communication, and situational awareness into a
structure that supports actionable information – bridging the gap between data and decision support. This decision support domain can be targeted across a healthcare spectrum from the creation of support dashboards for clinicians to making information more readily accessible to the general public.

5. *Operationally focused research and solutions* – Given the perverse incentives that permeate the healthcare system, research must be aligned and developed from inception alongside the major stakeholders: providers or consumers, depending on the project. This will help ensure that an operational need is being met by the research. In driving basic research to the field, there are a number of hurdles, including difficulty obtaining investments in time and energy from healthcare corporations, IT groups, providers, and clinicians. Through the establishment of partnerships with key stakeholders at the point of inception, research programs can be better defined and the pathway to delivery and community implementation will be clearer.

Institutions with well-positioned expertise in systems engineering provide a significant and uncommon opportunity to investigate the health continuum. While this approach cannot solve every problem in healthcare, organization competencies which bundle the problems are possible and will facilitate access to the continuum. The continuum will allow various research solutions to be applied at many different stages of the life cycle, while simultaneously intersecting the various points of care that a given individual experiences while accounting for their personalized health.
References


Appendix 1

Strategic Forum Reengineering Healthcare Delivery

Burton D. Morgan Building, Discovery Park, Purdue University
1201 West State Street, West Lafayette, IN 47907

Wednesday, September 21, 2016

Burton D. Morgan Building- Discovery Park, Purdue University
1201 West State Street
West Lafayette, IN 47907-2057

Room 121

12:45 pm  **Keynote – Health is More Than Health Care: Challenges and Opportunities**
Deborah Freund, PhD
Senior Principal Researcher and Paul O’Neill-Alcoa Chair in Policy Analysis
Rand Corporation

1:45 pm  **Potential Contributions of Engineering in Healthcare** – Robert Kaplan, PhD
Regenstrief Distinguished Fellow at Purdue University
Regenstrief Center for Healthcare Engineering

2:00 pm  **Regenstrief Foundation** – Craig Brater, MD
Vice President for Programs
Regenstrief Foundation

2:15 pm  **Panel Discussion: Engineers Impacting Healthcare**

Yuehwern Yih, PhD, **Moderator**
Associate Director, Regenstrief Center for Healthcare Engineering
Professor of Industrial Engineering, Purdue University

Jeff Jopling, MD, MS
Implementation Fellow
Clinical Excellence Research Center
Stanford University School of Medicine

Victoria Jordan, PhD, MBA, MS
Executive Director, Strategic Management and Systems Engineering
MD Anderson Cancer Center
Chancellor’s Health Fellow for Systems Engineering
University of Texas
Strategic Forum Reengineering Healthcare Delivery

Burton D. Morgan Building, Discovery Park, Purdue University
1201 West State Street, West Lafayette, IN 47907

Georgia Tourassi, PhD
Director
Health Data Sciences Institute and Biomedical Sciences and Engineering Center
Computational Sciences and Engineering Division
Oak Ridge National Laboratory

3:15 pm  Coffee Break
3:30 pm  Panel Discussion: Resources for Healthcare Delivery Research

Cleveland Shields, PhD, **Moderator**
Professor Human Development & Family Studies
College of Health and Human Sciences, Purdue University

Rear Admiral Jeffrey Brady, MD, MPH
Director, Center for Quality Improvement and Patient Safety
Agency for Healthcare Research and Quality
U.S. Department of Health and Human Services

Holly Jimison, PhD, FACMI
Professor of the Practice
College of Computer & Information Science
School of Nursing
Bouvé College of Health Sciences
Northeastern University

Joseph Moser, MS
Medicaid Director
State of Indiana

4:30 pm  Panel Discussion: The Future of Healthcare Delivery

Sara McComb, PhD, PE, **Moderator**
Professor
School of Nursing
School of Industrial Engineering, Purdue University

Joanne Burns, RN, MPA
Senior Vice President, Chief Strategy Officer
Cerner Corporation
Strategic Forum Reengineering Healthcare Delivery

Burton D. Morgan Building, Discovery Park, Purdue University
1201 West State Street, West Lafayette, IN 47907

Robert S. Dittus, MD, MPH
Executive Vice President, Public Health and Health Care
Director, Institute for Medicine and Public Health
Vanderbilt University Medical Center
Senior Associate Dean, Population Health Sciences
Albert and Bernard Werthan Professor of Medicine
Vanderbilt University

John Ware, Jr., PhD
President and CEO, John Ware Research Group, Inc.
Professor and Chief, Outcomes Measurement Science
Department of Quantitative Health Sciences
University of Massachusetts Medical School

5:30 pm    Afternoon Meeting Adjourn
6:30 pm    Cocktails at Westwood
            500 McCormick Rd, West Lafayette
7:00pm     Dinner and return to hotel

Thursday, September 22, 2016

7:45     Shuttle from Holiday Inn to Burton Morgan will pick up
8:00     Breakfast and check in at Burton Morgan/ Brief summary from day 1
8:30     Strategy sessions as assigned
10:00    Break
10:15    Re-convene from strategy sessions & refinement of themes as a large groups
11:30    Summary and boxed lunches for those who need to depart
Appendix 2

**Distinguished Keynote Speaker**

**Deborah Freund, PhD: Senior Principal Researcher and Paul O’Neill-Alcoa Chair in Policy Analysis, Rand Cooperation**

Deborah Freund is a senior principal researcher at the RAND Corporation and the O’Neill-Alcoa Chair in Policy Analysis. Freund’s research has focused on issues related to managed care for Medicaid patients, outcome measurement in orthopedic treatment and pharmacoeconomics, a field that she helped pioneer. Among her past research projects is one that revised the way the Australian government reviews the effectiveness of new drugs and pays for their use, and another that established a database now used by many of major health insurers to determine what they should pay for out-of-network claims.

Freund is the recipient of the Kershaw Prize given to the best young scholar under 40 by the Association of Public Policy Analysis and Management, the J.S. Drotman Award from the American Public Health Association to recognize the individual younger than 30 who has challenged public health in a creative manner, and the Board of Trustees Award from the American Hospital Association.

Freund served as the President of Claremont Graduate University, the Provost at Syracuse University, and the Vice Chancellor for Academic Affairs at Indiana University. Her current board service includes Cedars Sinai Health System, Children’s Hospital Los Angeles, and the Institute for Clinical and Economic Review. Freund also has served on the board of Excellus Blue Cross and Blue Shield, MedAmerica, the Health Research and Education Trust and Academy Health.

Freund received her Ph.D. in economics from the University of Michigan.
Robert Kaplan, PhD: Regenstrief Distinguished Fellow at Purdue University, Regenstrief Center for Healthcare Engineering

Robert M. Kaplan has served as Chief Science Officer at the US Agency for Health Care Research and Quality (AHRQ) and Associate Director of the National Institutes of Health, where he led the behavioral and social sciences programs. He is also a Distinguished Emeritus Professor of Health Services and Medicine at UCLA, where he led the UCLA/RAND AHRQ health services training program and the UCLA/RAND CDC Prevention Research Center. He was Chair of the Department of Health Services from 2004 to 2009. From 1997 to 2004 he was Professor and Chair of the Department of Family and Preventive Medicine, at the University of California, San Diego. He is a past President of several organizations, including the American Psychological Association Division of Health Psychology, Section J of the American Association for the Advancement of Science (Pacific), the International Society for Quality of Life Research, the Society for Behavioral Medicine, and the Academy of Behavioral Medicine Research. Kaplan is a former Editor-in-Chief of Health Psychology and of the Annals of Behavioral Medicine. His 20 books and over 500 articles or chapters have been cited nearly 30,000 times and the ISI includes him in the listing of the most cited authors in his field (defined as above the 99.5th percentile). Kaplan is an elected member of the National Academy of Medicine (formerly the Institute of Medicine). Dr. Kaplan is currently Regenstrief Distinguished Fellow at Purdue University and Adjunct Professor of Medicine at Stanford University, where he works with Stanford’s Clinical Excellence Research Center (CERC).

Craig Brater, MD: Vice President for Programs, Regenstrief Foundation

Dr. Brater is a native of Oak Ridge, Tenn. He attended undergraduate and medical school at Duke University, completed his internship at Duke, and his residency at the University of California at San Francisco (UCSF), followed by a fellowship in clinical pharmacology. There he developed a research and clinical interest in diuretics that continues today. After a year as a junior faculty member at UCSF, Dr. Brater spent nine years on the faculty at the University of Texas Southwestern Medical Center.

Dr. Brater joined the faculty at the Indiana University School of Medicine in 1986, where he began the Division of Clinical Pharmacology in the Department of Medicine. Four years later he was selected to chair the Department of Medicine, the largest department in the School. In 2000, Dr. Brater was selected to be the ninth dean of the IU School of Medicine.

As dean, Dr. Brater supervised nine campuses across the State of Indiana. The school includes about 2,000 full time faculty and more than 2,200 physicians who serve as volunteer faculty throughout the State of Indiana. The School admits approximately 350 students per year and is the largest medical school in the US.
Dr. Brater also served as Vice President for University Clinical Affairs for IU.

Dr. Brater retired from IU in 2013 and since then serves as Vice President for Programs of both the Walther Cancer Foundation and the Regenstrief Foundation. He also continues to serve (since 2008) as President of the Alliance for Academic Internal Medicine. The Alliance represents Internal Medicine Department Chairs, residency Program Directors, subspecialty Chiefs and Program Directors, Clerkship Directors and Administrators having close to 10,000 individual members.

Dr. Brater has published more than 130 research articles and 50 books or book chapters. These publications, for the most part, concern diuretics or the effects of non-steroidal inflammatory drugs (NSAIDs) on renal function.

He has been awarded memberships in the American Society for Clinical Investigation and the Association of American Physicians. He has been or is currently president of the American Society for Clinical Pharmacology and Therapeutics, the Association of Professors of Medicine, the Central Society for Clinical Research, and the United States Pharmacopoeia. In 2000, his alma mater awarded him the Duke Medical Alumni Award in recognition of his contributions to academic medicine.

Panel Discussion: Engineers Impacting Healthcare

Yuehwern Yih, Ph.D., Moderator
Associate Director, Regenstrief Center for Healthcare Engineering
Professor of Industrial Engineering, Purdue University

Jeff Jopling, MD, MS, Implementation Fellow: Clinical Excellence Research Center, Stanford University

Jeff received a degree in molecular biology from Haverford College and then spent time working at Intermountain Healthcare's Institute for Healthcare Delivery Research. While completing the Advanced Training Program in clinical quality improvement at Intermountain, Jeff discovered the great potential that lay at intersection of systems engineering and medicine. He has since pursued these interests through his M.D. at Emory and a master's degree in systems engineering at the Georgia Institute of Technology. Now a General Surgery Resident at Stanford, he is currently a fellow at Stanford’s Clinical Excellence Research Center (CERC) and a fellow at the Gordon and Betty Moore Foundation.
Victoria Jordan, PhD, MS, MBA: Executive Director, Strategic Management and Systems Engineering, MD Anderson Cancer Center

Ph.D. from Auburn University in Industrial and Systems Engineering with an emphasis in applied statistics. M.B.A. from Ohio State University, M.S. in Industrial and Systems Engineering from Auburn University, and B.S. from the University of Kentucky in Statistics, with minors in Computer Science and Mathematics.

Dr. Victoria Jordan specializes in applied statistics and quality improvement. As the Executive Director of Strategic Management and Systems Engineering at M.D. Anderson Cancer Center, she currently leads Quality Engineering and Clinical Informatics within the Office of Performance Improvement. Quality Engineering provides expertise to the organization in process and system improvement by applying quality tools and methodologies that support safety, timeliness, effectiveness, efficiency, equity, and patient-centeredness. Through Clinical Informatics, her area provides accurate and timely process and outcomes data (internal and comparative) to process owners in support of the needs of the EVP of Clinical Operations, the EVP of Research, and Division Heads. Dr. Jordan’s research interests include statistical quality control, Six Sigma, process optimization, mathematical simulation of patient flow, and applied statistics. Dr. Jordan is a senior member of the American Society for Quality, and the Institute of Industrial Engineers member of the American Statistical Association. She is a Six Sigma Master Black Belt (certified by ASQ and BMGi). She is the co-author of a McGraw-Hill textbook, Design of Experiments in Quality Engineering, author of several peer reviewed articles, and has served as an Adjunct Professor in Industrial Engineering at the University of Houston and as an Instructor in Industrial and Systems Engineering and Assistant Professor in Statistics at Auburn University. In addition to her position at M.D. Anderson, Dr. Jordan currently serves as the University of Texas Vice-Chancellor’s Health Fellow for Systems Engineering, as a Research Fellow at the University of Texas Red McCombs College of Business, on the Industry Advisory Board for the University of Houston Industrial Engineering department, and on the Alumni Council for the Auburn University Industrial and Systems Engineering department.
Dr. Georgia Tourassi is the Director of the Biomedical Science and Engineering Center and the Health Data Sciences Institute at the Oak Ridge National Laboratory (ORNL). She holds a B.S. in Physics from the University of Thessaloniki, Greece and a Ph.D. in Biomedical Engineering from Duke University. She received the Young Investigator's Award from NIH and the Whitaker Foundation. Before joining ORNL, Dr. Tourassi was Associate Professor of Radiology and the Medical Physics Graduate Program at Duke University Medical Center, where she currently holds an Adjunct Professor position. Her research interests include biomedical informatics, medical imaging, and computer-aided decision support. Her medical imaging research has been featured in several publications including The Economist and recently won an R&D 100 award in 2014. Latest research work is focused on the use of cyber-informatics for cancer related epidemiological discovery, which was selected as finalist for R&D 100 award in 2015. Her research has been funded by NIH, DOD, DOE, the Komen and Whitaker Foundations. She has authored over 200 peer-reviewed journals, conference proceedings papers, and book chapters. She serves regularly on NIH grant review study sections as charter and ad hoc member. She also serves on the FDA advisory committee on computer-aided diagnosis devices. She is a senior member of IEEE, INNS, and SPIE. In 2015 she was elected Fellow of the American Institute of Medical and Biological Engineering (AIMBE) and the American Association of Physicists in Medicine (AAPM).
Panel Discussion: Engineers Impacting Healthcare

Cleveland Shields, PhD, Moderator
Professor Human Development & Family Studies
College of Health and Human Sciences, Purdue University

Rear Admiral Jeffrey Brady, MD, MPH: Director, Center for Quality Improvement and Patient Safety, Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services

Rear Admiral Jeffrey Brady, M.D., M.P.H., serves as an Assistant Surgeon General in the Commissioned Corps of the U.S. Public Health Service and is assigned to the Agency for Healthcare Research and Quality (AHRQ) as Director of the AHRQ Center for Quality Improvement and Patient Safety (CQuIPS). He is a member of the AHRQ Senior Leadership Team and leads a part of the Agency that conducts several AHRQ programs, including:

- Patient Safety Research
- Healthcare-Associated Infections Program
- Patient Safety Organizations Program
- National Healthcare Quality & Disparities Reports (QDR)
- Consumer Assessment of Healthcare Providers and Systems (CAHPS) Program

The AHRQ Patient Safety Research Program, which RADM Brady led from 2009 to 2013, supports projects aimed at understanding and enhancing the safety of health care through approaches such as increased teamwork, prevention of healthcare-associated infections, the effective use of medical simulation, expansion of a culture of patient safety, and other health care quality improvement initiatives.

In a prior position at AHRQ, RADM Brady led the team that produces the National Healthcare Quality Report and National Healthcare Disparities Report—annual reports to Congress on the status of health care quality in the United States.

RADM Brady has a long-standing interest in activities that are at the intersection of health care and public health, and, before moving to AHRQ in December 2006, he served as a medical officer and clinical reviewer for the Food and Drug Administration’s Office of Vaccines. Additionally, he has held positions as a medical epidemiologist for the Department of Defense, and primary care physician in the U.S. Navy, including a tour as medical officer aboard USS Coronado, flagship of the U.S. Navy’s Third Fleet.

Dr. Brady attended the Medical College of Georgia, completed internship training in Internal Medicine at the Naval Medical Center, San Diego, California, and earned a Master’s degree in public health from the Uniformed Services University of the Health Sciences (USUHS), in Bethesda, Maryland. He completed the Navy’s General Preventive Medicine Residency, also at USUHS, and is board-certified in Public Health and General Preventive Medicine.
A native of Fayetteville, Georgia, and a graduate of Fayette County High School and Mercer University in Macon, Georgia, RADM Brady lives in Germantown, Maryland, near Washington, D.C., with his wife and two children.

Holly Jimison, PhD, FACMI: Professor of the Practice, College of Computer & Information Science, School of Nursing, Bouvé College of Health Sciences Northwestern University

Holly B. Jimison is a Professor in both the College of Computer & Information Science and Bouvé College of Health Science at Northeastern University. As the Director of the Consortium on Technology for Proactive Care at Northeastern University, she leads a multidisciplinary, multi-institutional effort to facilitate research in the area of home monitoring of health behaviors, including helping researchers address the challenges of Big Data related to large amounts of complex and noisy streaming data from multiple sources used to infer clinically relevant health behaviors. She received her PhD in Medical Informatics from Stanford University with dissertation work on a knowledge representation for medical decision making and automated tailored feedback for patients. Previous to joining Northeastern, Dr. Jimison was on the Medical Informatics faculty at Oregon Health & Science University with research projects in the area of consumer health informatics and also served as technology advisor to NIH’s Office of Behavioral and Social Science Research. She served on the Executive Board of the Oregon Center for Aging & Technology and was past president of Oregon’s Health Information Management Systems Society Chapter. Dr. Jimison is a Fellow of the American College of Medical Informatics.

Joseph Moser, MS: Medicaid Director, State of Indiana

Joe Moser was appointed Director of Indiana Medicaid in November 2013. Joe oversees the policy and program direction for Indiana’s Medicaid programs, which currently cover 1.4 million Hoosiers. In this capacity, Joe oversees the quality of the $12 billion program and ensures members are accessing services in the appropriate settings and when they need them. Joe is tasked with administering Indiana’s Medicaid programs efficiently and in the most fiscally responsible manner for Indiana taxpayers. Joe was a member of Governor Pence’s team that developed the Healthy Indiana Plan 2.0 program. He also currently serves on the board of the National Association of Medicaid Directors, the organization for state Medicaid Directors across the country.

Before joining Indiana Medicaid, Joe was the director of government affairs at Medicaid Health Plans of America (MHPA), a national trade association for Medicaid managed
care organizations. Joe also previously worked in the U.S. Congress where he worked on Medicaid, Medicare, SCHIP, Indian Health Service and public health issues. Mr. Moser worked on legislation including the Medicare Modernization Act of 2003, the Deficit Reduction Act of 2005, the Children’s Health Insurance Program Reauthorization Act of 2009, and legislation that established the Medicaid Commission.

Joe is originally from Coal City, Indiana, and has a bachelor’s degree from Marian University and a master’s degree from Miami University in Ohio.

Panel Discussion: Engineers Impacting Healthcare

Sara McComb PhD, PE, Moderator
Professor, School of Nursing
School of Industrial Engineering, Purdue University

Joanne Burns, RN, MPA: Senior Vice President, Chief Strategy Officer, Cerner Corporation

Joanne Burns is Chief Strategy Officer for Cerner Corporation (Nasdaq: CERN); working directly with CEO, Neal Patterson, she advances Cerner’s strategic initiatives and direction. Cerner is the largest healthcare information technology company in the world, with $4.5B in annual revenue, clients in 35 countries, and 22,000 associates worldwide. Since joining Cerner in 2004, Joanne has held a number of progressive positions with responsibility for large scale program development, global market entry strategy, business development, crisis management, solution strategy and development.

As Chief Strategy Officer, Joanne has responsibility for ensuring that execution across Cerner’s business units aligns to vision through a clearly articulated strategy. Additionally, she works with executive leadership at large national health care organizations; in this capacity she guides alignment of information technology initiatives to strategic goals and objectives tying directly to Board of Directors’ priorities.

From 2010 to 2013, Joanne led the Tiger Institute, a unique public/private partnership between Cerner and the University of Missouri. As Executive Director of the Tiger Institute, Joanne presided over the vision, strategy, and execution of the partnership including research and development, commercialization of technology innovations and strategic relationships with investors. Concurrently, as Chief Information
Officer of MU Health Care, Joanne had strategic and operational responsibility for information technology including the IT strategic plan, cybersecurity, big data management, technology deployment, and infrastructure to support population health management across the state of Missouri.

From 1988 to 2003, Joanne worked at Stanford University Medical Center in Stanford, CA. During her tenure there, she held progressively responsible leadership positions across clinical, operational, and technical domains. While at Stanford, she had responsibility for pioneering health care delivery in order to drive down costs by leveraging new models of care delivery with heavy reliance on innovative technology. This innovation resulted in peer-reviewed journal publications and presentations. For this work, Joanne was honored with the 2001 annual employee achievement award.

Joanne received her Bachelor of Science in Nursing from the University of New York at Plattsburgh in 1982 and her Masters of Public Administration in Hospital Administration from University of San Francisco in 1997. Joanne received Program Certification in “Women on Boards” from the Harvard T.H Chan School of Public Health in 2016.

Joanne currently serves on the Board of Governors for the Tiger Institute which has responsibility for governing the joint investments of Cerner and the University of Missouri. In addition, she is co-chair of the Executive Oversight Board for the Cerner and Banner Health partnership as well as vice-chair for the Strategic Executive Board for the Trinity Health and Cerner partnership. She has extensive experience setting up and leading governance boards overseeing public-private partnerships.

Robert S. Dittus, MD, MPH: Executive Vice President, Public Health and Health Care – Director, Institute for Medicine and Public Health, Vanderbilt University

Robert Dittus, MD, MPH is the Albert and Bernard Werthan Professor of Medicine, Executive Vice President for Public Health and Health Care, Senior Associate Dean for Population Health Sciences, and Director of the Institute for Medicine and Public Health at Vanderbilt University and Director of the Geriatric Research, Education and Clinical Center (GRECC) and Director of the Quality Scholars Program at the VA Tennessee Valley Healthcare System. He trained in industrial engineering, medicine and epidemiology. He was formerly Chief of General Internal Medicine at Vanderbilt and founding director of the Vanderbilt Center for Health Services Research. His research has advanced the methodology of medical decision making, demonstrated the comparative effectiveness of strategies for clinical care and studied systems of health care that improved health care delivery and impacted health policy. He has served as President of the Association for Clinical Research Training and the Academy for Healthcare Improvement. His awards include Vanderbilt’s Harvie Branscomb Distinguished Professor, Purdue University’s Outstanding Industrial Engineer, Indiana University's Distinguished Alumnus, the AAMC Innovation with Distinction in Research Training and Education, the Academy for Healthcare Improvement Curricular Innovation and he is an elected member of the Association of American Physicians.
Dr. Ware is an internationally recognized leader in health and quality of life (QOL) measurement and Professor at UMass Medical School (UMMS). He was Senior Research Psychologist for 15 years at RAND where he led development of outcome measures for the Health Insurance Experiment followed by serving as Principal Investigator of the Medical Outcomes Study, which continued into a 12-year term as Senior Scientist at Tufts Medical Center. Prior to joining UMMS, he founded and led QualityMetric Incorporated for 10 years. Throughout his career, his goal has been to develop practical patient-reported measures that are useful in improving healthcare and, more recently, that meet regulatory requirements for monitoring outcomes. In addition to development of the SF-36 Health Survey, he led the IQOLA Project which spawned 100+ SF-36 translations. Currently he is applying modern psychometric methods to construct more actionable measures, including the first disease-specific QOL impact scale standardized across conditions and normed in a representative chronically-ill population. Dr. Ware has published 400+ peer-reviewed articles, was elected to the National Academy of Medicine, and has received multiple lifetime achievement awards.
## Appendix 3

**Strategy Session Assignment**

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<thead>
<tr>
<th>Accessibility of Patient Safety</th>
<th>Marietta Harrison</th>
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<td>Moderator: Cleve Shields</td>
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<td>Kathy Abrahamson</td>
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<td>Craig Goergen</td>
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<td>Abhi Deshmukh</td>
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<td>Lingsong Zhang</td>
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<td>Victoria Jordan</td>
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<td>Holly Jimison</td>
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<th>Healthcare in the age of overwhelming data</th>
<th>Ken Musselman</th>
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<td>Moderator: Sara McComb</td>
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<td>Melba Crawford</td>
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