Joy Keeler Tobin

571.230.6562   Arlington, VA   joytobin11@gmail.com

Highly experienced healthcare executive. Widely recognized early implementer of comprehensive electronic health record (EHR). Initiator of research and relationships that influenced national policy regarding EHR adoption and interoperability across EHRs. A particularly successful track record in building partnerships between executives in hospitals, not-for-profits and the federal government. Extensive experience in academia, private sector and government-- including roles as Associate Vice Chancellor and Chief Information Officer. Innovator, ahead of the curve thinker, able to get things done.

The MITRE Corporation, Center for Transforming Health   2007 - Present

MITRE is a not-for-profit corporation chartered to work in the public interest. As a Federally Funded Research and Development Center, MITRE operates as a long-term strategic partner with sponsoring government agencies to address problems of considerable complexity, analyze technical questions with a high degree of objectivity and provide creative and cost effective solutions.

Retired, Serve as a Senior Advisor for Health IT Research, Partnerships,	*2017 – present*
Director (Acting), National Patient Safety Partnership	*2013 – 2016*
Senior Principal, Health IT	*2007 – 2013*

IMPACT:
Dramatically increased MITRE's portfolio of work and raised MITRE visibility in the health IT industry. Initiated research that created tools adopted by government and industry as part of the Meaningful Use[*] program. Launched efforts that created widely influential paper that shaped federal interoperability initiatives. Drove creation of the National Patient Safety Partnership and its successor, Data for Healthy Insights. Created novel partnerships in each case that enabled success.

Expanded the Health IT Portfolio of Work
- Expanded the health IT direct work program from a single project with the Office of the National Coordinator for Health IT to a broader program including:
    - Privacy Policy
    - Prescription Drug Monitoring
    - Health Information Exchange
    - Meaningful Use:
        - Clinical Quality Measurement and Reporting
        - Electronic Health Record Certification
        - Clinical Quality Measure Development.
- Formed deep relationships across the senior-most levels of strategic government sponsors.
- Expanded the health IT program beyond the Office of the National Coordinator for Health IT to the Centers for Medicare & Medicaid Services (CMS), Substance Abuse and Mental Health Services Administration (SAMSHA), Department of Veteran's Affairs and other federal entities.

Drove High Value Research
- Contributed to MITRE's Health Research Strategy and initiated research that had broad applicability and usage in the pubic and private sectors.
- Developed suite of open source tools that facilitated rollout of the Meaningful Use Stage 2 electronic health record testing and vendor certification. (Centers for Medicare & Medicaid Services and the Office of the National Coordinator for Health IT.)
    - Cypress – a Meaningful Use Testing and Certification Tool http://projectcypress.org

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[*] The American Recovery and Reinvestment Act of 2009 includes measures to modernize the nation's health infrastructure including the Health Information Technology for Economic and Clinical Health Act (HITECH) which supports hospital and physician use of health IT. The use of this technology in a 'meaningful' manner is essential for improved care, better outcomes and lower costs. https://www.healthit.gov/providers-professionals/meaningful-use-definition-objectives

- o popHealth - the foundation for early electronic calculation of Clinical Quality Measures (CQMs) http://projectpophealth.org
  - o Laika – first electronic health record interoperability testing tool http://laika.sourceforge.net
- Led an internal Health Data Interoperability research initiative. The research led to the creation of hData--a direct predecessor of the Fast Health Interoperability Resource (FHIR) currently being adopted for improved information exchange. Also resulted in federal direct work piloting the technology for veteran health in rural areas. http://www.projecthdata.org
- Established *Healthy Insights*, an open source mapping tool with visualization and predictive modeling capabilities that enable users to simultaneously view local level disease burden, risk factors, community resource, and the predicted impact of targeted investments in order to help guide decisions about intervention design and priority. The software is deployed in Amazon Web Services to easily and inexpensively support repeatable analytics, allowing the open source based tool to be used by other communities at minimal cost and requiring minimal technical assistance. http://www.healthyinsight.org

Framed Health IT Interoperability Policy Accelerator

- Initiated work with the JASON organization to expand the policy debate on interoperability and the US healthcare IT strategy. Resulting JASON Report was widely reviewed and regarded, directly and rapidly influencing federal policy and health IT standards currently being deployed. https://www.healthit.gov/sites/default/files/ptp13-700hhs_white.pdf

Created National Patient Safety Partnership (NPSP)
The NPSP is a collaboration among leading children's hospitals to collect, analyze, and share sensitive patient safety data with a goal to create a comprehensive and predictive picture of adverse patient safety events. Inspired by MITRE's successful collaboration in the aviation industry, this partnership uses big data analytic techniques to identify previously unknown safety risks.

- Launched the National Patient Safety Partnership -- MITRE and three leading pediatric hospitals partnered to collect data from multiple sources within each hospital, to make that data comparable across hospitals, and then to use advanced analytics to identify previously unknown safety risks.
- Early work resulted in two distinct sets of findings currently under peer review for publication:
  - Medication waste when prescribed using computerized physician order entry systems.
  - Early detection of patient physiologic deterioration through the use of predictive models and real-time clinical data.

Built Novel Public-Private Partnerships
Many of the successes described above depended on novel partnerships to get traction:

- JASON Reports: Created first-of-a-kind studies in healthcare with JASON. Built a partnership in which the Robert Wood Johnson Foundation, the Agency for Healthcare Research and Quality and the Office of the National Coordinator for Health IT came together to agree on scope and success criteria. The partnership resulted in two JASON Reports – one to address nationwide interoperability and one exploring a culture of health: A Robust Health Data Infrastructure (September, 2013), Data for Individual Health (October, 2014).
- National Patient Safety Partnership: Established flagship membership between MITRE and leading pediatric health system CEOs: Boston Children's Hospital, Cincinnati Children's Hospital and Children's National Health System. Partnership expanded to include major electronic health record vendors Cerner Corporation and Epic Systems.
- Health Data Interoperability: A multiple year initiative to create a set of scalable health data standards, begun in 2008. Partnership expanded over time to include hospital CIOs, EHR vendors (Emdeon and Cerner Corporation) and the federal government. The Federal Health Architecture Program and Maine HealthInfoNet undertook a successful pilot to prove the technology in 2013.
- Meaningful Use Open Source Software: A multiple year initiative, begun in 2008, to create simple and scalable tools to certify Meaningful Use. Partnership included MITRE, Federally Qualified Health Center, and Certification Commission for Health IT. The research led to a series of open

source tools adopted and now sponsored by the federal government for EHR certification testing, clinical quality measurement calculation and reporting.

- Public Health Assessment and Investment: Partnered with the Robert Wood Johnson Foundation and the South Carolina Association for Community Economic Development (SCACED) to apply advanced analytics to publicly available data in order to empower actors from all sectors, at all levels, to drive public health improvement in their communities.

SPECIFIC FEDERAL EXPERIENCE:

- Health and Human Services including:
    - Center for Medicare & Medicaid Services
    - Agency for Healthcare Research and Quality
    - Indian Health Service
    - Assistant Secretary for Preparedness and Response
    - National Disaster Medical System
    - Office of the National Coordinator for Health Information Technology
    - Food and Drug Administration
    - Substance Abuse and Mental Health Services Administration
    - Federal Health Architecture Program
- National Institutes for Health: National Cancer Institute, National Library of Medicine
- Department of Defense
- Department of Veteran's Affairs
- Social Security Administration
- Department of Homeland Security

National Organization for Research and Computing (NORC)   2005 - 2006
at the University of Chicago

Deputy Director, National Resource Center for Health Information Technology

In 2004 the Agency for Healthcare Research and Quality (AHRQ) selected NORC as the primary contractor for the National Resource Center for Health Information Technology (NRC). NORC, along with a coalition of partners, established the NRC to assist 100+ health IT grantees ($166 million) and 6 regional health information exchange contracts ($30 million) realize the full potential of their investments.

As Deputy Director, refined strategic goals and developed the operational infrastructure and partnerships to support the deployment of health IT to improve patient safety, efficiency and effectiveness.

Representative accomplishments include:
- Managed the $25 million contract with a coalition of partners including the Foundation for the eHealth Initiative, Indiana University's Regenstrief Institute, Center for Information Technology Leadership of Partners Healthcare, Vanderbilt Center for Better Health and Computer Sciences Corporation.
- Built a communications infrastructure including a web portal, a publicly available health IT web site and knowledge library containing vetted information with an advanced search engine. *www.Healthit.ahrq.gov*
- Developed support solutions and partnerships with rural health IT providers including the first National Rural Health IT Conference sponsored by the Office of Rural Health Policy and coauthored 'Roadmap for the Adoption of Health Information Technology in Rural Communities' with the Walsh Center for Rural Health Analysis.
- Developed industry-leading, easy-to-use tools to measure the value of health information technology.

University of Illinois at Chicago   1994 - 2004
Associate Vice Chancellor for Health Affairs	*2002 - 2004*
Chief Information Officer	*1998 - 2002*
Director of Patient Care Systems	*1996 - 1998*

Systems Analyst   *1994 - 1996*

Designed and managed the implementation of a comprehensive, first-generation Electronic Health Record (EHR) system. Led the cultural change needed to move from a traditional, paper medical record environment to an advanced, longitudinal electronic record. The enterprise transformation fundamentally changed the way health care is provided and taught at the University of Illinois Medical Center. Recognized internationally with the Davies Award of Excellence and CIO Magazine Enterprise Value Award.

The medical center's 5-year enterprise strategy included moving to a newly constructed outpatient care center, consolidating the care of 28 clinics to one, state-of-the art facility *without paper records.* The new electronic record, known as Gemini, integrated inpatient and outpatient records, creating an unprecedented longitudinal record with extensive knowledge management and clinical decision support.

Associate Vice Chancellor for Health Affairs

Designed strategies to leverage the EHR investment at the local, national and international level, furthering the organizational mission of patient care, education and research. Actively involved in defining national policy to improve the safety of healthcare with information technology.

- Developed relationships and shaped policy on behalf of the University with the Joint Commission for the Accreditation of Healthcare Organizations, National Committee on Vital and Health Statistics, Markle Foundation, Leap Frog Group, and others.
- Played an influential role in the formation of the UIC Informatics Institute, a multidisciplinary, cross campus initiative to coordinate and enhance Campus informatics research.
- Completed an overseas assignment as Director of UK Transformation with Cerner Corporation, developing strategy and approaches for implementation and clinician adoption of patient care software.

Chief Information Officer
Director of Patient Care Systems

Implemented an enterprise-wide electronic health record in a financially strapped organization--replaced paper in the clinical care process, decommissioned a 17-year old patient care system and oversaw the successful conversion of 125+ applications and platforms in time for Y2K. Managed a combined staff of 300.

Electronic Health Record
- Achieved enterprise-wide cultural change through the use of information technology. One year after go live clinicians fully adopted the electronic health record, Gemini. 97% of physicians and 98% of nurses used Gemini routinely in 2001.
- Gemini increased patient safety, reduced length of stay, improved clinical efficiency and enhanced employee satisfaction. Nurse satisfaction resulted in a 3% vacancy, 7% lower than the national average.
- Gemini became an effective resident recruitment tool, resulting in the frequent selection of UIC College of Medicine.

Clinical Process Redesign
- Developed a strategy to understand ambulatory clinic processes and convert them to electronic processes, replacing patient charts and changing clinician practice behavior. Converted 28 clinics over an 8-month time period and successfully moved into a new $100 million Outpatient Care Center on-time and without paper.
- Big-bang implementation of Gemini in the hospital including all ancillary orders, computerized physician order entry (CPOE), electronic medication administration record (eMAR) and medication interaction checking across 18 nursing units, 4 ICU's and 43 ancillary departments in a 2-week period.

The deployment was so successful that one of the biggest issues was unanticipated broad acceptance and rapid conversion from the decommissioned system to Gemini.

- One of the first organizations in the country to close the loop on medication safety by fully integrating CPOE, eMAR and 100% Pharmacy medication order verification prior to administration. Along with advanced clinical rules and alerts, this clinical decision support system has measurably improved patient care.

Technology
- Developed a technology strategic plan to effectively apply advanced technologies, minimize capital investment and scale resources in lieu of adding operations and support staff.
- Designed and oversaw development of the medical center's first data center, a $4 million state-of-the-art facility. Consolidated multiple data centers to 2 locations, now recovery sites for one another.
- Co-developed several technology tools including Oracle standby databases, automated testing, performance monitoring, hierarchical backup and optimal configurations for HP platforms.

Supplier Partnership
- Provided alpha or beta sites for multiple modules of Cerner's Millennium product line.
- Distinguished as the only Cerner client with Nicholas E. Davies and CIO Enterprise Value Awards.

Team Building and Enterprise Consensus
- Recruited and trained an IT staff (largely from within the medical center) to re-engineer processes and design products that would drive clinical change with value.
- Developed unprecedented partnerships with clinicians to deliver a unique electronic health record system with broad buy-in.
- Co-chaired executive oversight committee, member executive systems steering group and established key project committees all co-chaired by physicians and IT.

IBM Corporation, Hospital-to-Physician Network Strategist		1990 - 1991
Baxter Healthcare Corporation, Senior Market Analyst		1986 - 1990
Peat, Marwick, Mitchell & Co., Consultant		1983 - 1985
Orlando Regional Medical Center, Management Analyst		1982 - 1983

AWARDS

CIO Magazine Enterprise Value Award   2003
The prestigious CIO Magazine Enterprise Value Award recognizes ten organizations per year across all industries. The selection criteria focused on using IT to transform how business gets done. The University of Illinois Medical Center was recognized for becoming one of the country's most advanced health care organizations, bringing measurable and substantial value from the IT investment. The medical center's success was measured, not in terms of bottom-line ROI, but rather the improvement in clinical operations and patient safety. http://www.cio.com/archive/020103/eva_charts.html

Excellence in Corporate IT Leadership Award   2003
The Excellence in Corporate IT Leadership Award honors executive women leaders for significant contributions to their respective corporations and technology industries. This award recognized leadership in transforming healthcare through the early adoption of health information technology and culture change at the University of Illinois Medical Center. http://www.witi.com/center/conferences/2008/chicago/

Nicholas E. Davies Award of Excellence 2001

Charged by the Institute of Medicine in 1994 and modeled after the Malcolm Baldridge Award, the Davies Award is the most prestigious and recognized award for excellence in the implementation of EHR systems in the United States. The University of Illinois was recognized as one of two industry leaders in 2001 for transforming healthcare by shifting the organization away from paper to utilize technology, improving patient safety. http://www.himss.org/ASP/davies_organizational.asp

AFFILIATIONS

- Health Information Management Systems Society (HIMSS)
    - Fellow, 2005-present.
    - Board of Directors, 2007-2010.
    - Advocacy and Public Policy Committee, 2003-2004.
    - Annual Conference Education Committee, 2000-2003.
- Board of Commissioners, Certification Commission for Health IT (CCHIT), 2008-2011.
- Nicholas E. Davies Electronic Health Record Award Committee, 2002-2006 (Chair 2005-2006).
- National Rural Health IT Conference Planning Committee (sponsored by the Office of Rural Health Policy), 2005, 2006.
- The Joint Commission for the Accreditation of Healthcare Organizations
    - Healthcare Information Technology Advisory Panel to the Board, 2005-2006.
    - Health Information Management Workgroup (redefined national standards to address transitioning from paper to electronic medical records), 2004.
    - Disaster-planning Standards Workgroup, 2003.
    - Featured in Health Information Management Security national training program, 2002.
- Markle Foundation Connecting for Health Initiative, Data Standards Committee, 2002-2003.
- National Alliance for Health Information Technology, Computerized Physician Order Entry Standards Task Force, 2004.
- ADVANCE for Health Information Executives, Editorial Board, 2002-2006.
- University of Illinois at Chicago
    - Informatics Committee Board, Founding member, 2002-2004.
    - Center for Resource Information Management eHealth Forum, Founding member, 2003-2004.

EDUCATION

Rollins College, Winter Park, FL	University of Central Florida, Orlando
MBA – Accounting and Management, 1983	BS – Biological Sciences, Botany, 1980

PUBLICATIONS

- Roadmap for the Adoption of Health Information Technology in Rural Communities. Co-author. August, 2006. http://www.norc.org/issues/HIT_Paper_Final.pdf
- MIS Quarterly Executive. Bringing Professionals On Board: Lessons on Executing IT-enabled Organizational Transformation. Co-author. June, 2006. http://misqe.org/ojs2/index.php/misqe/article/view/62
- Differing faculty and house staff acceptance of an electronic health record. Journal of Medical Informatics. Co-author. March, 2005. http://www.ncbi.nlm.nih.gov/pubmed/15361024
- The University of Illinois Medical Center Transformation Journey documenting the seven year implementation of the Vice Chancellor for Health Affair's strategic plan. Co-author. 2003.
- ADVANCE for Health Information Executives. The UIC Health System Transformed its Operations with Information Technology. October, 2001.

NATIONAL AND INTERNATIONAL ACTIVITIES

- Pew Charitable Trusts and the Department of Health and Human Services Health IT Safety Day, The Role of Electronic Health Records in Health IT Safety, 2016.
- Casey Family Programs, multiple federal government entities, Electronic Health Record Vendor Association, National Patient Safety Partnership Briefings, 2014-2016.
- Federal Committee on Statistical Methods Policy Seminar, Public-Private Partnerships: Viable in the Federal Statistical System? How to Increase Private Sector Engagement in Government Data Collection and Reporting, 2016.
- National Alliance of Community Economic Development Associations, Community Development & the Social Determinants of Health, Data for Healthy Insights, 2016.
- JASON Briefing, National Patient Safety Partnership, Use of Big Data Analytics and Health IT to Identify Previously Unknown Safety Risks, 2014.
- Boston Children's Pediatric Innovation Summit, Building a National Patient Safety Partnership, 2014.
- US Food and Drug Administration--Unique Device Identification for Postmarket Surveillance and Compliance Workshop, Presenter and Panel Participant, 2011.
- National Institutes for Health Clinical Research Information Systems, Trainer (preparing the NIH to develop their strategy to transform healthcare within its research hospital and clinics), 2002.
- Leap Frog Group's Computerized Physician Order Entry Evaluation Tool, Advisor, 2002, 2005-2006.
- Congressional Steering Committee: Telehealth and Healthcare Informatics Briefing, 2003.
- National Committee on Vital Health Statistics (NCVHS) Testimony, 2003.
- Health Transformation Speaking Engagements:
    - Estes Park Institute, 2000.
    - American Healthcare Information Management Association, 2003.
    - Center for Research Information Management, 2004.
- Frequent Health IT Educator:
    - TCBI Summit on Patient Safety and Information Technology, 2002.
    - National HIMSS meetings, 2000-2004.
    - Maryland HIMSS Chapter, 2003.
- UK National Health Service Supplier Forum Education Session, Speaker, (to assist 400+ suppliers understand the requirements and their role in automating the UK healthcare system), 2002.
- Featured in publications including:
    - Financial Times
    - Economist
    - CIO Magazine
    - Modern Healthcare
    - HealthLeaders cover story
    - Modern Physician
    - Advance for Healthcare Information Executives
    - Hospital and Health Networks
    - Medical Economics
    - Healthcare Informatics
    - Healthcare Finance
    - CAP Today
    - Chicago Sun Times
    - iStreet

CLEARANCES

Secret

Research Project Leadership

Background

Federally Funded Research and Development Centers (FFRDC) are not-for-profit organizations that work in the public interest and are chartered to meet the needs of the United States including investing in internally competed research, anticipating the needs of the Country before the government. MITRE exclusively operates seven FFRDC's in addition to being the first Health FFRDC operator.

Health Strategy

Co-developed first Health IT Research Strategy for The MITRE Corporation, crafting strategies to bring systems engineering to many aspects of healthcare. This served as the framework for investing $5M-8M per year in internally competed research. (*2008-2014).*

Health Data Interoperability

Initiated and co-led a network of research projects bringing new software and technologies to improve electronic health record interoperability. (*2008-2013)* Component projects included:

- o Laika – first electronic health record interoperability testing tool http://laika.sourceforge.net
- o Cypress – a Meaningful Use Testing and Certification Tool http://projectcypress.org
- o popHealth - the foundation for early electronic calculation of Clinical Quality Measures (CQMs) and the quality of healthcare delivered by clinical providers http://projectpophealth.org
- o hData – a new health data standard and direct predecessor of the Fast Health Interoperability Resource (FHIR) currently being adopted for improved information exchange http://www.projecthdata.org
- o hQuery – proof of concept clinical information query capability
- o hReader – secure 'wrapper' for mobile based clinical information, patient centric family health manager

Health Experience

Co-Principal Investigator for HealthLab, a large integrated research project to amplify MITRE's impact on transforming how individuals experience healthcare. Consisted of a small operational clinic with a focus on an individual's awareness of their health along with the challenges and enablers of the US health system *(2009-2011)* Component projects included:

- o HealthLab - patient centric clinic
- o HealthStation – passive acquisition of patient vitals and other data
- o mHealth – mobile platform for patient centered data collection and visualization
- o hGraph – a compelling, standardized visual representation of a patient's health status, designed for the mobile platform. Patient focused with professional clinical relevance
- o hConsent – granular privacy consent

National Patient Safety Partnership

Created the National Patient Safety Partnership. Director/Principal Investigator of the MITRE-CEO funded research initiative to improve care, cost and quality through the reduction of adverse events, waste and inefficiencies. This ground-breaking work leveraged internal MITRE talent and external research leaders from top pediatric hospitals. Internal MITRE funding sources included CEO, Division, Innovation and FFRDC. (*2013-2017)* Component projects included:

- Safety Event Analysis – evaluating a decade of reported events across hospitals
- Alarm Fatigue – evaluating patient acuity, monitoring, clinician impact

- Predicting Patient Deterioration - identifying precursors to safety events, building predictive analytics and then applying them in pediatric acute care settings
- Medication Safety – understanding preventable medication errors and developing metrics for risk and harm previously not measured
- Medication Waste – identifying opportunities to mitigate medication waste with the potential for significant savings while reducing adverse events

To complete these advanced research studies, additional component projects explored first of a kind techniques:
- Comprehensive data collection from three partner hospitals including EHR, safety event reports, physiologic monitors and administrative data
- Data fusion and normalization of data, from different vendors, with different formats, different definitions
- Data Visualizations – new approaches to clinician oriented visualizations to identify anomalies
- Technical architecture with unprecedented privacy, security and scalability (using techniques from the intelligence community)

Healthy Insights
Principal Investigator of the Healthy Insights research collaboration with the South Carolina Association for Community Economic Development. The research sought to demonstrate how publicly available data can be harnessed to identify food desserts for public health intervention and investment. This research resulted in data visualizations and predictive modeling capabilities. Co-funded by the Robert Wood Johnson Foundation and MITRE *(2017)* http://www.healthyinsight.org