



Department of Health & Human Services
Office of the National Coordinator for
Health Information Technology

The Innovation Imperative Within HITECH and Health Reform

Wil Yu, Innovations
Dept. of Health and Human Services

Wil.Yu@HHS.gov

The Office of the National Coordinator for
Health Information Technology



SHARP

Strategic Health IT Advanced Research Projects

Putting the **I** in **HealthIT**
www.HealthIT.gov



To establish targeted research projects focused on areas where breakthrough improvements can greatly enhance the transformational effects of health IT and address problems that have been barriers to adoption and progress along the pathway to Meaningful Use

“We are asking that these sites bring to bear the absolute highest level of expertise that can be assembled in the nation.”

Each site will implement a collaborative, interdisciplinary program of research addressing a specific focus area

- Addressing short-term as well as long-term challenges
- Including a cooperative program engaging multiple stakeholders to transition the results of research into practice

SHARP – Awardees and Affiliates



SHARPS

www.sharps.org



www.sharpc.org



SMART

www.smartplatforms.org



www.sharpn.org



www.mdnpn.org

For More Information About:

The SHARP Program, visit <http://healthit.hhs.gov/programs/SHARP>



Supporting Innovation – Federal Perspective

- Encourage innovations that will be required to help enhance health and well being for all Americans
- New products, services, ideas
 - Support Meaningful Use
 - Support health reform
 - Support the achievement of a high performance learning system

Emergence of an Innovation Imperative

- Policies that assume innovation
- Accelerating innovation demand
 - Clinical demands – e.g. decision support, inter-operability
 - Administrative “data deluge”
 - Reimbursement
 - Market forces
 - Policies
- Meaningful Use and Health Information Exchange are only the first steps



Innovations – Supporting Meaningful Use

- Innovations to address current and expected future challenges representing barriers to adoption and meaningful use of health IT
- Examples: privacy and security, improving physician workflow, improving decision support, facilitating exchange
- SHARP – Strategic Health IT Advanced Research Projects

Innovations – Supporting Health Reform

- Simultaneous Pursuit of Triple Aim –
 - Better Care
 - Better Health
 - Lower Cost through Continuous Quality Improvement
- Improving partnerships with individuals and families, redesign of primary care, population health management, financial management, and macro system integration
- New care delivery and payment models

Innovations – Supporting High Performance Learning System

- Creation of a sustainable learning health care system
 - Gets the right care to people when they need it
 - Captures the results for improvement
- Engagement with hospital and insurance industry administrators, health care providers, those who train and educate health workers, researchers, and policymakers

Supporting Early Stages of Innovations: A Framework



Innovation Framework: Core Values

- Passionately Inspire Innovation
- Demonstrate Bold Leadership
- Promote Communication and Identify Pathways to Success
- Champion Engagement
- Support Judiciously

*Now is the best time to innovate in healthcare
...market and policy conditions are aligned*

Supporting the Stages of Innovations

– Select examples from ONC



high ← Innovation risk and cost → low



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BACKUP SLIDES

Introduction:

- The University of Illinois at Urbana-Champaign, leads a multi-institutional and multi-disciplinary team to advance the requirements, foundations, design, development, and deployment of security and privacy tools and methods.
- Organized around three major healthcare environments: Electronic Health Records (EHRs), Health Information Exchange (HIE), and Telemedicine (TEL), with Personal Health Records (PHRs) included as a major subtopic.
- Advised by a by a distinguished project advisory committee of leaders in academic research, industrial research, healthcare delivery organizations, developers of HIT, government healthcare, policy leaders, and stakeholder groups. The project organization assures project synergy and the capacity to act as an effective collaborator with a Federal Steering Committee.
- The projects will address strategic cross-cutting themes that foster collaboration, consistency, and a multi-purpose technology convergence of EHR, HIE, and TEL.

Strategic Healthcare IT Advanced Research Projects on Security (SHARPS)

Goals:

- Advancing the maturity of security and privacy technologies and policies through the removal of key barriers that prevent the use of valuable health information.
- The creation of an integrated security and privacy research community for HIT that will exist following the culmination of the SHARPS program.

Progress to date: Fall 2011

- Automated policy: developing ways to automate complex decisions about sharing of health records and assure compliance to regulations and consents
- Audit: developing ways to analyze logs of access to health records to catch policy violations and continuous improve access procedures
- Encryption and Trusted Base: developing a resilient foundation for sharing health information.
- Telemedicine: assuring the security and privacy of emerging systems of sensors and actuators for healthcare and wellness

Introduction:

- Located at the University of Texas – Houston - a nationwide collaboration established in response to the urgent and long-term cognitive challenges in adoption and meaningful use
 - *NCCD's vision is to become a national resource which provides strategic leadership in patient-centered cognitive support research and applications in healthcare*

Goals:

NCCD has a three part mission:

Bring together an interdisciplinary team of researchers - biomedical and health informatics, cognitive science, computer science, clinical sciences, industrial and systems engineering, and health services –

- Focus on patient-centered cognitive support.
- Short-term research that addresses the usability, workflow, and cognitive support issues of HIT
- Long-term research that can remove key cognitive barriers to HIT adoption and meaningful use

Maximize HIT benefits for quality, efficiency, and safety by translating research findings to the real world through a cooperative program involving all stakeholders

Progress to date: Fall 2011

- Development and piloting of Rapid Usability Assessment Protocol
 - 1) quickly identify critical usability problems in an EHR, and 2) objectively compare usability across EHR systems
- Developed the initial TURF tool for increased agility in usability testing
- Developed MATHflow 0.3 discrete-event simulation engine and proxy measures for workflow efficiency modeling and cluster analysis on information architecture.
- Developed the architecture and knowledge engine for Cognitive Support System (CSS) based on medical cognition (with SMART app)

Cognitive Challenges in HIT



- Short-Term
 - address the urgent usability, workflow, and cognitive support issues of HIT
- Long-Term
 - Conduct breakthrough research that could fundamentally remove the key cognitive barriers to HIT adoption and meaningful use

Progress to date: Fall 2011

- Developed initial Implementer's Workbench for CDS rule refinement, and CDS knowledge formalization, adaptation, and implementation
- Development of Clinical Summarization Prototype within the SMART app platform
- Developed a prototype for Medication Reconciliation using visualization (including an algorithm to automate reconciliation and reconcile two lists)

Introduction:

- Led by Harvard Medical School in collaboration with Children's Hospital Boston, Partners Healthcare, the Regenstrief Institute, the University of Texas, and the University of Wisconsin
- The anticipated outcomes include foundational knowledge and useable, testable prototypes for a national-scale SMART platform with a developing ecosystem, robust and scalable network data services, and advanced data analysis capabilities

Substitutable Medical Apps, Reusable Technologies

Goals:

The major deliverable of this project will be the SMART platform architecture
SMART will achieve two major goals:

- *Develop a user interface which allows “iPhone-like” substitutability for medical apps based upon shared basic components.*
- *Create a set of services that enables efficient data capture, storage, retrieval and analytics, which are scalable to the national level and respectful of institutional autonomy and patient privacy.*



Progress to date: Fall 2011

- Created the SMART reference container, the test-bed for the SMART API and app development
- Developed the initial SMART API, the foundation of SMART-enablement and substitutability
- Developed initial SMART data models for basic medical record elements, incorporating existing coding systems (RxNorm, LOINC, SNOMED-CT)
- Held the SMART Apps for Health Challenge, which resulted in the submission of 15 apps
- SMART-enabled i2b2, a data analytics platform, and Indivo, a personally-controlled health record
- Showed the Challenge winner running against SMART i2b2 and SMART Indivo, thereby demonstrating substitutability in action
- Developed a pediatric blood pressure centiles SMART App, which is in the process of being put into production within a SMART-enabled Cerner installation at Children's Hospital, Boston

Introduction:

- Mayo Clinic's SHARP project will enhance patient safety and improve patient medical outcomes through the use of an electronic health record (EHR).
- Traditionally, a patient's medical information, such as medical history, exam data, hospital visits and physician notes, are inconsistently stored in multiple locations, both electronically and non-electronically.
- With a vision of solving this issue, the project aims to efficiently leverage EHR data to improve care, generate new knowledge, and address population needs.

Goals:

- Create tangible, scalable, and open-source tools, services and software for large-scale health record data sharing.
- Collaborate to create, evaluate, and refine informatics artifacts that advance the capacity to efficiently leverage EHR data to improve care, generate new knowledge, and address population needs.

Introduction:

- Led by the Medical Device Plug-and-Play (“MD PnP”) Interoperability program at CIMIT / Massachusetts General Hospital, MD SHARP will advance the requirements, architecture, and standards to enable medical device interoperability to improve patient safety.
- Create an open tool set and platform built on the ASTM 2761-09 ICE architecture (Integrated Clinical Environment)
- Prototype healthcare intranet will enable clinicians/hospitals to build verifiably safe and effective clinical “apps” using standards-compliant interoperable medical devices
- Open research platform will support FDA evaluation of systems of heterogeneous medical devices, help to drive development of open device software adapters and an ASTM ICE reference implementation, and serve as a source of comprehensive device data for other SHARP projects
- Major deliverables are based on clinical and engineering processes and will include clinical scenarios and use cases, clinical and engineering requirements, software simulations of medical devices, and complete test coverage of all software and interactions
- 5-year \$10M Quantum grant (Sept 2010 – Aug 2015) from National Institute of Biomedical Imaging & Bioengineering

Progress to date: Fall 2011

- Built and piloted end-to-end proof of concept solution, based on new tools, technology, models and methods; demonstrating:
 - Ability to push unsolicited data using NwHIN exchange protocols
 - Conversion and normalization of lab messages & medication orders
 - Extraction of medication from narrative clinical documents
 - Persistence in a light weight SQL database
 - Phenotype processing across CEM database utilizing Drools

Progress to date: Fall 2011

- Deployed SHARPN cloud computing environment.
- Released new NLP annotator software cTAKES 1.1 : medication extraction, dependency parser and smoking status.
- Released a Clinical Element Model Library and web search tool.
- Two Annual Face-to-Face meetings conducted in Rochester, MN (2010 – 60 participants; 2011 – 81 participants).
- 10 published manuscripts/publications; 9 scientific presentations

Goals:

- Create a complete eco-system for interoperability between medical devices and between a medical device and the EHR in high-acuity environments, to support innovation in patient safety and healthcare quality
- Create industry-adopted solutions that will prime industry for delivering interoperable medical devices for acute care
- Deliver more accurate and comprehensive device data to the EHR
- Provide clinical scenarios and related use cases for testing other projects' tools
- Advance critical knowledge of regulatory requirements
- Develop sharable platform, tools, neutral lab environment

Progress to date: Fall 2011

INDUSTRY ADOPTION

- Developed and implemented an Industry Adoption Work Plan, including analysis of clinical, provider, regulatory, and medical device industry barriers to adoption of medical device interoperability

CLINICAL SCENARIOS

- Selected 4 high level Clinical Scenarios, in conjunction with leading US and international clinical and medical device industry experts:
 - PCA Infusion Pump Safety Interlock
 - Prepare ICU to Receive Post-Op Patient (after Cardiac Surgery)
 - Use of Tele-health Devices in Hospital
 - Integration of Data for Smart Alarms and Closed-Loop Medication Administration

ARCHITECTURE REQUIREMENTS

- Developed detailed requirements for Safety, Reliability, Medical Record and Protected Health Information
- Created Medical Device Interface Data Sheets to collect sharable interface specifications from industry and hospitals