###-### title - PI - area

CERIAS

the center for education and research in information assurance and security

IPS: Security Services For Healthcare Applications[+]

Lorenzo D. Martino[±], Suchit Ahuja[±], Elisa Bertino[ŧ]

[±]Computer & Information Technology, Purdue University, USA [ŧ]Computer Science, Purdue University, USA

Background

- Need for longitudinal Electronic Health Record, but
  - –**Fragmented Systems**
  - –**Interoperability and Standardization issues**
- Federal initiative for Electronic Medical Record (EMR)
  - –Enable sharing of medical data
  - –Reduce healthcare information / administration costs
- **Personal Health Record (PHR)**
- **Personal Health Applications (PHAs)**
- Legal & Regulatory Compliance issues
  - –HIPAA Security Rule & Privacy Rule
- Security and Privacy challenges

Personal Health Record (PHR)

- The Markle Foundation defines the PHR as an electronic application through which individuals can access, manage and share, their health information in a secure and confidential environment.

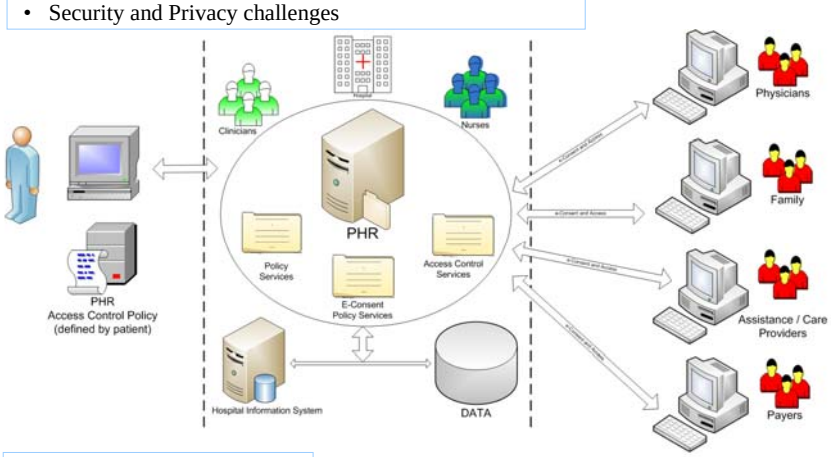
Source: The Markle Foundation - Connecting For Health Report

Personal Health Applications (PHAs)

- According to Project Health Design, Personal Health Applications (PHAs) are software tools that assist consumers to track and manage the health status and medical conditions of themselves and their families
- Provide a shared infrastructure to promote interoperability among healthcare applications

Source: The California HealthCare Foundation in Partnership with The Pioneer Portfolio of the Robert Wood Johnson Foundation

Examples: Microsoft HealthVault, Google HealthCare Initiative, etc.



Scenario

- PHR provided by third party vendor
- Several healthcare providers offer **web-based PHRs** to provide 24x7 accessibility for patients to their medical records
  - –Limited functionality without sharing data with external entities
- Increasing demand for **PHA modules** to be integrated with PHRs to improve and increase functionality for patients
- PHR vendor & customer / patient - **NOT HIPAA "covered entities", *but*** PHR vendor has to cater for **LIABILITY** due to privacy breach
- Patients want to control their data:
  - –Patients "**data ownership**"
  - –Patients define access control policy on their data

PHR System Design Security Challenges

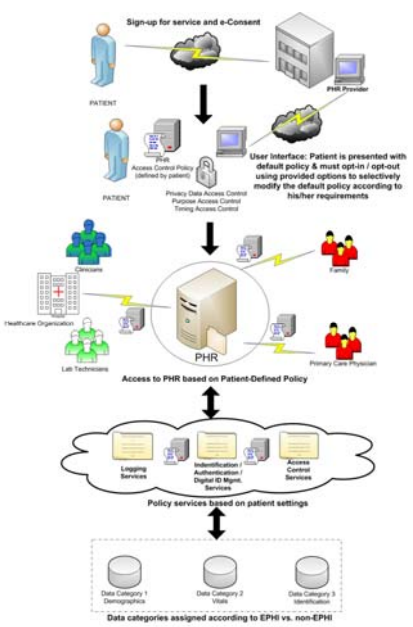
- Usability: accommodation of patient-centric policy options
- Manageability by the PHR service provider
- Security and privacy: mediating between PHR service provider, patient and third parties security and privacy requirements and obligations

Process Flow

- Patient signs-up for **PHR service** and opts-in/opts-out **default PHR vendor privacy policies**
- The patient may modify the default policies and allow other subjects (**family members, Primary Care Physician, Healthcare Providers,** etc.) to access his PHR data. For caregivers**,** a notification and an **e-consent** process is activated
- PHR vendor privacy policies (and patients' modification thereof) defined according to a **privacy-extended** Access Control model
- Engineered process to define patient data structure and data privacy sensitivity:

  - standard-defined healthcare data categories by **ASTM, DHHS, CDA, etc.** drive PHR data grouping, easing data exchange

  - Electronic Protected Health information **EPHI** as defined by **HIPAA** to identify privacy-sensitive data



Patient Privacy and Security Challenges

- Patient-centric Access Control Policy
  - –Data Categories: Electronic Protected Health Information (EPHI) -- HIPAA
  - –Entities + Levels of Access
  - –Purpose of Access
  - –Access Time
- Integration of an **e-Consent** process into the overall workflow: Patient + Provider
  - –Patient should be **NOTIFIED** of privacy norms, coverage and responsibility
- To provide patient with Access Control mechanisms in order to control access that can be easily understood and configured in the system
- **Privacy-Aware Access Control** based on **purpose of access**
- **Authentication / Digital ID Mgmt.** mechanisms for granting access to other entities according to patient-centric policy
- **Over-riding** the patient-centric policy during emergencies to provide access
  - –"**BREAK THE GLASS**" principle

Security / Privacy as a Service

- Use of RBAC in heterogeneous eHealth systems
- Roles can be pre-defined and assigned specific pre-identification parameters. The challenge is to investigate possibility of **Dynamic Role Creation** based on RBAC
- Interoperability + Security & Privacy: Identity Mgmt., Authentication, Access Control

SOA approach to Security & Privacy

- Patient-centric & Policy-based security services
- Service Classes
  - Digital Identity Management Services
  - Authentication Management Services
- Service Classes and Auditing: Logging services for regulatory compliance

[+]NSF Grant Number 102641

PURDUE UNIVERSITY

CERIAS

Discovery Park e-Enterprise Center