Ready for what's next.

# Trends for the Mobility-Enabled Healthcare Enterprise and Security Threats, Vulnerabilities, and Countermeasures

*NIST HIPAA Conference*
May 10, 2011

# Agenda

- Context for Mobile Health
- Risks
- Security Implementation Considerations

# Health care has increasingly used technology to expand its reach or enhance delivery

- Hippocrates (460-377 B.C) and Galen (131-201 A.D) documented their patient's process of healing to improve patient care.
- 1901 the Trans-Atlantic radio introduced and by 1924, envisioned this technology bringing the doctor to our home
- 1946 the ENIAC computer introduced
- 1950 the transmission of radiologic images by telephone between West Chester and Philadelphia (24 miles was reported in the scientific literature)
- 1970s a growing number of electronic medical records systems were introduced


**Rapid advancements of today bring even more possibilities tomorrow**

# Today, mobility and “anywhere connectivity” is being used to transform business, drive productivity, and redefine the workplace

# The explosion of new devices and applications focused on healthcare solutions is resulting in mHealth…

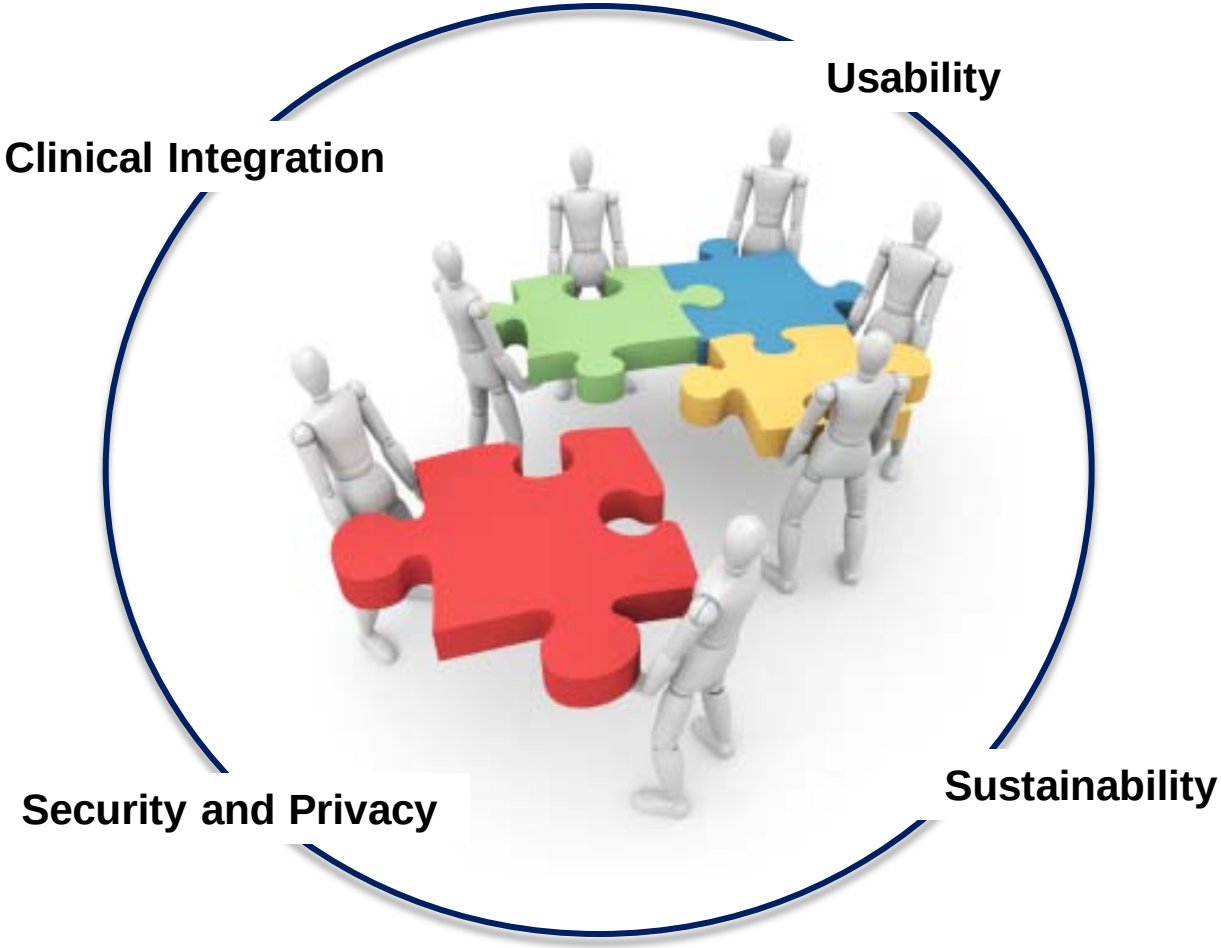

…a term used for the practice of medical and public health, supported by mobile devices

# These mobile solutions offer significant opportunity for improvements across the health market



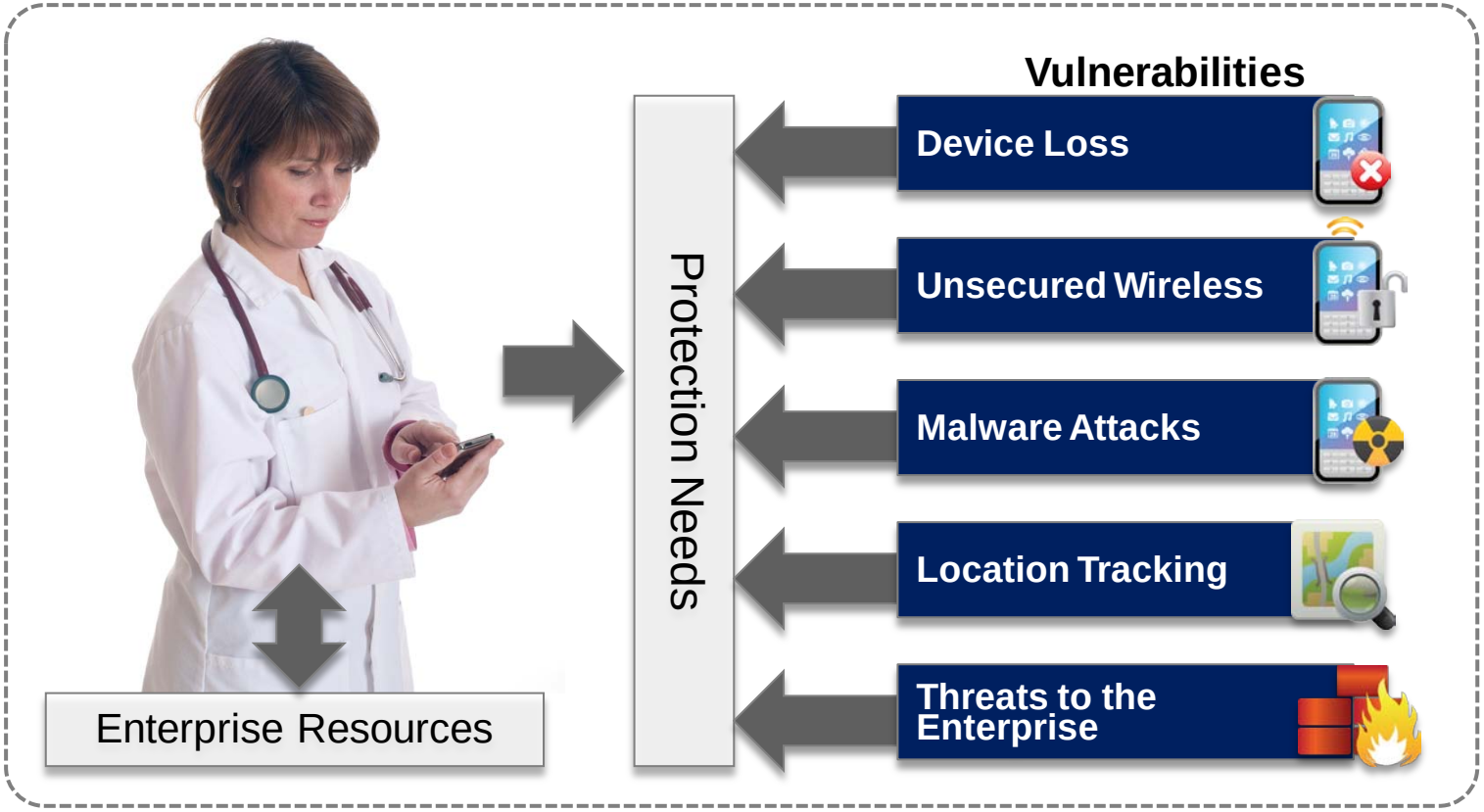
| Education | Reminders and Alerts | Data Collection | Care Delivery | Emergency/ Events |
|---|---|---|---|---|
| **Examples** | | | | |
| • Search the web for health information<br>• Utilize local software or remote enterprise applications<br>• Conduct patient education or review results bedside | • Local alarm or calendar alerts<br>• Register for service – calls; text messages<br>• Enter information for personalized responses | • Patient History at the Bedside; home visits<br>• Personal Health Records… local or hosted<br>• Door to door surveys and research protocol data collection | • View patient information, labs, images<br>• Remote monitoring & consults<br>• Prescription ordering<br>• Dictation<br>• Clinical Decision Support | • Collect and transmit patient data at the point of care<br>• Transmit images from the scene<br>• Obtain guidance and start intervention |

# Success of these mobile solutions requires a holistic and integrated approach



# As users increasingly rely on mobility for health care services, the risk of data compromise escalates

Potential Threats and Vulnerabilities



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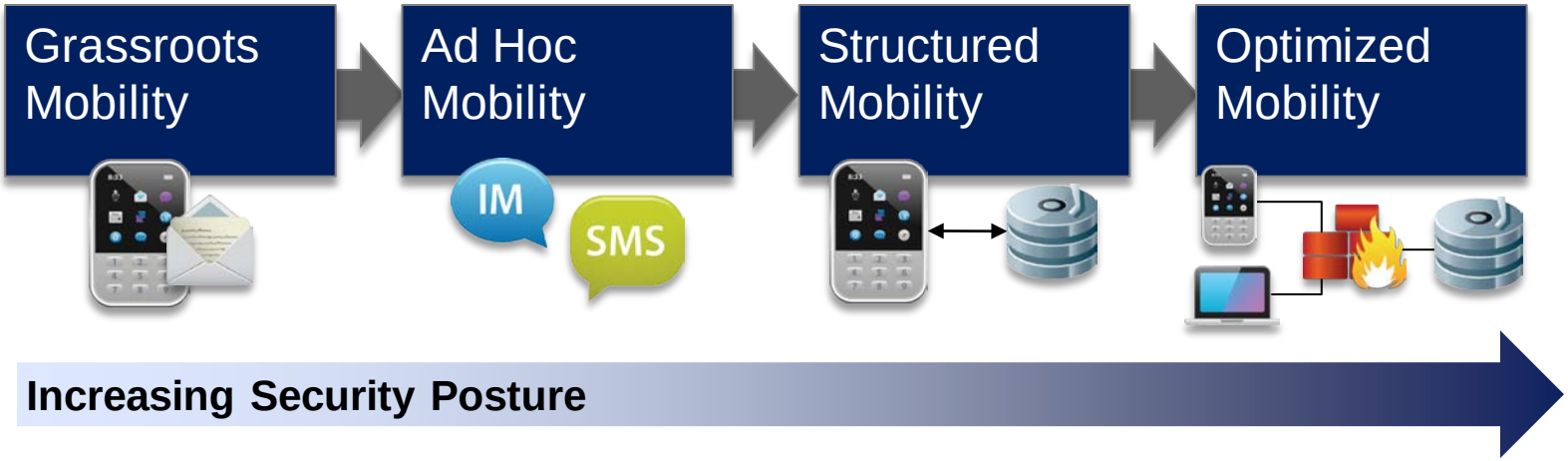
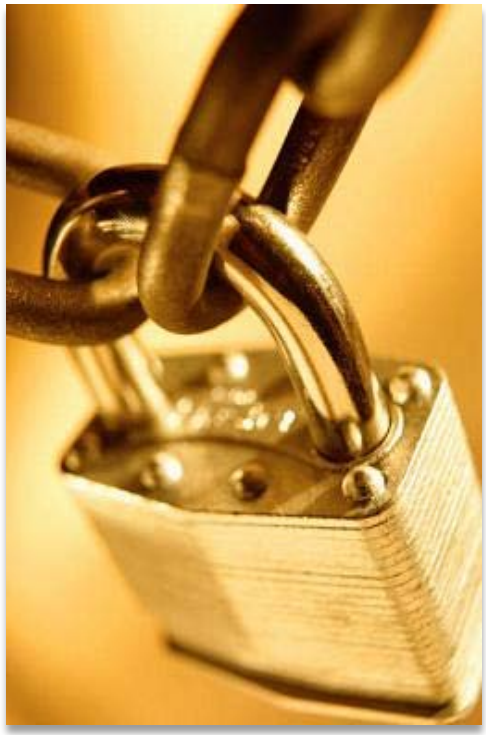
# As security professionals, we have been playing catch-up by trying to learn, analyze, and secure mobile technologies




- Realize substantial savings, increased information dissemination from previously disparate systems, and enhanced real-time and operational efficiencies
- Ability to integrate communications more closely with business processes
- Anywhere and anytime access to email, calendars, and applications
- Enabled business processes applications with automated alerts and context-driven architectures

# Mobile technologies extend the wired infrastructure but introduce many new challenges for information security personnel

- Personal devices vs. care delivery organization (CDO)
- Connectivity from anywhere and everywhere
- Multiple devices and OS platforms
- Multiple applications to support
- Data is outside the ‘secure’ perimeter
- Hard to distribute security controls
- Access complexities (power users, etc)
- Device management



# Our goal is to move employees to technologies that provide greater mobility, efficiency, and productivity

## Mobility Challenges

- Information security concerns
- Business processes can change dramatically, presenting organizational challenges
- The business case is complex
- Point solutions that do not address total requirement
- Technical issues surrounding connectivity
- Standards are evolving
- Evolving policies and corporate governance related to mobile devices
- Human acceptance of new technology
- Integrating dynamic mobile devices with legacy information systems
- Maintaining the user experience

**Mobile Security**

**Considerations**

## Security Challenges

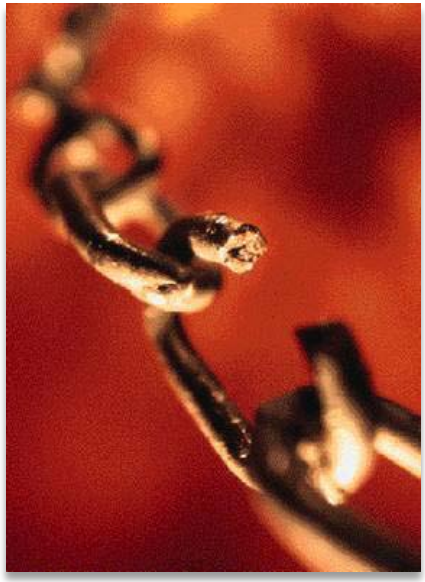
- Data disclosure (storage and transmission)
- Physical security
- Strong authentication / multi-factor authentication
- Multi-user support; separate organizational and personal data
- Safe browsing
- Operating systems and abundance of hardware platforms
- Application isolation
- Malware, phishing
- Updates – App, OS, and Firmware mechanisms
- Geolocation privacy
- Improper decommissioning

# The potential effects of risk from mobility include more than just eavesdropping on mobile users

- Unauthorized **monitoring** and disclosure of ePHI
- Unauthorized **modification** of ePHI
- Unauthorized or **fraudulent** use of ePHI
- Radio frequency **interference** or disruption of service
- Radio traffic analysis and **operations** security

**In addition, mobile and wireless technology typically increases network complexity**

- Complexity is the enemy of security
- Provides more points of entry to intruders
- Mobile security tools and technologies are not standardized



# So how bad is it really?

**According to the Department of Health and Human Services, 9,300 medical data breaches were reported under HIPAA/HITECH between September 23, 2009 and September 30, 2010**

**Recent Breaches**

- 18 April – Sensitive personally identifiable information (PII) was stolen from Android Skype users by malicious third-party applications
  - Any third-party application with data harvesting capabilities could steal data
    - Stolen data included customer names, date of birth, location, account balances, phone numbers, email addresses, and biographic details
- 17 March – BlackBerry JavaScript vulnerability allowed hackers to steal user data
  - Remote code execution attack provided access to media cards and storage
- 02 March – Two dozen infected applications were removed from Android Marketplace
  - Malware was capable of rooting devices and stealing data
    - Over 200,000 of these applications were downloaded
- 22 February – Financial data was stolen from thousands of Symbian and Windows mobile users
  - Zeus malware captured sensitive financial transaction authentication numbers

# Implementation of mobile application technology will require integrating a number of cyber-security, privacy, and confidentiality measures


- Establish a strong security policy foundation and risk management program for mobile solutions
- Define the mobile concept of operations (CONOPS)

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- Assess the threats and vulnerabilities faced by the enterprise
- Define a package of security countermeasures that mitigate the risks to an acceptable level

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- Develop and integrate the applications that allow the mobile services to be secure in the enterprise
- Make engineering tradeoffs and procurement decisions
- Migrate legacy systems

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- Enterprise mobile solutions are operated and administered according to defined requirements
- Security posture is periodically evaluated for compliance

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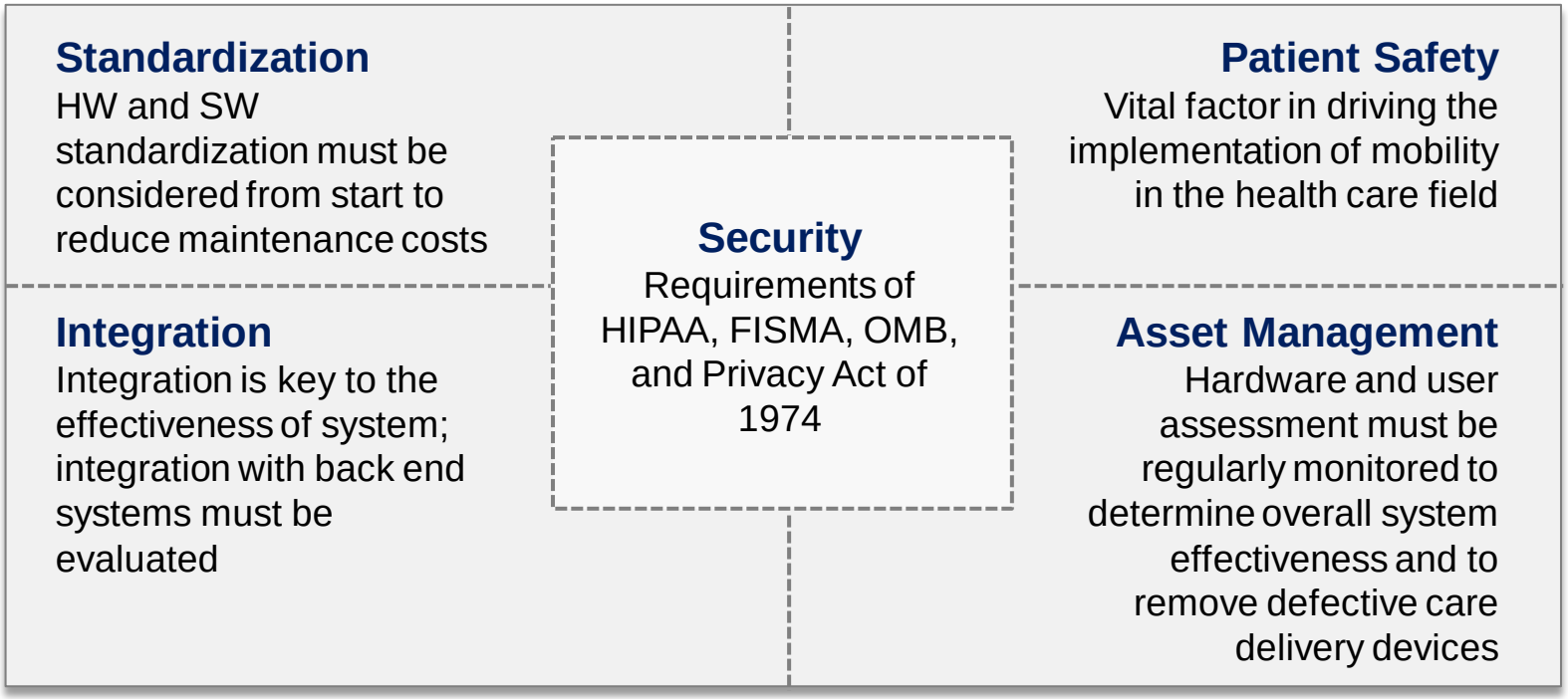
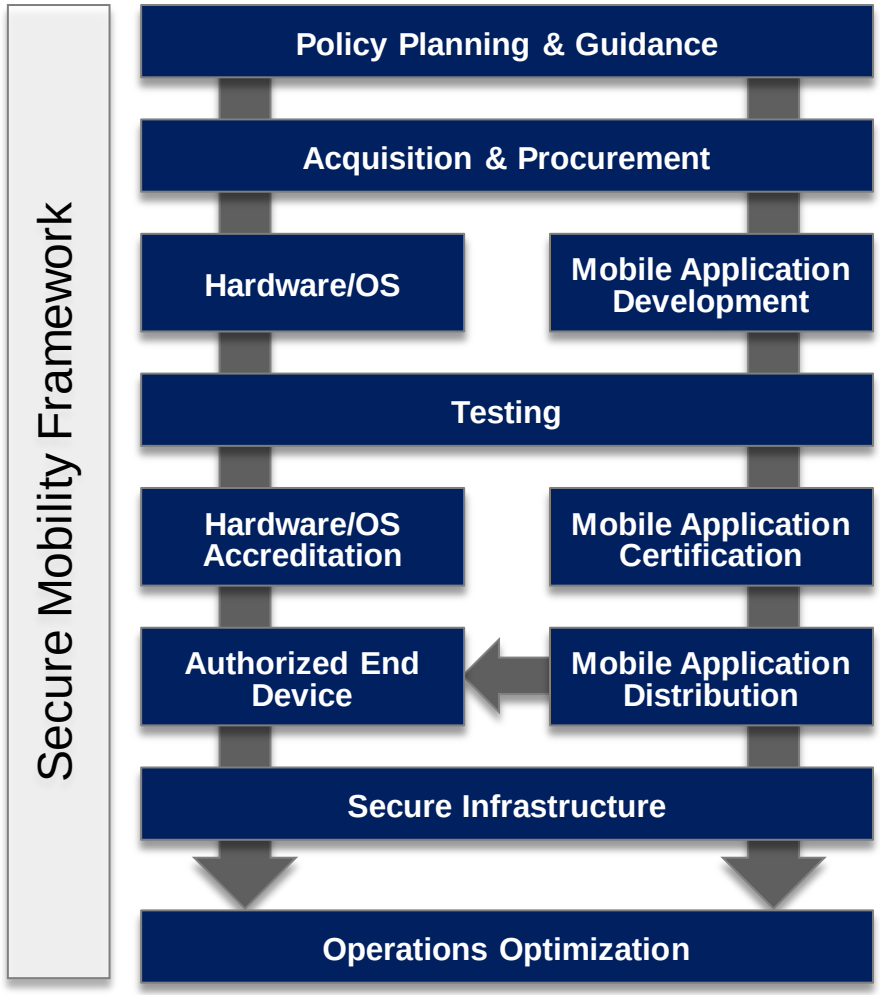
# The proper strategic imperatives to support a mobile ecosystem must be developed and thoroughly explored in the beginning



# Successfully implementing enterprise mobility requires an advanced Secure Mobility Framework

- Implement technical policies and procedures that allow and restrict system and data access
- Unique identification, multi-factor authentication (AuthN) and role-based authorization (AuthZ) access controls
- Continuous monitoring and detection for unauthorized wireless activity
- Data encryption (at rest and in transit)
- Configuration documentation
- Physical access controls, including session/device timeouts
- Security testing and evaluation
- Conduct risk analysis
- Incorporate into Security Awareness training
- Software Assurance



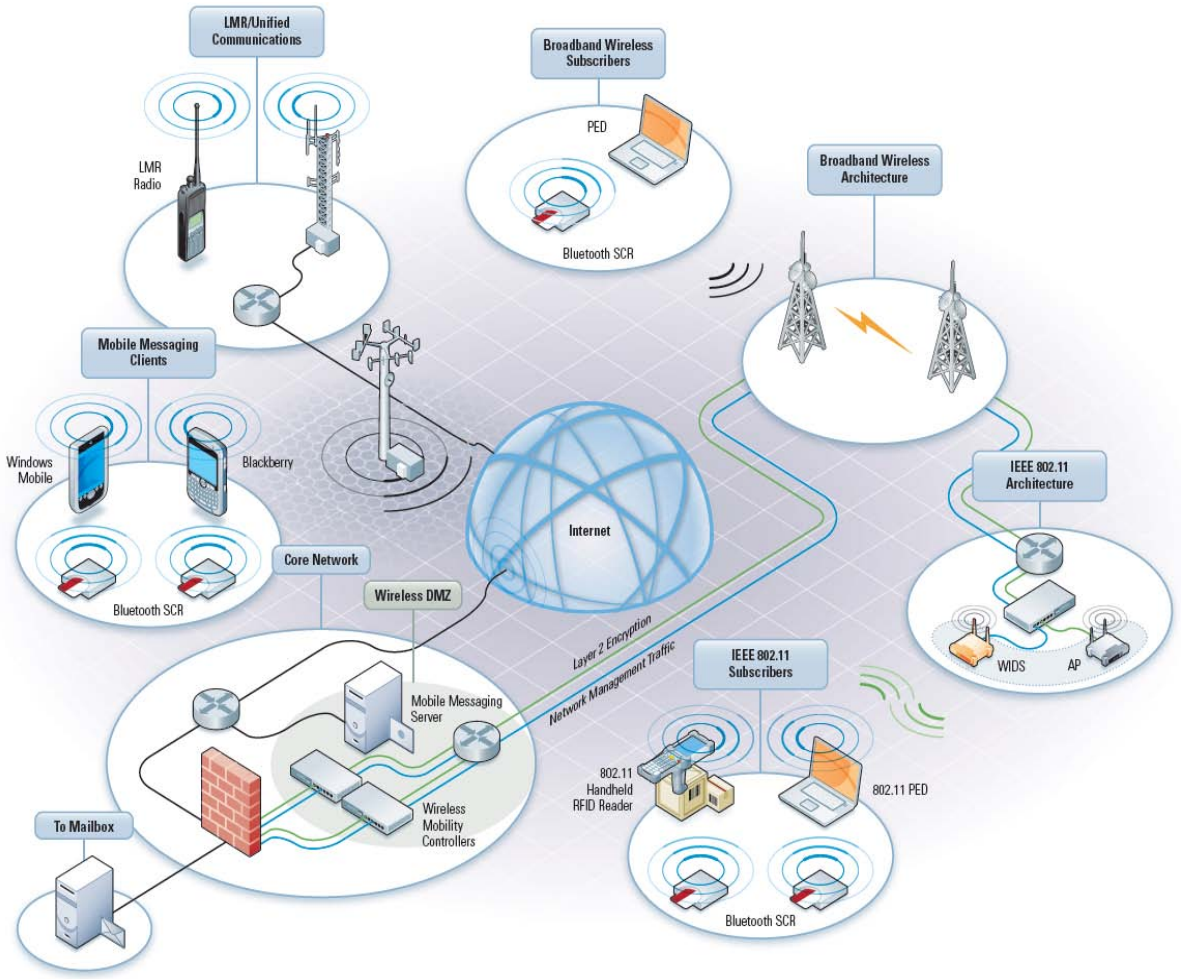
# Mobile security implementation includes all components of the communications system


| People | End-point | Commun-ications | Perimeter | Enterprise |
|---|---|---|---|---|
| • Implement technical policies and procedures that allow and restrict system and data access<br>• Have an approval policy and process<br>• Use only approved devices and implement controls to grant/restrict remote access<br>• Conduct a solution/technology risk assessment<br>• Provide end user security and awareness training<br>• Policy groups/role-based access | • ePHI Confidentiality/Integrity<br>• Unique two-factor/PIN local and enterprise AuthN<br>• Access control to local device<br>• Application-level security controls<br>• Device interrogation for enterprise compliance and access (phase 2 & 3)<br>• Audit controls<br>• Remote wipe (phase 2 & 3)<br>• Data separation (personal versus sensitive)<br>• Automatic logoff | • Patient History at the Bedside; home visits<br>• Personal Health Records… local or hosted<br>• Door to door surveys and research protocol data collection | • View patient information, labs, images<br>• Remote monitoring & consults<br>• Prescription ordering<br>• Dictation<br>• Clinical Decision Support | • Collect and transmit patient data at the point of care<br>• Transmit images from the scene<br>• Obtain guidance and start intervention |

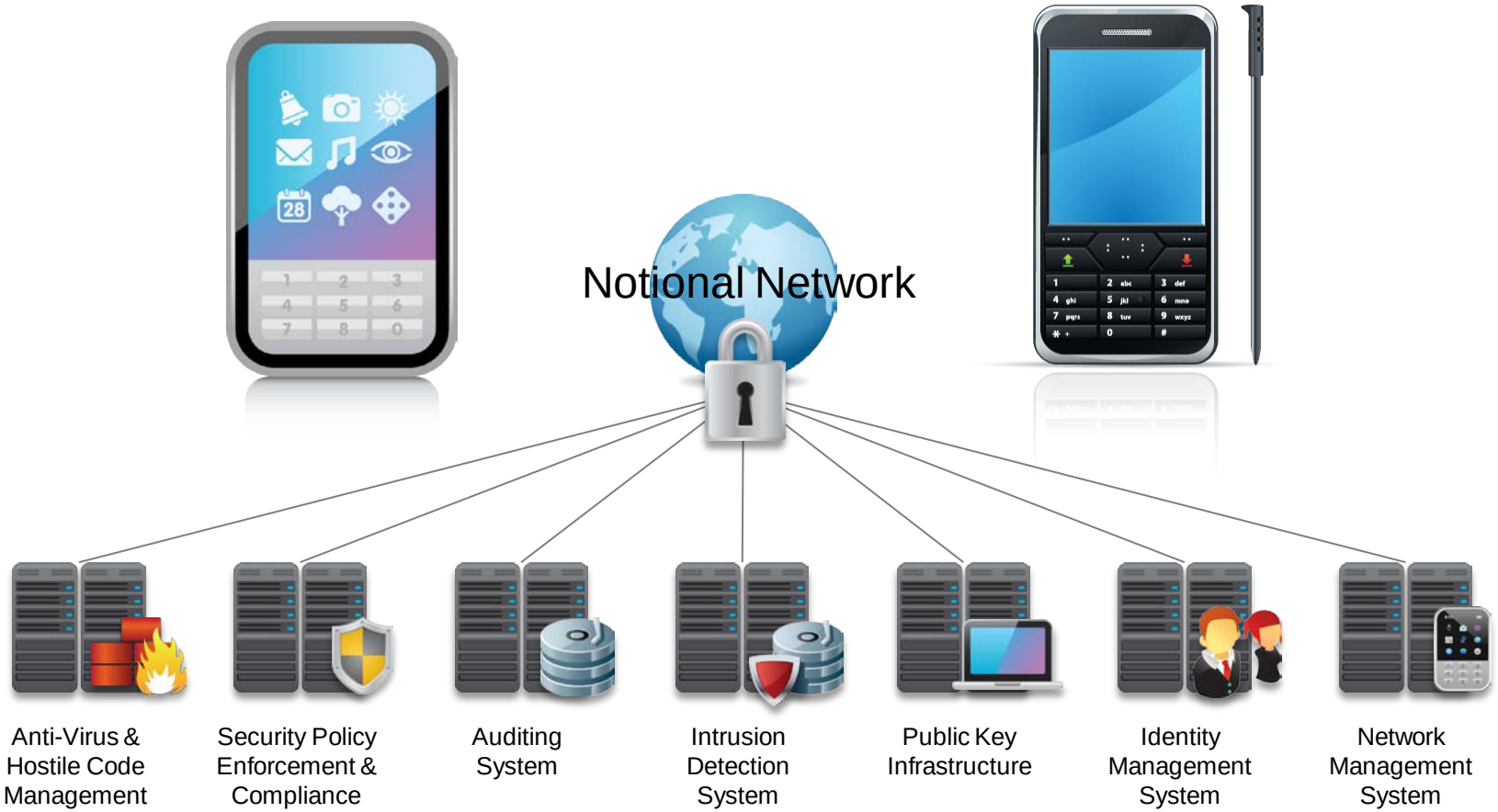
# To successfully reduce risk, CDOs must extend enterprise security throughout their mobile ecosystem

## The HIPAA Security Rule

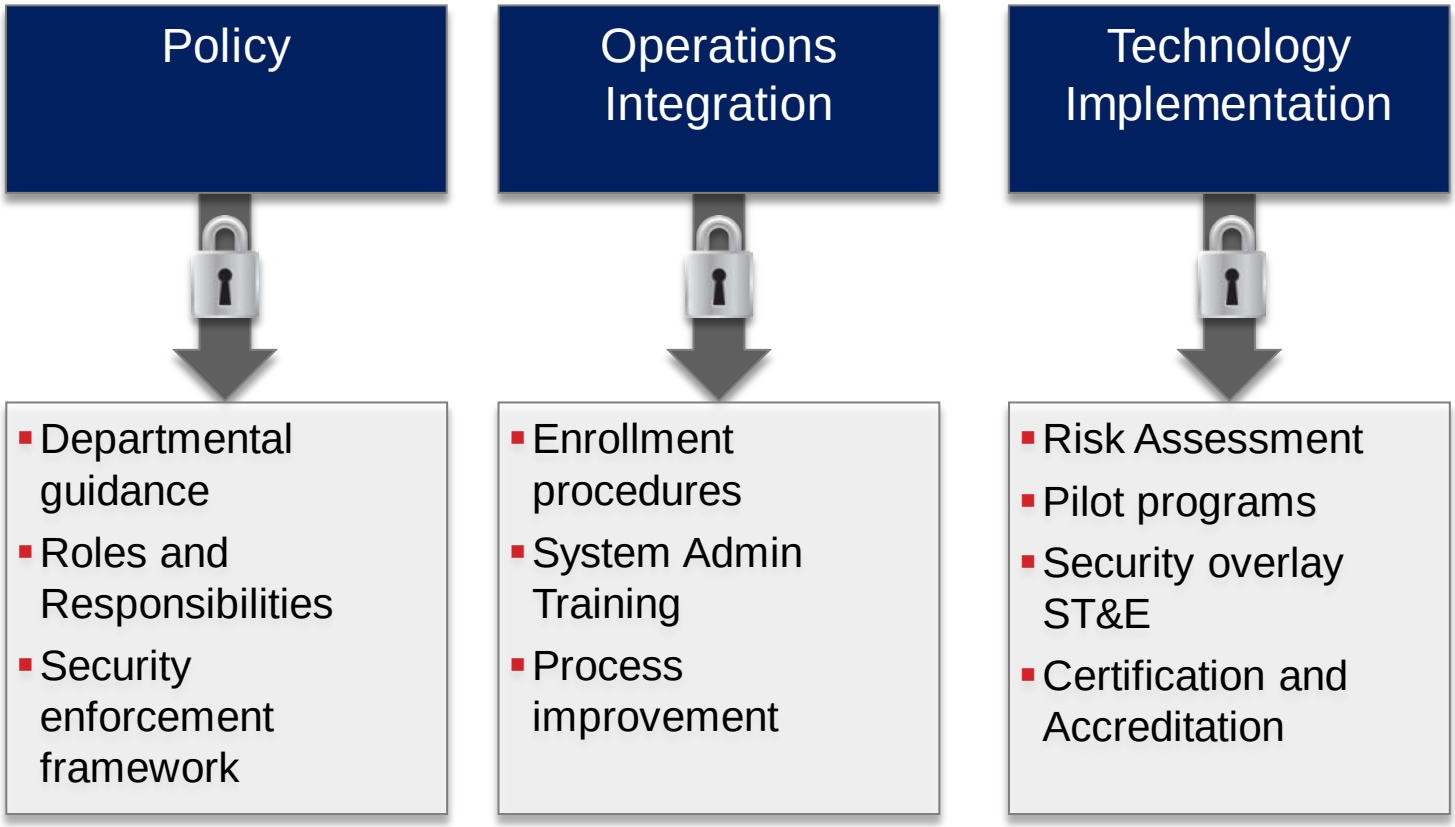
- Access Control §164.312(a)(1)
- Audit Controls §164.312(b)
- Integrity §164.312(c)(1)
- Person or Entity Authentication §164.312(d)(1)
- Transmission Security §164.312(e)(1)



# Security can be implemented by integrating and leveraging existing enterprise security capabilities for mobile technologies



# As with any technology, the goal is to balance convenience with security



# Security professionals should leverage NIST guidance and other industry best practices to establish baseline security requirements for mobile technologies

| NIST SP 800-53 Rev3 | | | Mobile Enterprise Solution (example) | | |
|---|---|---|---|---|---|
| **Category** | **Control Name** | **Control No.** | **IT Policy** | **Recommended Setting** | **Comments** |
| Access Control | Use of External Information Systems | AC-20 | Allow Internal Connections | FALSE | Specifies whether applications, including third-party applications, can initiate internal connections |
| System and Communications Protection | Mobile Code | SC-18 | Allow Resetting of Idle Timer | FALSE | Permits third-party applications to reset the inactivity timeout value, bypassing the security timeout value |
| Access Control | Concurrent Session Control | AC-10 | Allow Split-pipe Connections | FALSE | Specifies whether applications, including third-party, can open internal and external connections simultaneously |

**Leverage both civil and defense policy and guidance to secure your mobile and wireless investments (i.e. CNSS, DHS, HHS, NIST, VA and DISA Wireless STIGs)**

# Key Initiatives and Resources…

- The HIPAA Security Rule can be found at HHS.gov: http://www.hhs.gov/ocr/privacy/hipaa/administrative/securityrule/index.html
- Health information technology (Health IT) allows comprehensive management of medical information and its secure exchange between health care consumers and providers: http://healthit.hhs.gov/portal/server.pt
- The National Institute of Standards and Technology
  - SP 800-48 Rev1 - Guide to Securing Legacy IEEE 802.11 Wireless Networks
  - SP 800-66 Rev1 - An Introductory Resource Guide for Implementing the Health Insurance Portability and Accountability Act (HIPAA) Security Rule
  - SP 800-97 - Establishing Wireless Robust Security Networks: A Guide to IEEE 802.11i
  - SP 800-98 - Guidelines for Securing Radio Frequency Identification (RFID) Systems
  - SP 800-111 - Guide to Storage Encryption Technologies for End User Devices
  - SP 800-121 - Guide to Bluetooth Security
  - SP 800-122 - Guide to Protecting the Confidentiality of Personally Identifiable Information (PII)
  - SP 800-127 - Guide to Securing WiMAX Wireless Communications
  - IR 7497 - Security Architecture Design Process for Health Information Exchanges (HIEs)

# Closing remarks

- Don’t ignore – investigate the complete range of mobile devices necessary to enhance various clinical and business workflows within the enterprise
- Set strategy – realize that mobile and wireless technologies will create new privacy and security challenges that will require new policies and technical controls; be sure to include device ownership, support, and maintenance
- Set integration approach and employ standards-based technologies where possible
- Monitor and manage mobile devices and supporting infrastructure

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