# Importance of NIST Laboratory Research Programs to Support Healthcare IT Standards

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# The Health IT Domain

▸ The Health IT Domain is a big place…
▸ Challenges include:

◦ Interoperability

◦ Security

◦ Emerging technologies

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**NIST research:**
**• Standards Testing Infrastructure Project**

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**NIST research:**
◦ Security ⟶ • **Standards and Guidelines**
• **Identity Management Program**
• **Authentication Research**

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**• Medical Device Communications Project**
**• Pervasive IT Program (sensors & implants)**

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# Standards Testing Infrastructure

- NIST research in testing focuses on 'effective' testing
  - Definition, delivery, real-world context, coverage, etc.
- NIST conformance & interoperability tests & test tools are used by various industry domains
  - Correctness
  - Coverage; alignment with real-world use
  - Alignment & feedback to standards processes
- We are often asked to update our tools to suit a new testing paradigm, constrained/extended standard, etc.
- NIST solution: move towards collaborative testing framework

# Requirements for a Health IT Testing Infrastructure

▸ Perform conformance and interoperability testing for healthcare information systems

▸ Support self-test to third-party testing models

▸ Support multiple healthcare messaging, data, infrastructure, and security standards

▸ Support various tool delivery mechanisms

▸ Provide Flexibility, Modularity, Scalability, and Extensibility

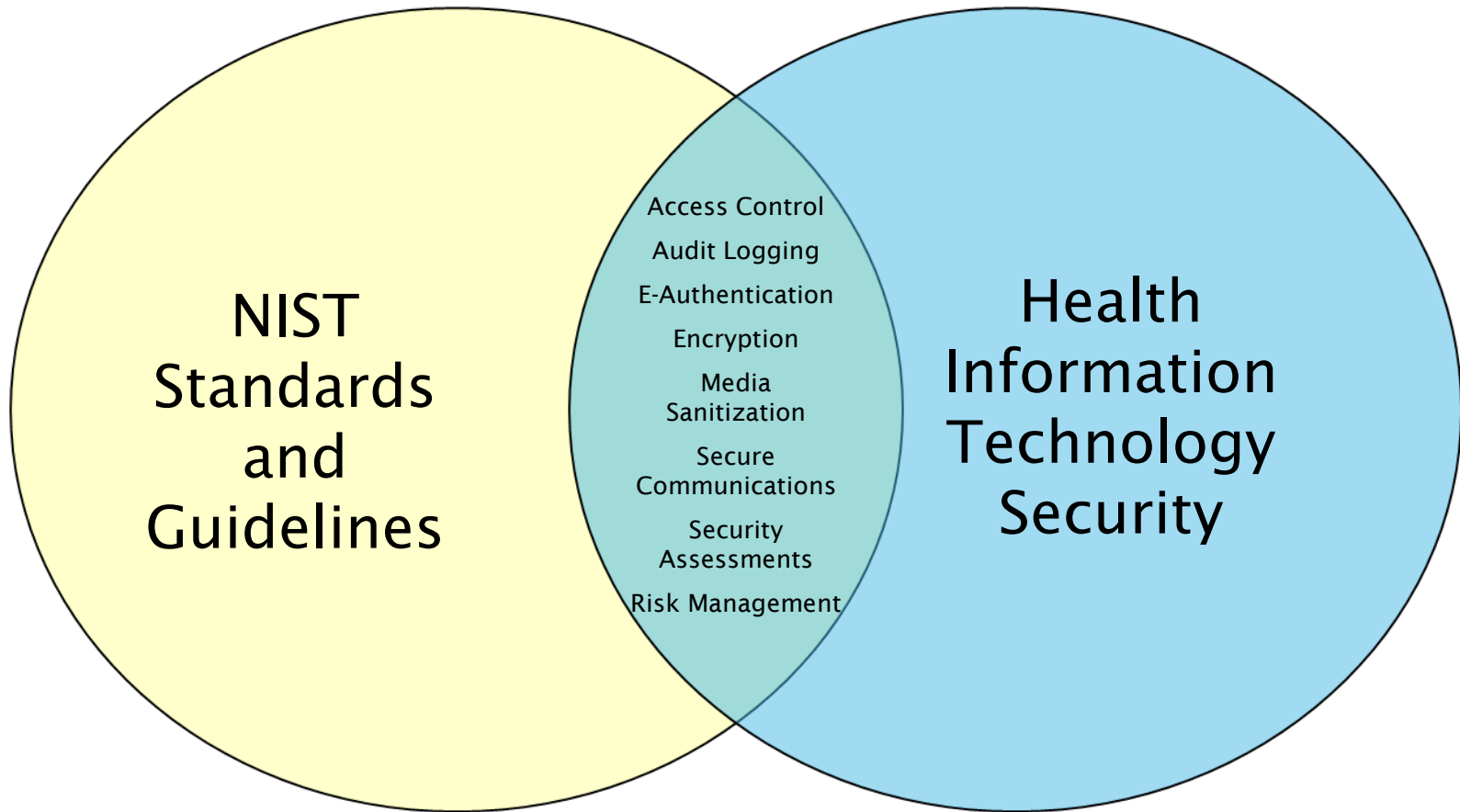# NIST Testing Infrastructure: A Framework for Building Test Systems

- Supports use of test tools from many sources (green/blue boxes)
- NIST provides the 'glue' definitions (brown boxes)
- NIST develops reusable purple boxes
- Research in scalability, coverage, semantic info testing, etc.
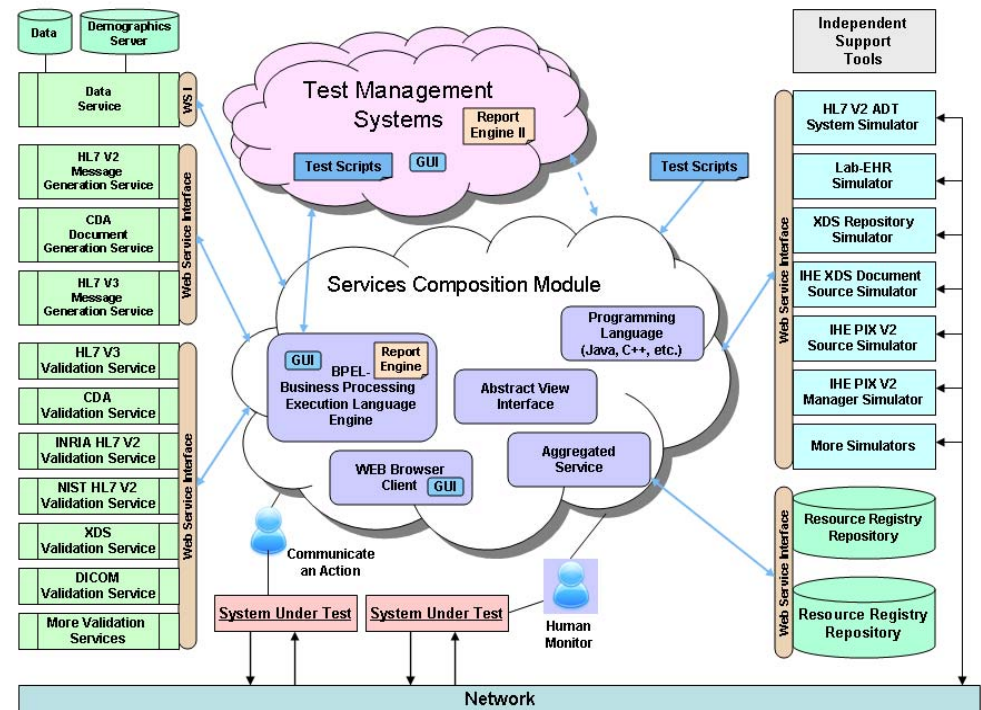


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# NIST Standards and Guidelines Support Health IT Security

NIST Standards and Guidelines

Access Control

Audit Logging

E-Authentication

Encryption

Media Sanitization

Secure Communications

Security Assessments

Risk Management

Health Information Technology Security

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# Identity Management & Authentication

- Who is Jeff really?
  - Is the person (really) Jeff?
  - Is the user Jeff?
  - Do I trust my partner organization who says it is Jeff?
- NIST Special Publication 800-63 "Electronic Authentication Guideline"
  - Considered by HITSP for trust model
  - Basis of trust models for federal agencies
- ITL Identity Management Program
  - Develops models, technologies & input to standards
  - Explores issues as barriers to trust

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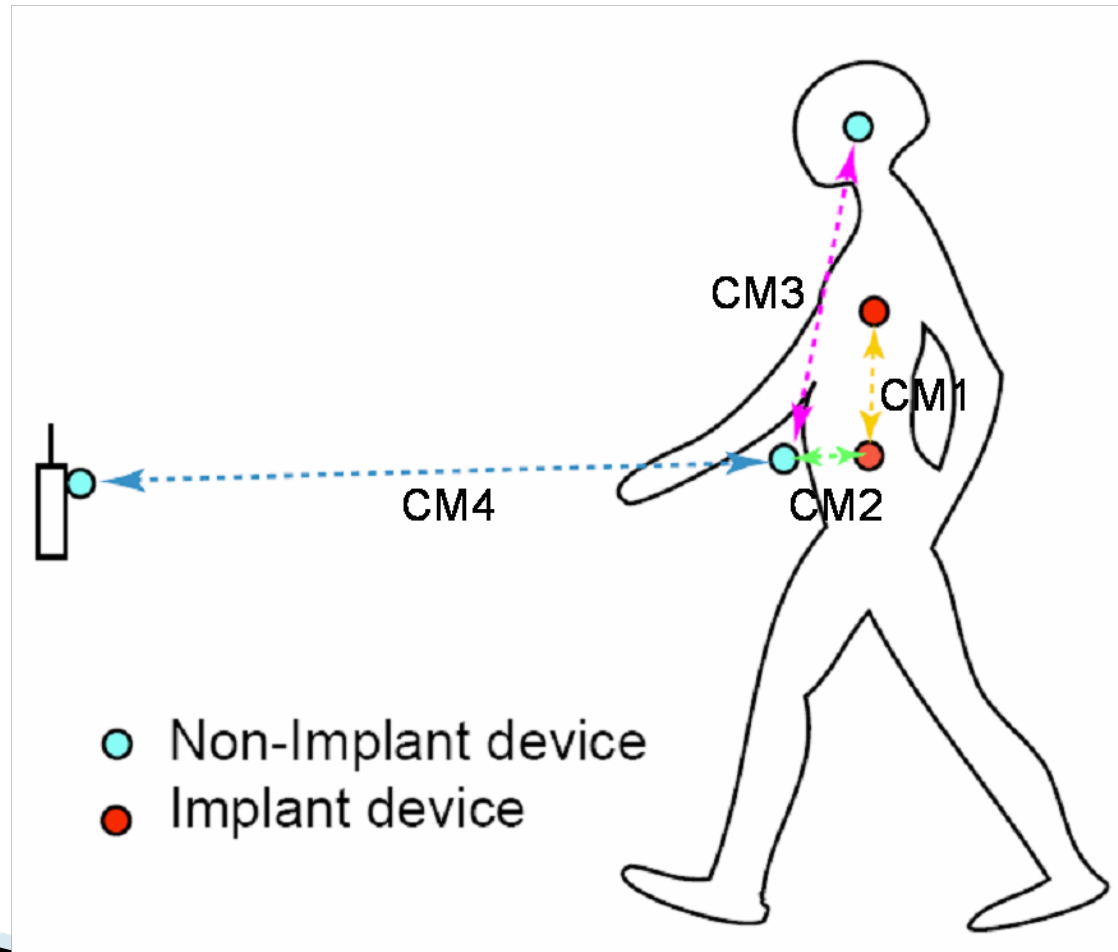  ◦ Interoperability

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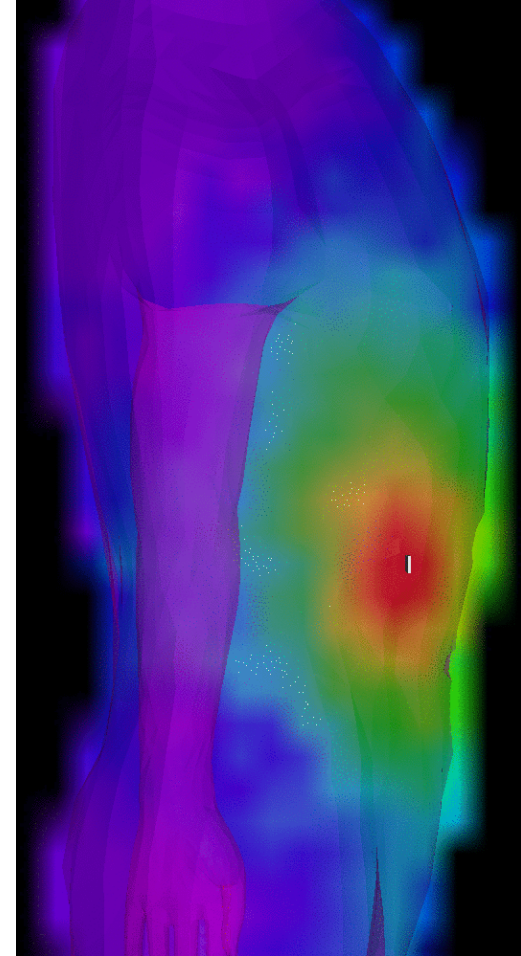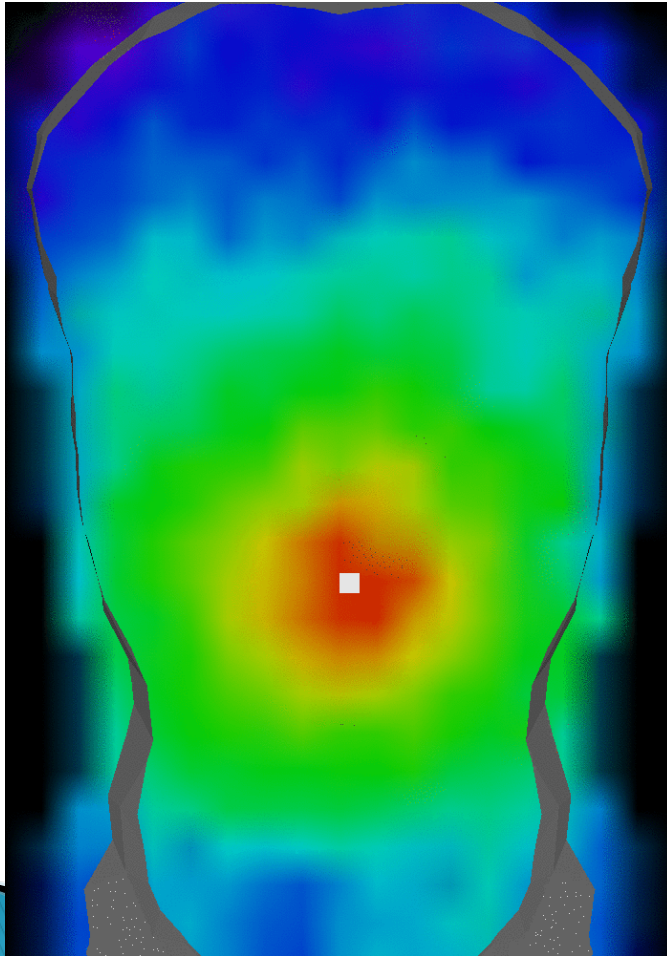  **• Pervasive IT Program (sensors & implants)**

# Interoperability of Personal Monitoring & Medical Devices

- Research on semantic interoperability of information
  - Modeling & representation
  - Determination (business use & technical definition)
- Wireless networks & sensor technologies
  - Performance, impedance, security
  - Measurement definition
- In medical devices/sensors/implants
  - Semantic interoperability: vital sign data, device configuration, status data
  - Wireless network/RF signal
    - Signal strength, interference among devices, security of device
    - Input to IEEE 802.15 Task Group 6 (Body Area Networks)

# Operating Scenarios and the Corresponding Channel Models



CM3

CM1

CM4

CM2

○ Non-Implant device

● Implant device

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# Sample Result
# (RSS Upper Stomach Implant)

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# Summary

- NIST research efforts contribute to the documentary standards necessary to achieve the healthcare vision in the U.S.
  - Interoperability – exchange & understanding of information
  - Security – confidentiality and privacy needs
  - Future Healthcare technologies & environments