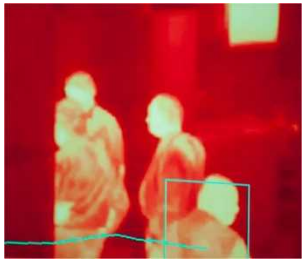
SAND2016-2594PE

# Center for Security Technology, Analysis, Response and Testing



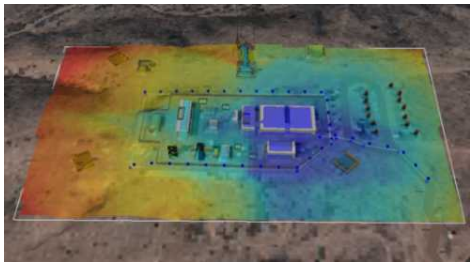


## R&D Investment Strategies

February 2016

# Objective

- Become familiar with new emerging technologies that have Physical Security relevance.
  - Two days of technologies that range from Technical Readiness Levels(TRL) 1 through 7.
  - Investment Strategies
  - Technology Gap Areas
  - Technology Development and Insertion Strategy
  - Technology Maturity Model
  - Next two days

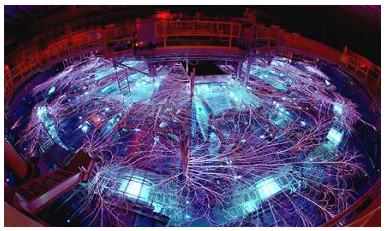


# Investment Strategies

- *In 1985, in response to the recommendations of national panels and commissions, the Department established the Exploratory Research and Development Program to formalize the practice of providing its national laboratories the means to conduct laboratory-initiated R&D.*
- *Six years later, DOE renamed the program Laboratory Directed Research and Development (LDRD) and formally established it at the DOE national laboratories. Today, the LDRD Program at the DOE national laboratories and analogous programs at the nuclear weapons production plants (Plant Directed Research and Development, or PDRD) and Nevada National Nuclear (NNSS) (Site Directed Research and Development, or SDRD) are active components of the DOE mission to promote scientific and technical (S&T) innovation that advances the economic, energy, and national security of the United States*.
- Laboratory Directed Research and Development (LDRD) currently is the largest single source of capability investment in each of the three NNSA laboratories.
- The objectives of these program (LDRD, PDRD, SDRD) are to:
  - maintain the scientific and technical vitality of the laboratories;
  - enhance the laboratories' ability to address future DOE/NNSA missions;
  - foster creativity and stimulate exploration of forefront science and technology;
  - serve as a proving ground for new concepts in research and development; and
  - support high-risk, potentially high-value research and development.

❑ DOE/OS LDRD programs:
- ❖ Ames
- ❖ Argonne
- ❖ Brookhaven
- ❖ Fermi
- ❖ Lawrence Berkely
- ❖ Oak Ridge
- ❖ PNNL
- ❖ Princeton,
- ❖ SLAC
- ❖ Thomas Jefferson

❑ NNSA LDRD programs:
- ❖ LANL
- ❖ LLNL
- ❖ SNL



❑ PDRD programs:
- ❖ Kansas City Plant
- ❖ Pantex Plant
- ❖ Savannah River Site
- ❖ Y-12.

❑ SDRD programs:
- ❖ Nevada National Nuclear Site

# Technology Gap Areas

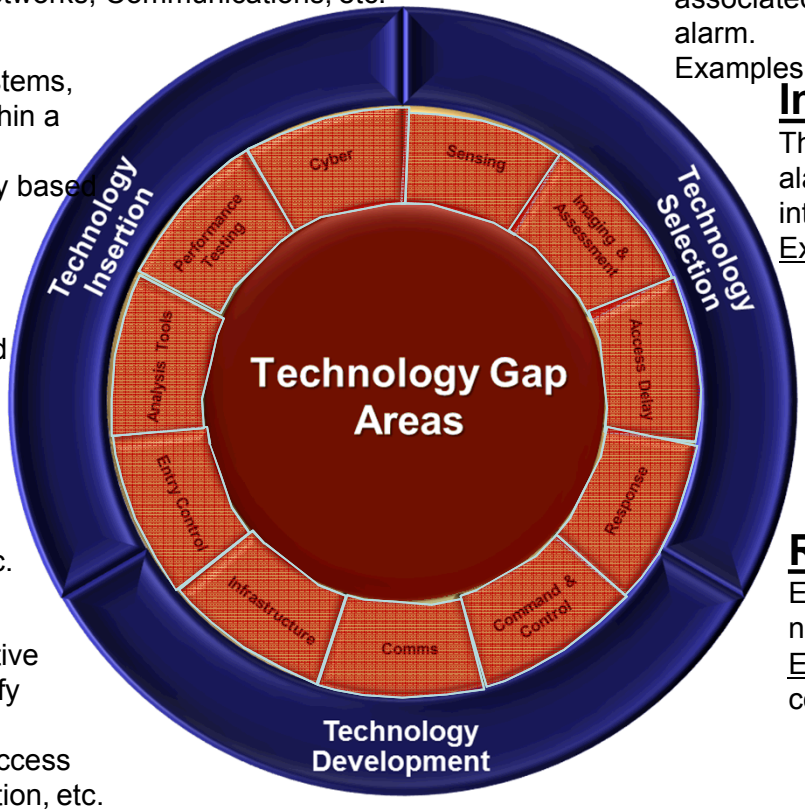
## Cyber:
The protection of security elements including computers and networks from unauthorized logical access.
Examples: Wired and Wireless Networks, Communications, etc.

## Performance Testing
Testing to evaluate the ability of systems, subsystems, or critical elements within a security design.
Examples: No-notice testing, Reality based training, Test to failure, etc.

## Analysis Tools:
These tools produce performance based estimate to better understand the trade-space for competing options or approaches impacting security.
Examples: Pathway analysis, Neutralization simulations, Cost optimization, Systems Modeling, etc.

## Entry Control:
Physical equipment and administrative procedures used to control and verify access authorization.
Examples: Contraband detection, access control, biometrics, explosive detection, etc.

## Infrastructure:
Critical systems that support site operations, safety, and security functions such as power, communication paths, etc.
Examples: Power distribution, fiber, copper, wireless, water, building construction, etc.




## Sensing:
The use of sensors, personnel, systems, software or other means to collect data in response to stimulus associated with an unauthorized action resulting in an alarm.
Examples: Exterior, Interior, Extended Sensing, etc.

## Imaging & Assessment:
The act of rapidly assessing or classifying an alarm for purposes of determining whether and intrusion has taken place.
Examples: cameras, lighting, video displays, etc.

## Access Delay:
The effect provided by physical features, technical devices, or protective forces that delays an adversary from gaining access to an asset being protected.
Examples: Barriers, Locks, Vaults, etc.

## Response:
Elements that support interruption or neutralization of adversary activity.
Examples: Pro-force equipment, tactics, communications, situational awareness, etc.

## Command & Control:
An integrated system to support an operator's primary role of detecting, assessing and responding to unauthorized activities.
Examples: Alarm Communication & Display equipment, Entry Control, Communications, etc

## Communications:
The function of transmitting security system information to include alarm, video, response, and status information.
Examples: Radios, Wired and Wireless Networks, etc.

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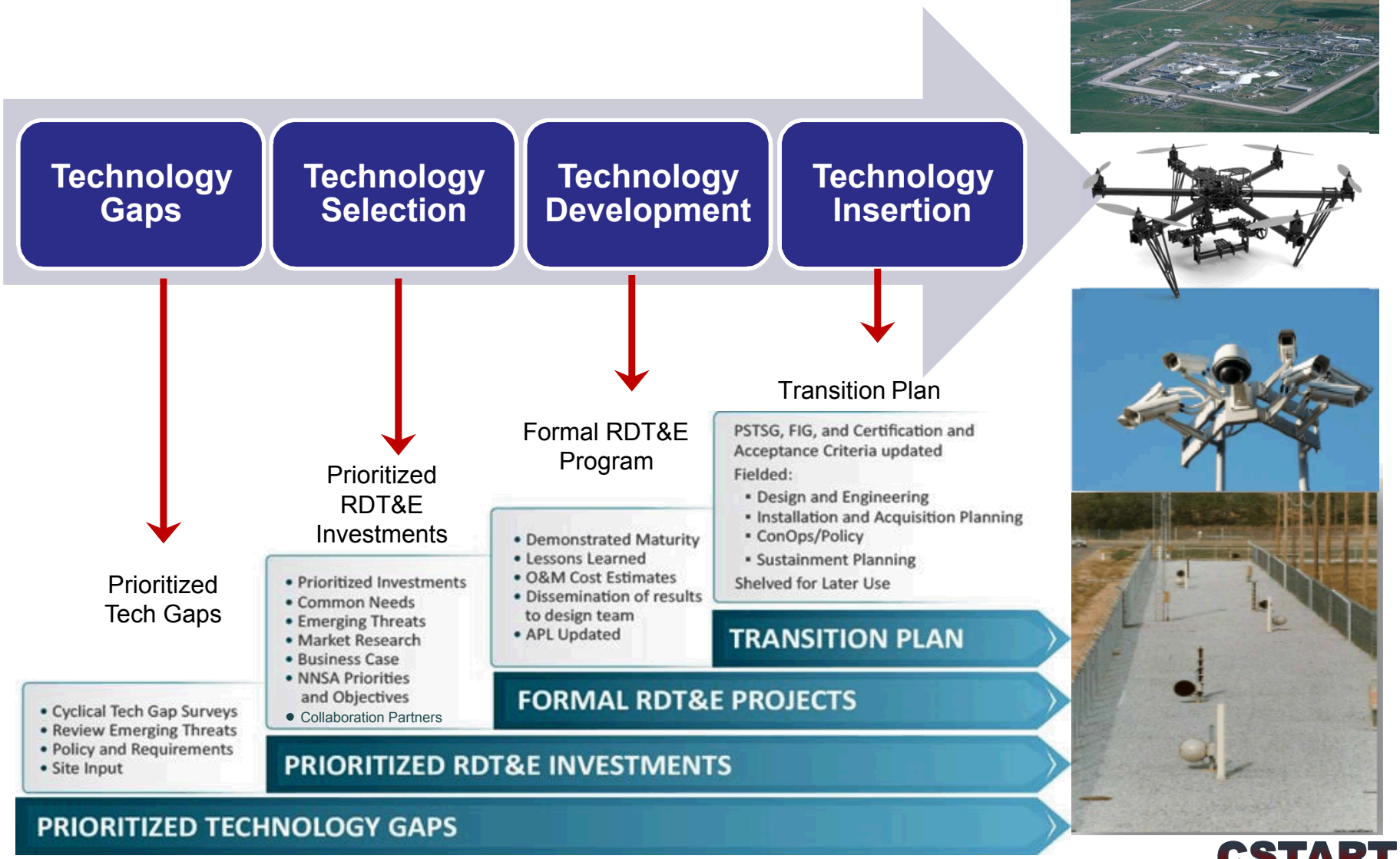
# Tech Development & Insertion Framework



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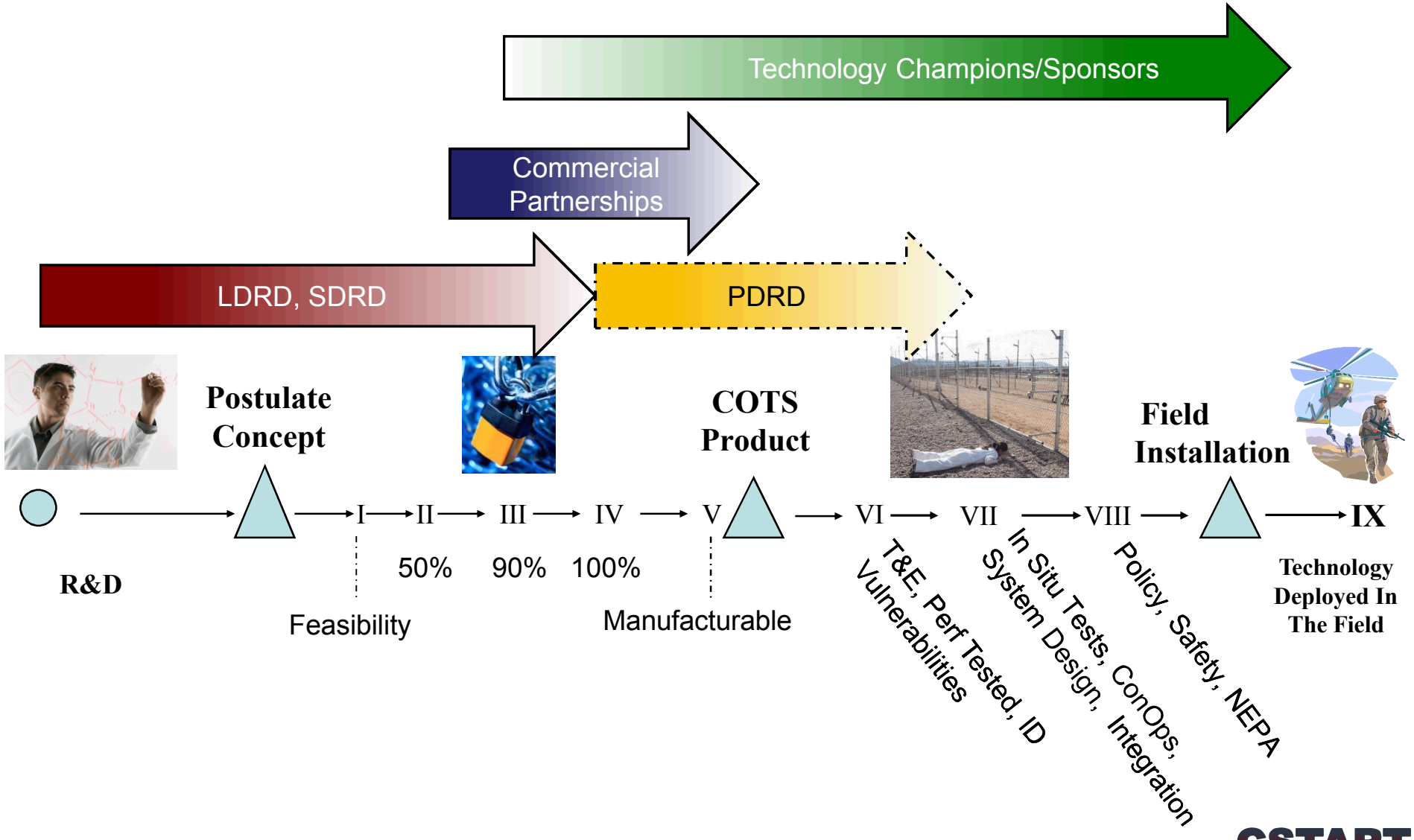
# Technology Maturity Model



# Agenda: Technology Days

**March 22, 2016**

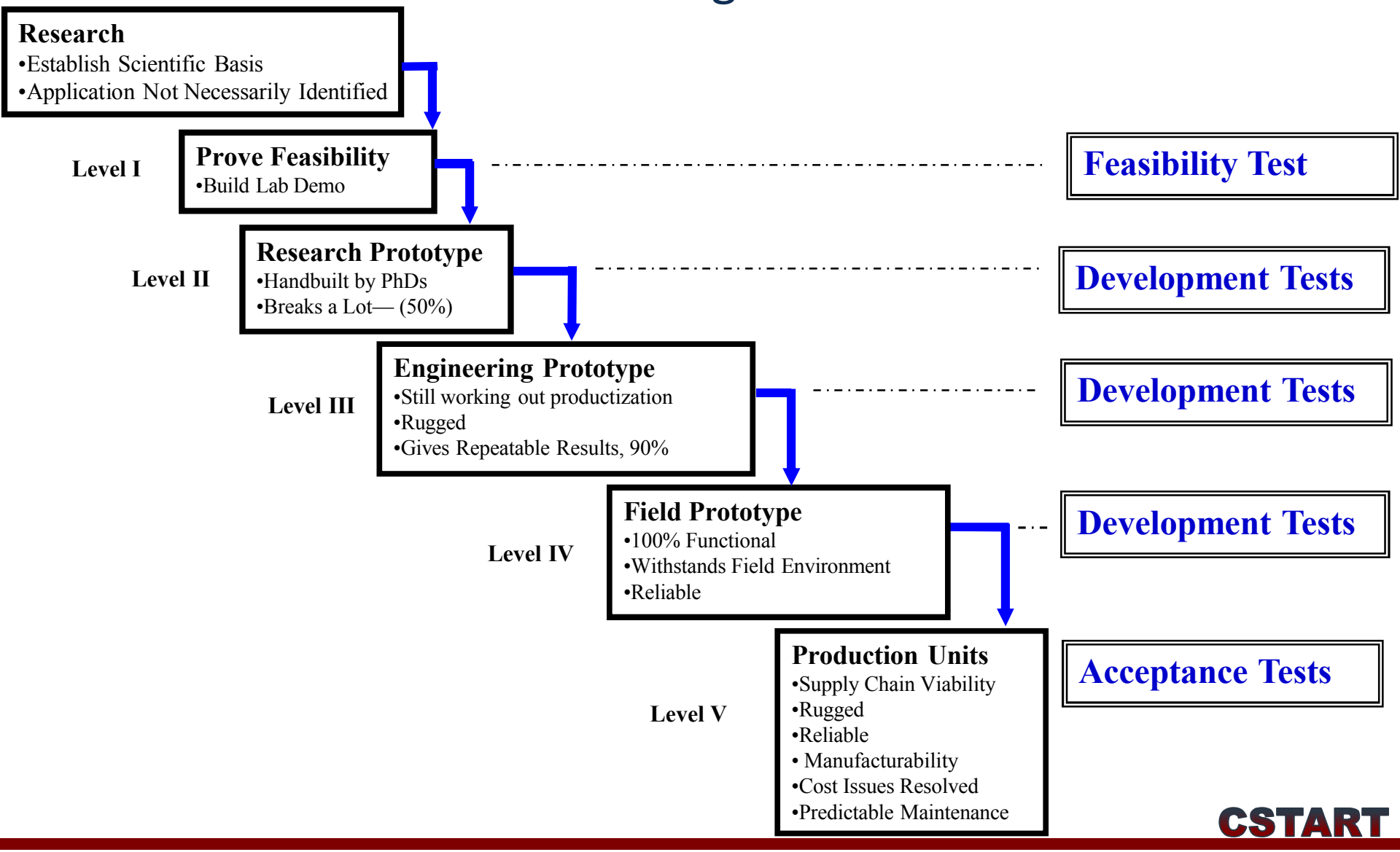
- Human/Machine Interface
  - Command Intent on the Future Battlefield: One to Many Unmanned Systems
  - Multi-Target Camera Tracking
- Analysis Tools
  - Complex systems Approach for Resilient Multi-Layered Security Systems
  - Cyber-Enabled Physical Attack Scenarios
  - Simulations of Large-Scale Wireless Networks
  - RF Enabled Cyber/Modeling Wireless Networked Info Systems.
- Addressing Emerging Threats
  - Airborne Defense against Small UAS Threat
  - Explosive or Shot Detection
  - DEMO: Counter Unmanned Aerial System
  - DEMO: Remotely Operated Weapons
- Emerging Technologies
  - CyberLock Testing & Evaluation
  - Improved Analytics for Dynamic 3D Security Systems
  - Ultra Wide Band Sensor System
  - Less than Lethal
  - DEMO: Red, Green, Blue and Depth for Biometrics

**March 23, 2016**

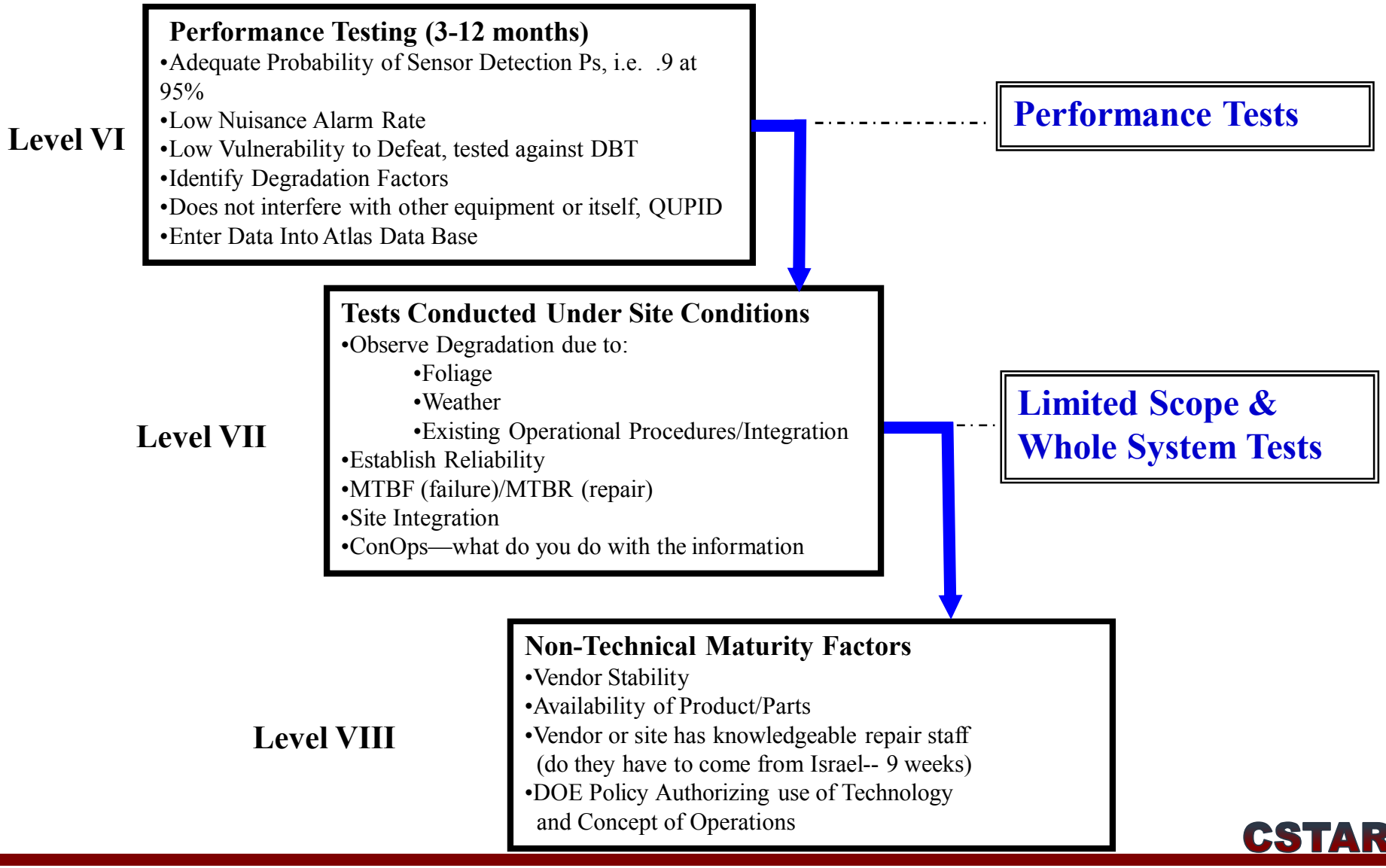
- Emerging Technologies (cont.)
  - Video Motion Detection Fused Radar
  - Polarity for Extended Persistence and Range in Fog
  - SPAWARS Project
- Infrastructure and Communications
  - Compressive Optical Un-clonable Function for Security Comms
  - Government LTE Wireless Network
  - Jam-Proof Wireless Communications
  - DEMO: Tactical Wireless Data Network
- Technology Review & Scoring
- Next Steps
- Final Comments & Feedback

Questions?

# Emerging Security Technologies and Associated Maturity Level Progression



# Emerging Security Technologies and Associated Maturity Level Progression



# Emerging Security Technologies and Associated Maturity Level Progression

**Level IX**

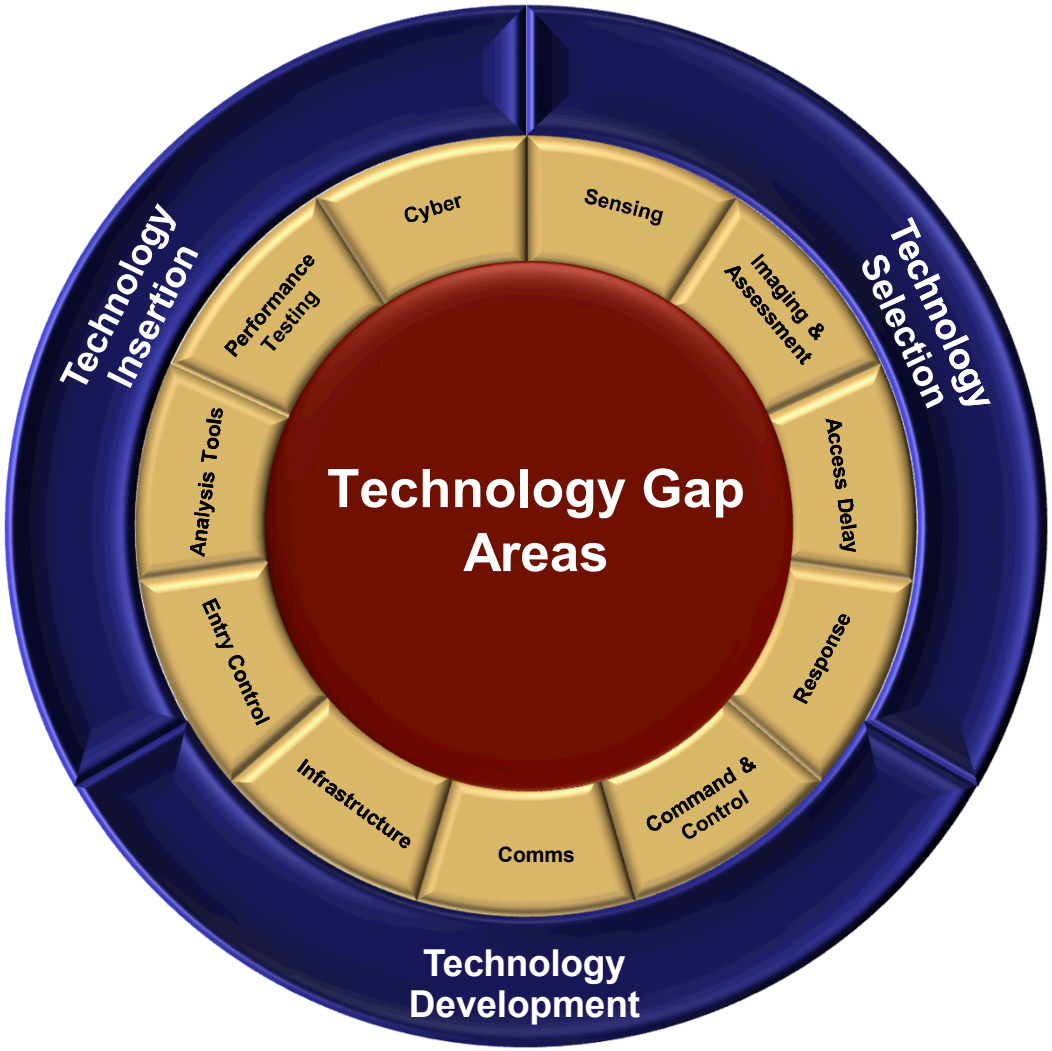
**Technology Deployed In The Field**

- Reliable
- Sustainable
- Improves Security System Effectiveness
- Operators Trust Performance
- Successful Audits
- Cost Effective

**Limited Scope & Whole System Tests**

**3'rd Party Evaluation Audits**
**Force on Force Simulations**

**Operability Tests**


Technology Insertion
Technology Selection
Technology Development
Technology Gap Areas
Cyber
Sensing
Imaging & Assessment
Access Delay
Response
Command & Control
Comms
Infrastructure
Entry Control
Analysis Tools
Performance Testing