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Institute for Critical
Infrastructure Technology

The Cybersecurity Think Tank



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Federal Cybersecurity Research and Development Strategic Plan

Ensuring Prosperity and National Security

February 2016

I'm confident we can unleash the full potential of American innovation, and ensure our prosperity and security online for the generations to come.

President Obama
February 9, 2016

Cybersecurity National Action Plan

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Federal Cybersecurity R&D Strategic Plan

- Requested by Congress
- Expands the 2011 plan, *Trustworthy Cyberspace*
- Interagency writing group within NITRD
- Community input via an NSF and DHS S&T
- Released in February as part of CNAP



The Need for Cybersecurity R&D

- Cyberspace provides major benefits
- Advances in cybersecurity are urgently needed
- Cybersecurity accelerates innovation



Cybersecurity Assumptions

- Adversaries will perform malicious cyber activities
- Defenders must thwart malicious cyber activities
- Users will circumvent cybersecurity practices
- Technology cross-connects the physical and cyber



Fundamental R&D Challenge in Cybersecurity

Make cybersecurity less onerous
while providing more-effective defenses

Evidence of Efficacy and Efficiency



Federal Cybersecurity R&D Goals

- Near-term, S&T for **effective and efficient risk management**
- Mid-term S&T for **sustainably secure systems development and operation**
- Long-term S&T for **effective and efficient defensive deterrence**



Cybersecurity Defensive Elements

- **Deter**

Efficiently discourage malicious cyber activities

- **Protect**

“Systems” efficiently resist malicious cyber activities

- **Detect**

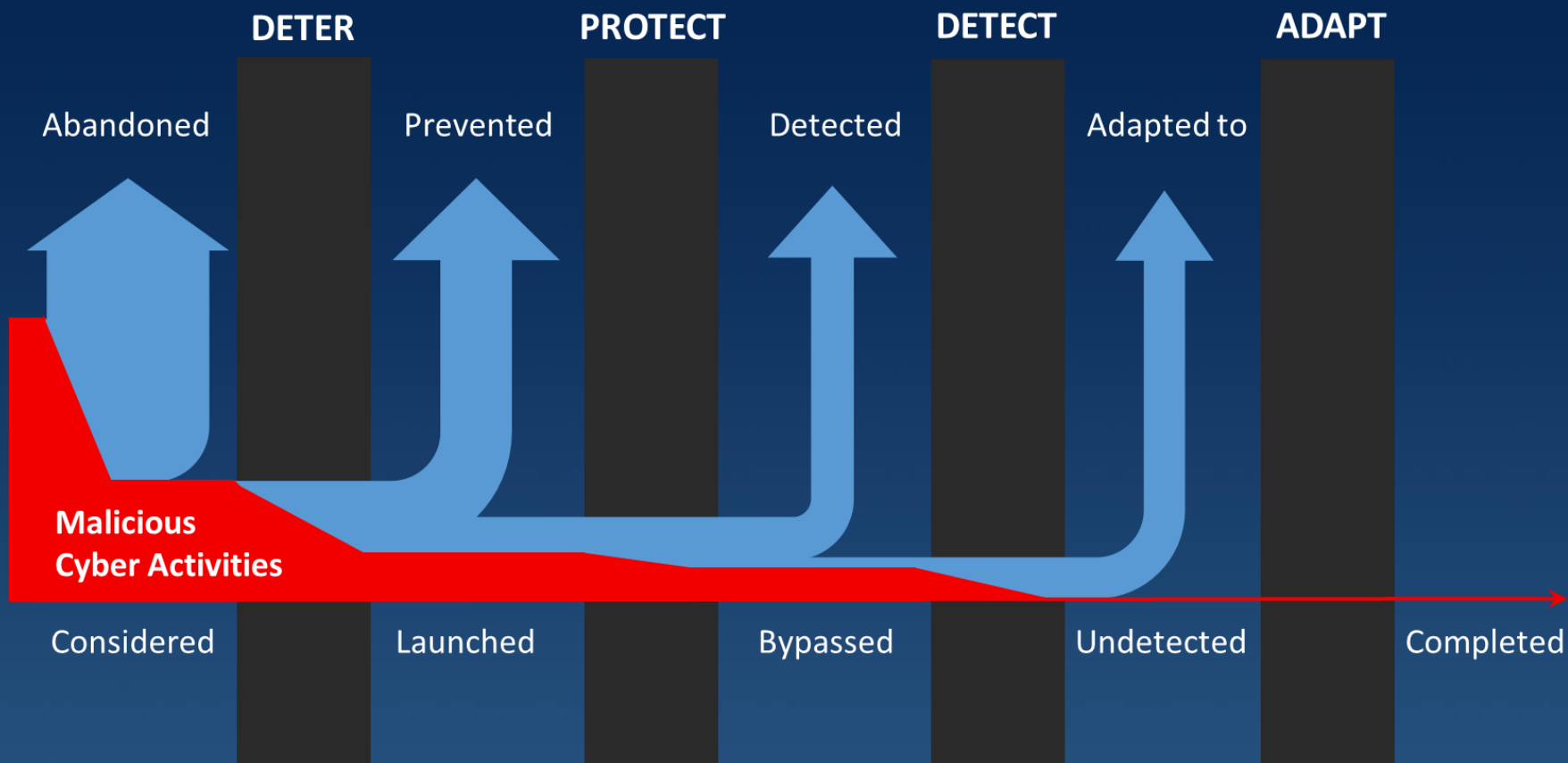
Efficiently detect and anticipate adversary actions

- **Adapt**

“Systems” adapt to malicious cyber activities



Federal Cybersecurity R&D Strategic Plan



Continuously strengthening defensive elements improves success in thwarting malicious cyber activities

(Figure 1. in the 2016 Federal Cybersecurity Research and Development Plan)



R&D Objectives for Defensive Elements

- Twenty-one objectives to measure progress
- Objectives are not comprehensive
- Two examples
 - Deter, near-term: Establish quantifiable **metrics of adversary level of effort** needed to overcome specific cybersecurity defenses
 - Protect, mid-term: Create tools for static and dynamic analysis that **reduce vulnerabilities by a factor of 10**



Cybersecurity for Emerging Technologies

- Context-based analysis for any technology
- Specific R&D priorities given for
 - Cyber-Physical Systems
 - Internet of Things
 - Cloud Computing
 - High Performance Computing
 - Autonomous Systems
 - Mobile Devices



Critical Dependencies for Cybersecurity R&D

Success depends on advances in these areas:

- Scientific foundations
- Risk management
- Human aspects

- Transition to practice
- Workforce development
- Infrastructure for research



Plan Recommendations

1. Prioritize basic and long-term research
2. Broaden public-private participation in R&D
3. Accelerate evidence-validated R&D transition
4. Expand diversity of research expertise
5. Expand diversity in the workplace



What Does Success Look Like?

The cybersecurity research, development, and operations community will quickly design, develop, deploy, and operate effective new cybersecurity technologies and services.

Cybersecurity tasks for users will be few and easy to accomplish.

Many adversaries will be deterred from launching malicious cyber activities, and those that choose to proceed will fail or fail to impact users or organization's mission.



Commission on Enhancing National Cybersecurity

Make detailed recommendations to strengthen cybersecurity in both the public and private sectors

- Develop recommendations regarding: (iii) further investments in research and development initiatives that can enhance cybersecurity



Information Available On-line

- **Federal Cybersecurity Research and Development Strategic Plan**

https://www.whitehouse.gov/sites/whitehouse.gov/files/documents/2016_Federal_Cybersecurity_Research_and_Development_Strategic_Plan.pdf

- **National Challenges and Goals for Cybersecurity Science and Technology**

<https://www.whitehouse.gov/blog/2016/02/08/national-challenges-and-goals-cybersecurity-science-and-technology>

- **Cybersecurity National Action Plan**

<https://www.whitehouse.gov/the-press-office/2016/02/09/fact-sheet-cybersecurity-national-action-plan>

- **Commission on Enhancing National Cybersecurity**

<https://www.whitehouse.gov/the-press-office/2016/02/09/executive-order-commission-enhancing-national-cybersecurity>



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