National CISR R&D Plan

Advancing the National CISR R&D Priority Areas through Stakeholder Collaboration

Homeland Security
Science and Technology

Erin Walsh, Ph.D.

Program Manager, Homeland Security Advanced Research Projects Agency

Science & Technology Directorate

Background

- Presidential Policy Directive (PPD) 21 directed DHS to coordinate with OSTP and other Federal departments and agencies to develop a National CISR R&D Plan "*that takes into account the evolving threat landscape, annual metrics, and other relevant information to identify priorities and guide R&D requirements and investments*."

- DHS led the development of the Plan, through a collaborative two-year process involving stakeholders from across the critical infrastructure community.

- The National CISR R&D Priority Areas represent the core of the Plan.

Development of Priority Areas

- During Plan development, DHS facilitated a workshop involving government and private sector stakeholders.
- Workshop discussions focused on grand-scale R&D challenges as a way to identify the R&D priorities called for in PPD-21.
- Five overarching topics emerged that represent the National CISR R&D Priority Areas.
- The Priority Areas are intended to inform R&D investments, promote innovation, and guide research across the CISR community.

National CISR R&D Priority Areas

A. Develop the **foundational understanding** of critical infrastructure **systems and systems dynamics**;

B. Develop **integrated and scalable risk assessment and management** approaches;

C. Develop **integrated and proactive capabilities, technologies, and methods** to support secure and resilient infrastructure;

D. Harness the power of data sciences to create **unified, integrated situational awareness** and to understand consequences of action;

E. Build a crosscutting culture of **CISR R&D collaboration**.

CISR R&D Priority Area A

Foundational Systems Understanding

A.1. Develop a foundational understanding of CI systems, systems dynamics, and the relationships underlying interdependencies and cascading effects (including strategic, national-level effects)

- Develop avenues of foundational science research, including structural / dynamic attributes, effects of human factors, and linkages to natural systems, to support enhanced security, resilience, and continuity of operations.
- Develop a R&D roadmap for acquiring an integrated understanding of infrastructure systems— technological, physical, and natural—to include interdependencies and cascading effects.

CISR R&D Priority Area B

Integrated and Scalable Risk Assessment and Management

B.1. Develop and field integrated risk assessment methodologies across the critical infrastructure community

- Develop an integrated system-of-systems approach to risk assessment and risk management to include external/cross-domain factors and characteristics.

B.2. Develop the technical basis and analytical tools needed to incorporate dependencies and interdependencies into risk assessment and risk management methodologies

- Identify and characterize dependency and interdependency dynamics for inclusion in risk assessment methodologies, appropriate to scale.

CISR R&D Priority Area B, cont.

Integrated and Scalable Risk Assessment and Management

B.3. Develop and disseminate best practices and methodologies for risk assessment and risk management

- Develop methods to link essential community functions to the critical infrastructure systems that provide enabling services to build a systems understanding of community-wide functions that supports prospective risk management and response strategies.

CISR R&D Priority Area C

Integrated and Proactive Capabilities for CISR

C.1. Characterize the predictive and proactive capabilities needed to forecast and prepare for threats and hazards

- Leverage advances in sensor technologies, data sciences, and analytics to develop improved all-hazard predictive capabilities for cyber & physical systems.

C.2. Identify policies, governance structures, and regulations that support and enable timely and responsive actions

- Develop standards of practice to harmonize existing policies, regulations, and codes and standards to enhance community resilience.

CISR R&D Priority Area C, cont.

Integrated and Proactive Capabilities for CISR

C.3. Develop capabilities to identify and rapidly integrate new technologies and respond to the evolving threat environment

- Leverage complexity sciences to characterize the challenges, implications, and opportunities presented by the increasingly distributed, complex, and richly connected critical infrastructure environment.

CISR R&D Priority Area D

Harness Data Sciences for Integrated Situational Awareness

D.1. Investigate the potential for increased situational awareness from data sciences and the increased use of sensor networks, augmented by networked intelligent systems and analysis

D.2. Develop the data sciences to support unified, integrated situational awareness

D.3. Develop modeling and analysis capabilities that properly characterize critical infrastructure systems and integrate cross-sector dynamics

CISR R&D Priority Area E

Culture of Collaboration

E.1. Encourage broad initiatives to develop a crosscutting culture of CISR R&D collaboration

- Encourage the development of training and education curricula focused on cross-disciplinary approaches that support system, organizational, domain, and cross-domain security and resilience.

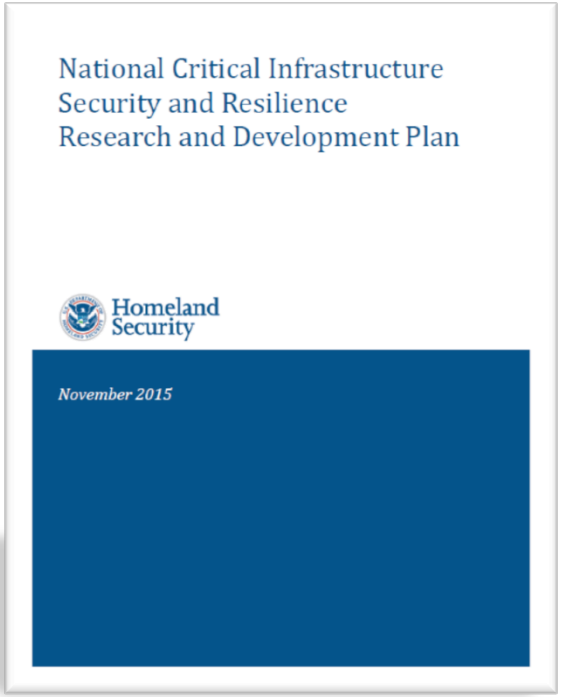
- Develop a crosscutting culture and skills to examine and communicate the operational complexity and interdependencies of critical infrastructure, through integrated multidisciplinary and interdisciplinary teams.

Advancing the R&D Priority Areas

- Requires active collaboration and information sharing across the broad critical infrastructure community, including academic and research institutions
- The following activities present opportunities for collaboration:
  - Documenting and sharing current R&D activities and their transition to use
  - Aligning sector R&D planning with the National CISR R&D Priority Areas
  - Coordinating the planning and execution of new and future R&D activities
  - Identifying barriers to implementation
  - Developing and implementing effective measures to demonstrate progress against the National CISR R&D Priority Areas

For More Information

- The Plan is available for download at: **www.dhs.gov/publications**
- Search “National Critical Infrastructure”
- **http://go.usa.gov/cVXhj**
- Questions?



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