

CISA | CYBERSECURITY AND INFRASTRUCTURE SECURITY AGENCY

DHS/CISA EMP ACTIVITY OVERVIEW

JUNE 12, 2019



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DHS/CISA Organization Around EMP & GMD

- DHS/CISA/NRMC established the EMP Coordinator position in February 2019. This position is responsible for:
 - Coordination & execution of DHS-internal EMP/GMD work
 - Leading technical interactions with the USG Interagency and industry
- DHS is currently responding to and coordinating work across three different strategies/orders
 - EMP Executive Order
 - National Space Weather Strategy
 - DHS EMP Strategy

There is overlap between these strategies/orders. DHS has put the effort under a single coordinator to leverage work across all three



Three EMP & GMD Strategies/Orders

- EMP Executive Order—EMP and GMD threats
 - Near-term focus on mitigation and incentives, component test data gaps and additional testing, and demonstration of mitigations
 - Several challenges arising from the sequencing of tasks
- National Space Weather Strategy (NSWS WG-1)—GMD threats
 - Mid-term to long-term focus on R&D to develop space weather forecasting and benchmarking and on infrastructure impact analysis
 - DHS developing work plan—presenting at July 10 SWORM meeting
- DHS EMP Strategy—EMP and GMD threats
 - Encompasses much of the EMP EO and NSWS
 - Additional emphasis on threat communication and response
 - Anticipate projects through DHS S&T



Purpose of the EMP EO

- EMP Executive Order signed on March 26, 2019
- *Section 1. Purpose. An electromagnetic pulse (EMP) has the potential to disrupt, degrade, and damage technology and critical infrastructure systems. Human-made or naturally occurring EMPs can affect large geographic areas, disrupting elements critical to the Nation's security and economic prosperity, and could adversely affect global commerce and stability. The Federal Government must foster sustainable, efficient, and cost-effective approaches to improving the Nation's resilience to the effects of EMPs.*

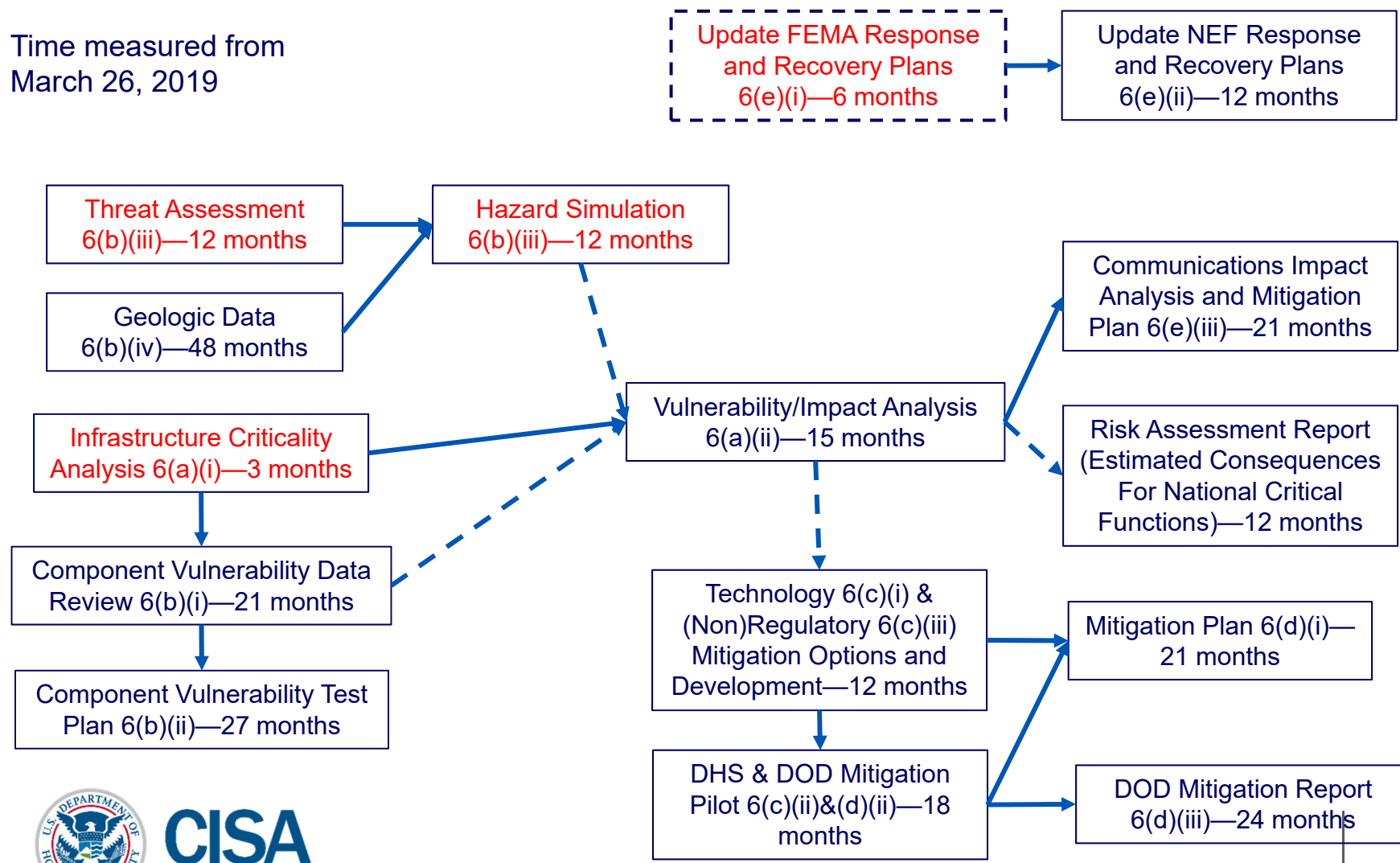


Principles of Analysis (For EMP or GMD)

- Use the best available science—Use physics and engineering constraints in analysis to avoid overestimation of risk
- Incorporate the engineered nature of the infrastructures systems—Impacts may already be mitigated by existing control systems, redundancy, backup, hardening, and restoration plans.
- Variable level of analysis sophistication—Each infrastructure has its own level of modeling/simulation maturity → Leverage what is currently available while prioritizing and funding R&D needs
- EMP is one of many threats—Develop best estimate of risk from EMP and GMD to place them in context of other infrastructure threats

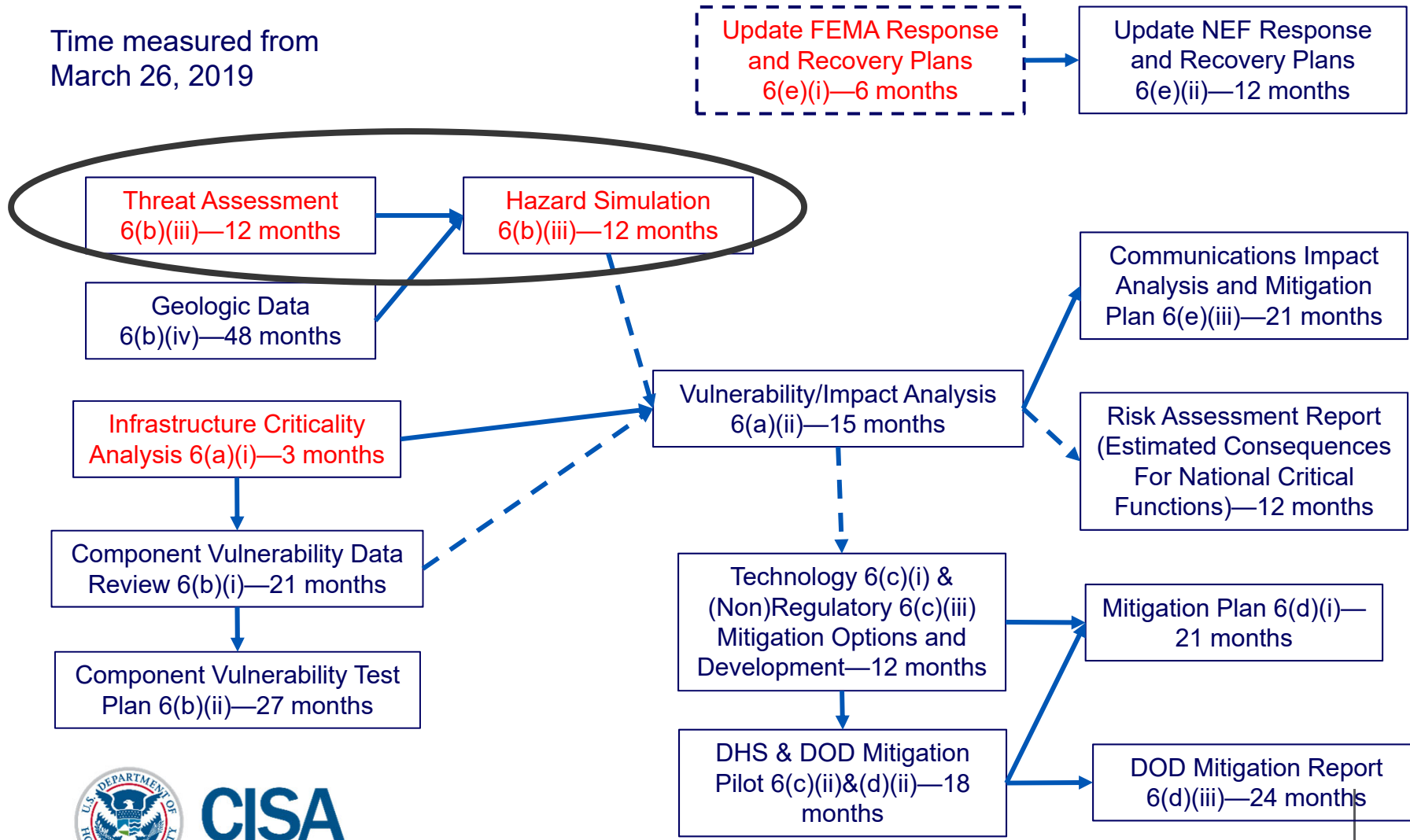
EMP EO Tasks—Timing Challenges

Time measured from
March 26, 2019



EMP EO Tasks—Threat and Hazard

Time measured from
March 26, 2019



Threat Assessment and Hazard Simulation

Section 6(b)(iii): Within 1 year of the date of this order, and as appropriate thereafter, the Secretary of Energy, in consultation with the heads of other agencies and the private sector, as appropriate, shall review existing standards for EMPs and develop or update, as necessary, quantitative benchmarks that sufficiently describe the physical characteristics of EMPs, including waveform and intensity, in a form that is useful to and can be shared with owners and operators of critical infrastructure.

- **EMP/E1 & EMP/E3: DOE, DTRA, US Nuclear Weapons Labs, and DHS are working together to develop a US government consensus around intelligence and science-based EMP threat and hazard fields**
- GMD: Coordinating with SWORM “Space Weather Benchmark Team” to leverage and adapt their work on Phase 1 Geo-Electric Benchmarks. Looking to collaborate with NERC on this.



EMP/E1 & E3 Fields—DHS Requirements

- One EMP waveform is not sufficient—We face threats from multiple actors and a range of nuclear weapon technologies
- We require:
 - EMP fields for several nuclear weapon technology levels
 - At each technology level—utilize the best weapon design data, weapon outputs, and EMP field simulation
- Benefits:
 - Estimate the potential impacts across the threat spectrum
 - Development of appropriate mitigations for each threat level
 - Enables the mapping of threat actors to technology levels as threat landscape evolves



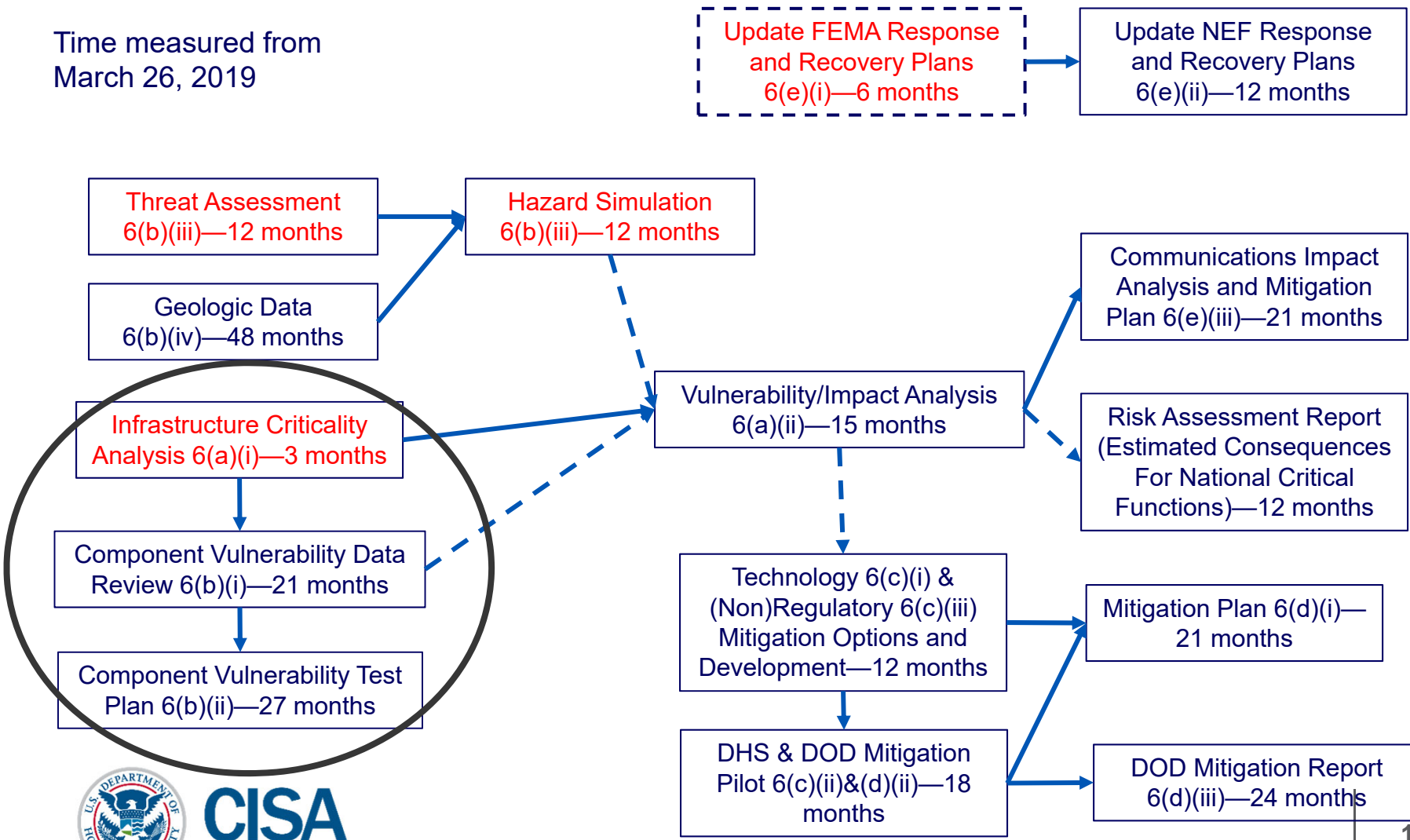
DOE Approach on EMP/E1 & E3 Waveforms

- Hold(ing) a series of classified EMP waveform workshops to develop US government consensus by identifying:
 - Consensus science and weapon design
 - Areas of disagreement that have a significant effect on waveforms, e.g., 10% or greater
- Leverage the science consensus to:
 - Generate a catalog of EMP waveforms at the S//RD level
 - Develop a well-characterized process to downgrade waveform classification → usable by industry
- Resolve areas of disagreement by nucleating a longer-term R&D projects on threat weapons and EMP



EMP EO Tasks—Infrastructure Assessment

Time measured from
March 26, 2019



Infrastructure Criticality Assessment

- Traditional DHS approach
 - Focus on singular asset or tight clusters of assets
 - Threshold for “critical” = significant national/regional impact is one asset or asset cluster is disrupted
- Shortcomings—especially for electric power system and EMP/GMD
 - Highly redundant infrastructure networks typically do not have singular assets
 - Does not recognize common-mode disruption of components that are replicated in redundant networks
 - Would not likely identify protective relays as “critical assets”



Infrastructure Criticality Assessment

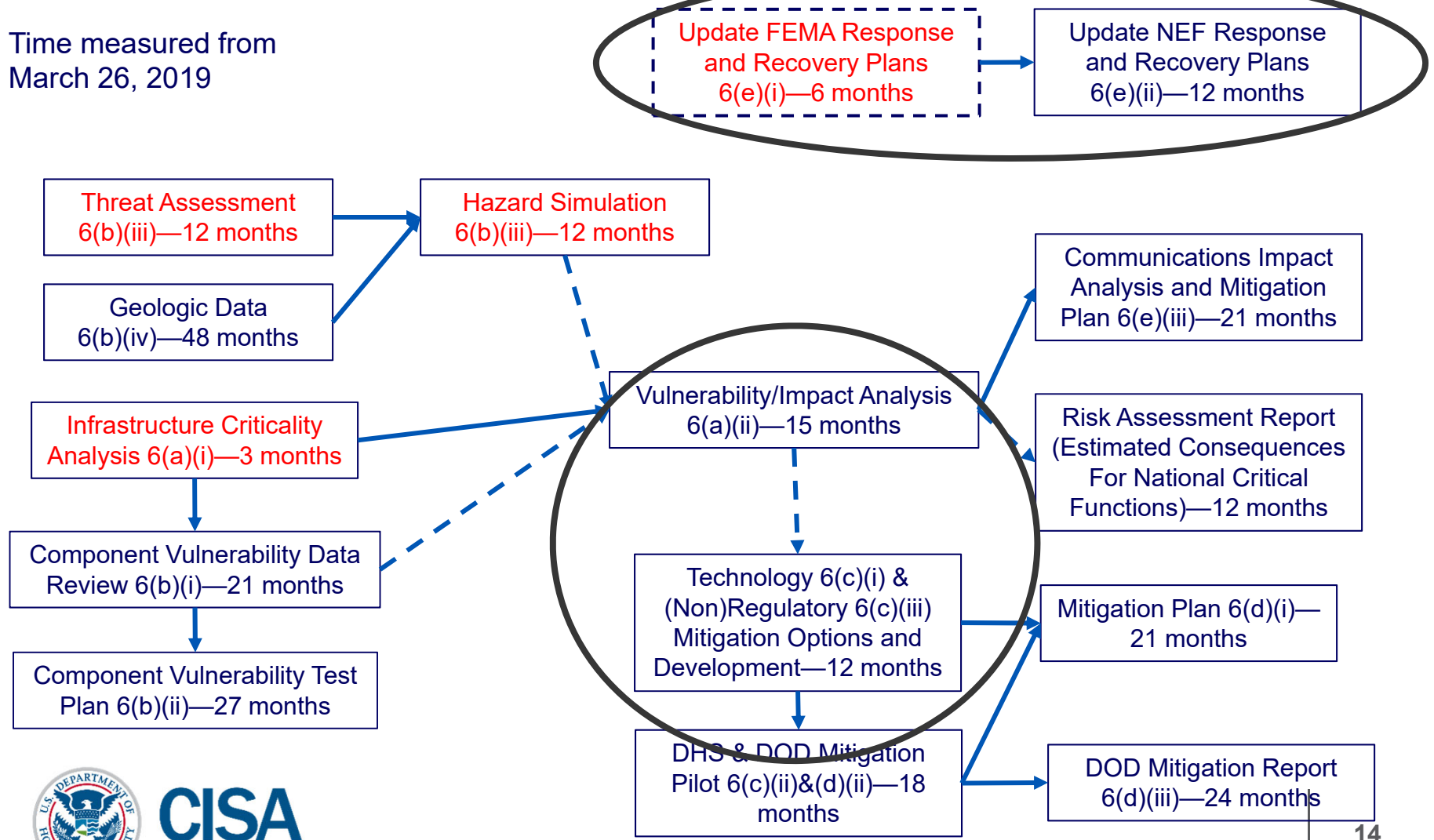
Extended DHS approach

- Retain the singular asset and asset cluster approach
- Identify specific national/regional-scale infrastructure networks that create significant impact if disrupted
- Identify local infrastructure networks with common architecture that are replicated nationwide—electrical distribution as a class
- Develop architectural description of region and local networks to identify critical components susceptible to common-mode disruption



EMP EO Tasks—Mitigations & Incentives

Time measured from
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Mitigations & Incentives—Technical Basis

- The EMP EO requires identification of mitigations and incentives prior to analysis of vulnerability and impact
- DHS and SSAs only option is to leverage existing impact studies to provide a technical basis.
- Impact studies must be:
 - Credible and scientifically sound
 - Consistent with the sectors' best practices for analysis
- Bulk electric system:
 - DHS/CISA and DOE are in-process of peer reviewing recent EMP/E1 and E3 impact studies from different entities
 - Recommendations expected at end of August





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For more information:
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