Sustainable Chemical and Material Risk Management

Protecting people, the environment, and the nation

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Patricia Underwood, PhD, DABT, MBA
Deputy for Chemical & Material Risk Management
Office of the Deputy Assistant Secretary of Defense
Environment

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Agenda

- **Introduction**
  - Sustainable Chemical and Material Management
- **Drivers for Action**
  - Environmental, Safety, and Occupational Health (ESOH) regulations and standards can create mission risk
- **Chemicals and Materials at Risk**
  - Hexavalent chromium
  - N-methylprrolidone
  - Per and poly fluorinated substances
- **Partnerships**

Environmental Sustainability in The Defense Context

DoD seeks to assure availability of chemicals and materials to enable equipment, weapon systems, and platforms that enhance war-fighter lethality.

Availability of vital chemicals & materials needed for production, performance, and sustainment of systems are increasingly at risk.

Assessing Mission Risks Associated with Chemical Regulation and Material Availability

- Identify emerging chemical and materials
- US and International ESOH science and regulations
  - Toxic Substances Control Act (TSCA)
  - European Union REACH
  - Safe Drinking Water Act (SDWA)
  - Clean Water Act (CWA)

- Assess material and materiel risks
- Characterize DoD and Defense Industrial Base Uses
  - Mission Critical Applications and supply chain
  - Identify vulnerabilities and need substitute chemicals or approaches
  - Alerts to DoD acquisition and O&M communities

- DOTMLPF* solutions
- Develop and apply RDT&E though:
  - Interagency engagement
  - Invest in alternatives
  - Sustainable Product Options
  - Sustainability Analysis and Lifecycle Costs

- PEOs / PMs
- Industry
- Services and components
- OSD

*Doctrine, Organization, Training, Materiel, Leadership, Personnel and Facilities

Mission-Critical Use

A mission-critical use is essential to operation and maintenance of a DoD weapon system. When a mission-critical system fails or is interrupted, DoD operations are significantly impacted.

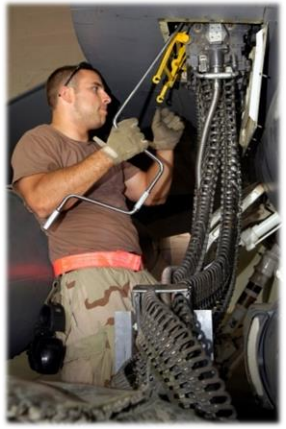
Disruption of mission-critical use results in a major adverse impact and the very real possibilities of loss of life, serious injury, and inability to execute the DoD mission.

- **Aircraft navigational system**
- **Products necessary to maintain landing gear**
- **Chemicals in missiles that are necessary to make them operate**

Assessing Risk to DoD as an Enterprise

Acquisitions / Research, Development, Testing, and Evaluation

Environment, Safety & Health

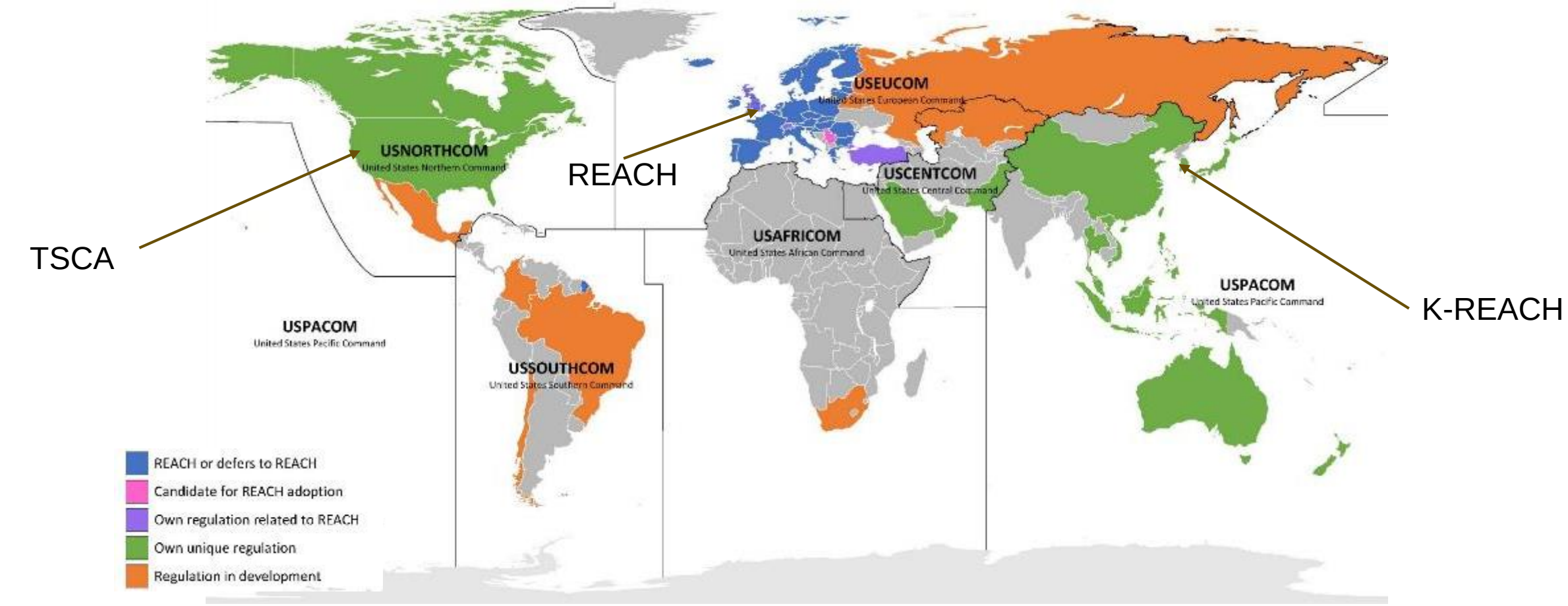


Production, Operation, Maintenance, and Disposal of Assets

Cleanup/Remediation

Training & Readiness

Expanding Global Chemical Regulations Footprint

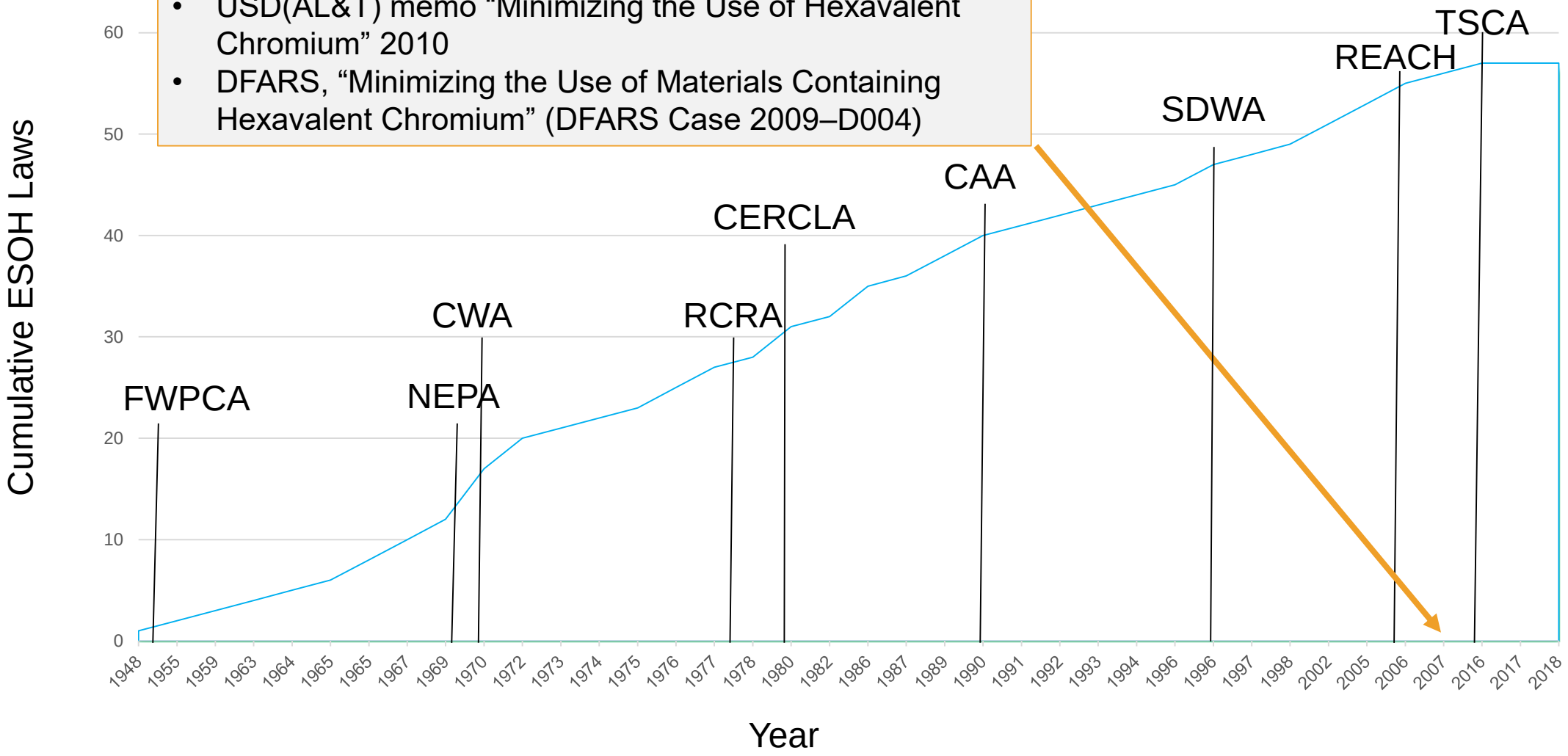


US environmental protection and occupational health regulations as well as other global regulations can limit DoD ability to operate and maintain weapon systems by restricting access to mission critical chemicals

TSCA – Toxic Substance Control Act (Domestic)
REACH – Registration, Evaluation, Authorisation and Restriction of Chemicals (international)

Increasing US ESOH Laws and Regulations Over Time

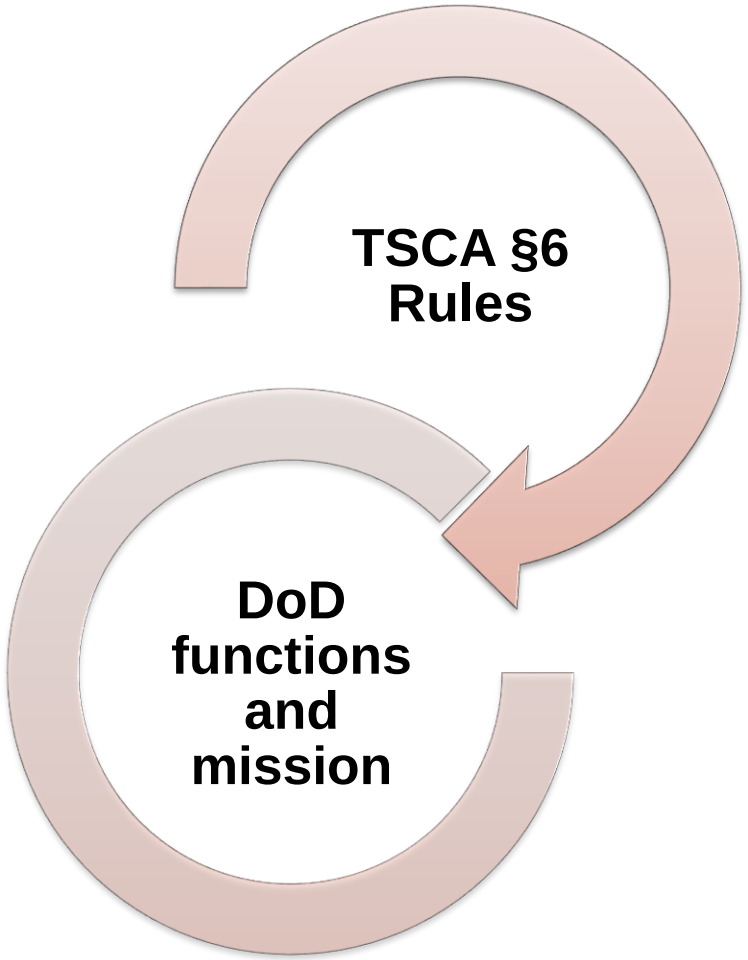
DoD Requirements
- USD(AL&T) memo “Minimizing the Use of Hexavalent Chromium” 2010
- DFARS, “Minimizing the Use of Materials Containing Hexavalent Chromium” (DFARS Case 2009–D004)



European Union REACH

- **Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) regulation (EC/1907/2006)**
  - Targets chemicals “placed into commerce” within EU
  - Came into force 1 June 2007
  - Phasing-in over time
- **Can restrict and, in some cases, ban the import, manufacture, sale, and use of specific chemical substances in EU marketplace**
- **Dynamic regulation: Annually, chemicals are evaluated/re-evaluated for regulatory action**
- **Certain REACH requirements also apply to “articles” sold in EU – complex finished products like cars, refrigerators, etc.**
- **Complexity in definition of “article”**
- **Complexity of classification, labeling, and packaging of hazmat/dangerous goods**

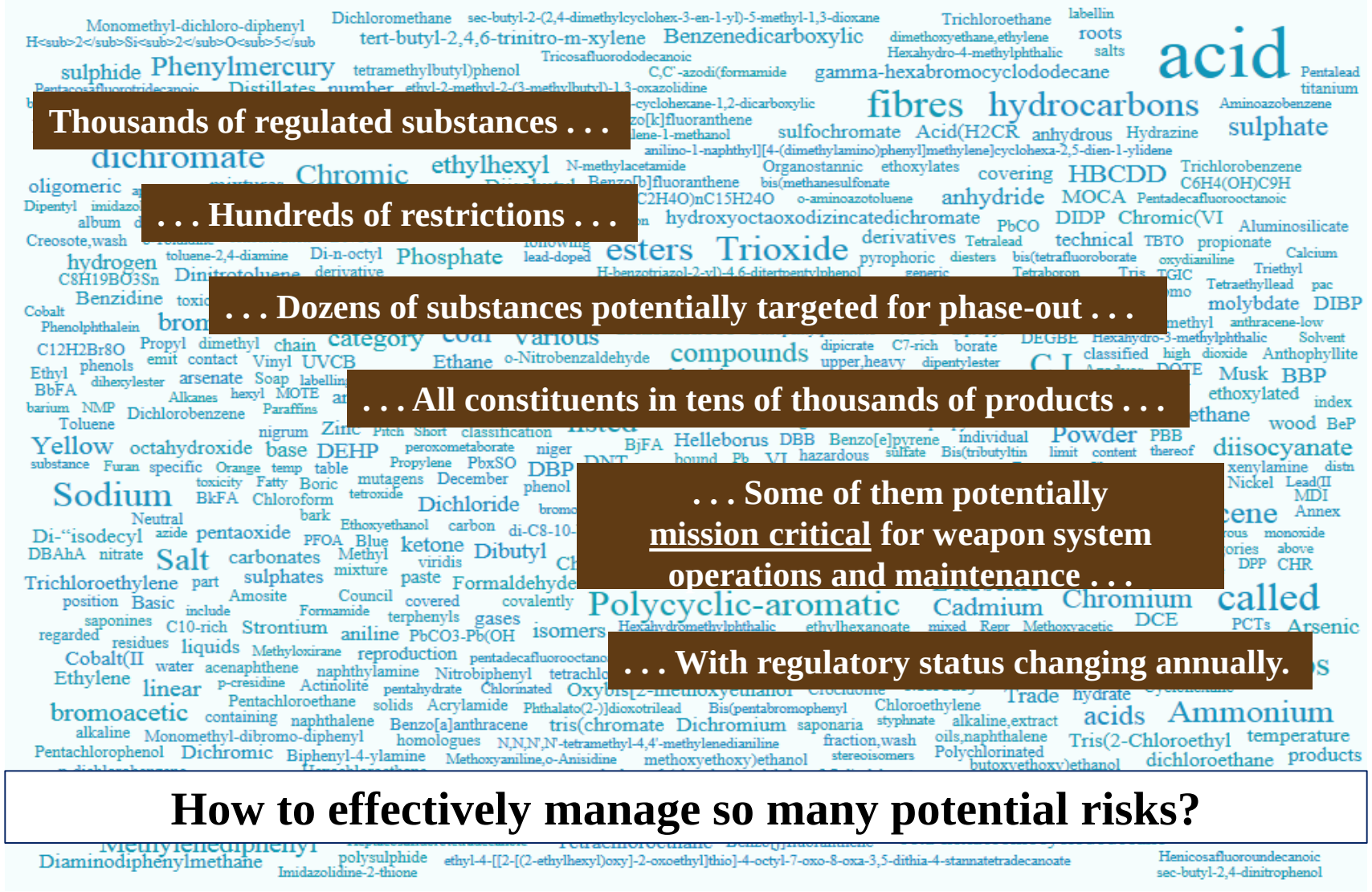
Impacts to DoD from TSCA §6 Rulemakings



- **EPA can apply one or more of the following risk management actions**
  - Ban on manufacturing, processing, distribution and commercial uses of the chemical
  - Restriction of specific chemical uses
  - Regulation of disposal methods
  - Labeling requirements
  - Recordkeeping requirements
  - Notification requirements

- EPA risk management actions can impact a number of DoD functional areas
  - Adversely impact mission critical functions associated with acquisition & logistics
  - Increased workload
    - Reviewing safety/risk assessments
    - Determining DoD functions/systems affected
    - Assessing availability of substitute chemicals and whether they can meet DoD performance specifications

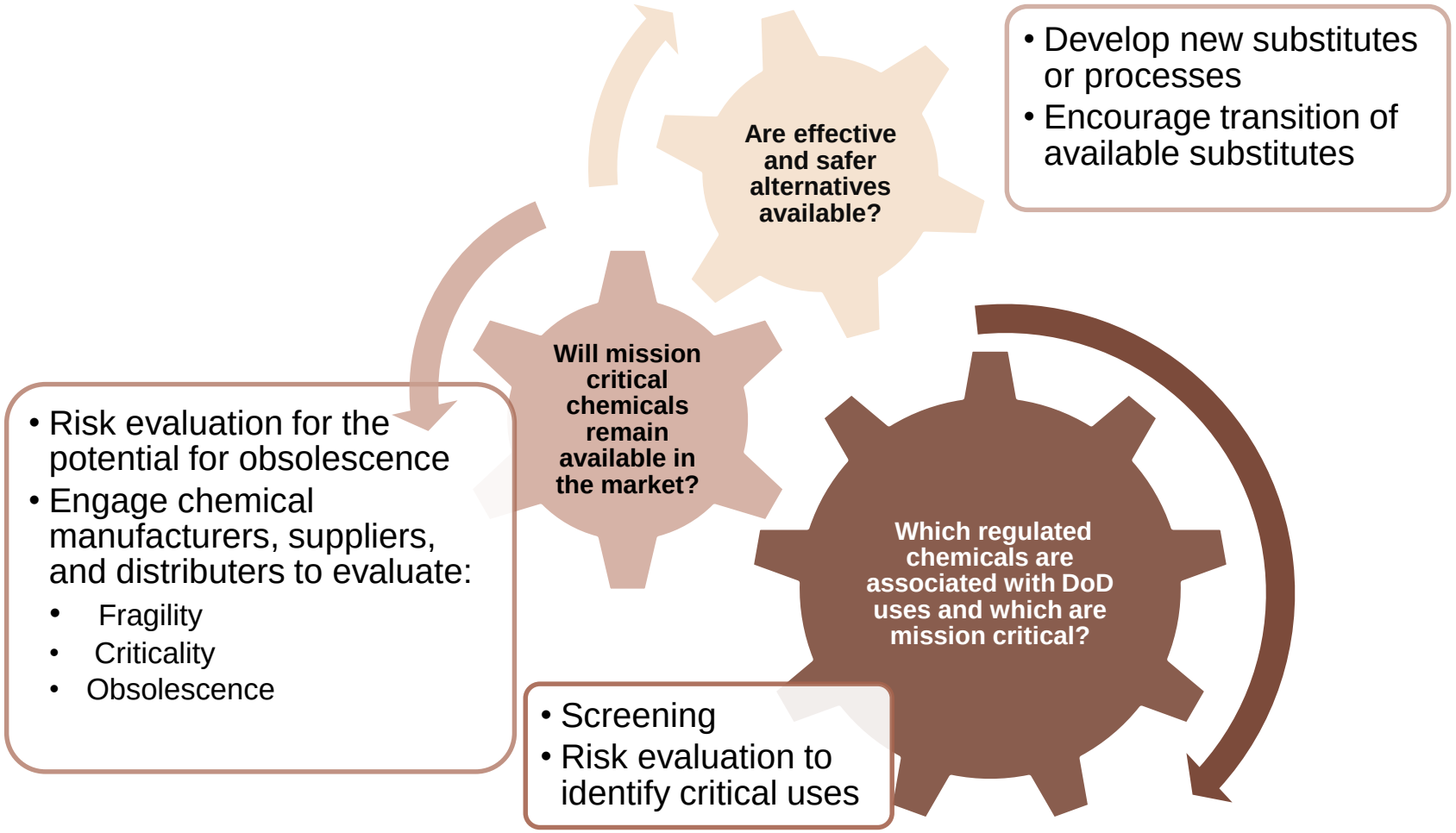
Global Chemical Regulations Present Risk Management Challenges



How to effectively manage so many potential risks?

Risk Identification and Mitigation

What are the mission risks and what do we do about them?



Regulatory Drivers and Chemicals of Interest to the Surface Finishing Segment

- **ACGIH – American Conference of Governmental and Industrial Hygienists**
  - Impacts on occupational exposure levels
  - Workers at depots and arsenals
- **TSCA – Toxic Substance Control Act**
  - Impacts on domestic Operations and Sustainment
  - 35 chemicals in current regulatory process
  - Did not identify chromium and compounds in the in the 20 chemicals in process as high priority for regulatory review – but the category remains on the work plan chemicals list
- **REACH – Registration, Evaluation, Authorisation and Restriction of Chemicals**
  - EU Operations and Sustainment
  - Transport
- **Clean Water Act**
  - NPDES Permitting/Industrial Wastewater Treatment Plant Discharge requirements

Substance	Regulation / Standard	Authorized Use
Chromium Trioxide	REACH, TSCA, ACGIH	Surface treatment in the aeronautics and aerospace industries; Functional chrome plating
Sodium Dichromate	REACH, TSCA, ACGIH	Surface treatment of metals such as aluminum, steel, zinc, magnesium, titanium, alloys, composites and sealing of anodic films
Strontium Chromate	REACH, TSCA, ACGIH	Application of paints, primers and specialty coatings in construction of aerospace and aeronautical parts, and for the maintenance of such constructions
N-Methylpyrrolidone (NMP)	TSCA REACH	Paint and coating removal, petrochemical processing, engineering plastics coatings, agricultural chemicals, electronic cleaning and industrial cleaning.
PFAS	CWA/CERCLA	Mist suppressants for chrome plating baths/Fire Fighter turn out gear

Strontium Chromate

Details of SME Review of Strontium Chromate

>96% used as field-level touch-up primer for aircraft and ground equipment

USAF actions underway to reduce risk

- Continuing AF-wide efforts to qualify and implement primer substitutes
- Work with program managers and chemical manufacturers to identify replacements for two sealants and one specialty coating

Mitigation planning hierarchy:

- Attempted to eliminate all field-level uses in Europe by 2019 *(not possible)*
- Therefore:
  - Minimizing variety of products, quantities, and usage locations
  - Referencing EU civil aviation authorizations: Civil aviation usage in Europe is same as USAF and USAF products are covered by authorization requests expected to be approved by ECHA, extending sunset by 5-7 years
  - Need to communicate approach with stakeholders and USAF personnel

N-Methylprrolidone (NMP)

- **Aerospace Products**
  - Chemicals are hard-to-replace elements of many aerospace products
  - NMP is used as solvent in hexavalent chromium-free aircraft conversion coatings from approximately 2005-2017
  - Restrictions on NMP could adversely impact chromium reduction efforts
  - Chemical is minor, but critical constituents in bonding primers, sealants, adhesives
- **TSCA Section 6 Rule Making**
  - Risk evaluations 2019
  - Rule Making 2020
  - Will EPA propose ban for some uses?
  - Will EPA propose national security exemption?

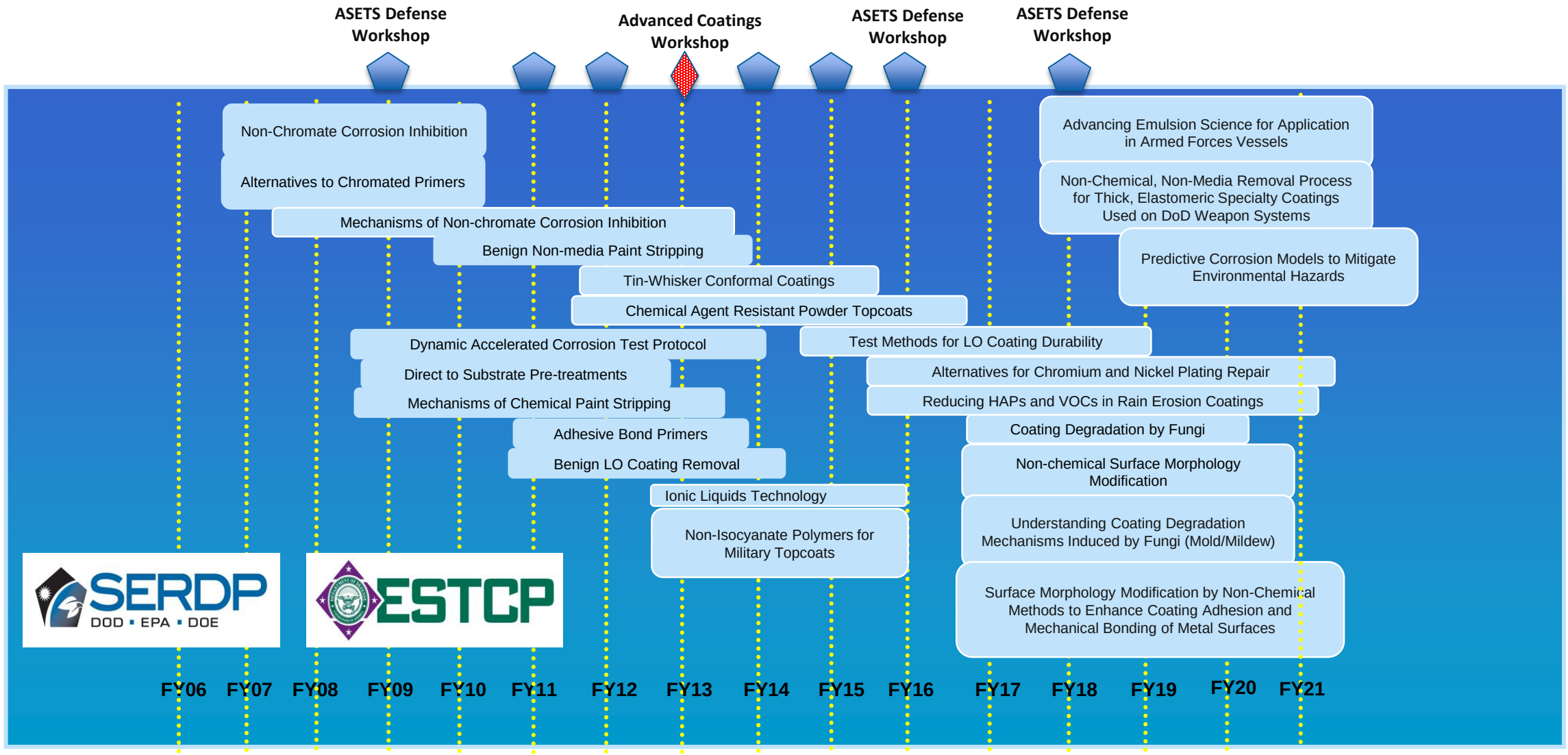
National Science Foundation / Water Environment Technology (WET) Center

- ❑ **EPA-Region 5, Michigan, other states beginning to inventory POTW influent/effluent for PFAS**
- ❑ **Finding numerous industrial sources of PFAS, both past and present facilities**
- ❑ **PFAS being added to NPDES permits**
- ❑ **POTWs going back "upstream" to limit PFAS via pretreatment limits where possible**
- ❑ **Many unknown sources of PFAS in influents**

❑ WET Center Project

- Investigate FOTW / POTW treatment options for PFAS
- GAC, Ion Exchange, and low-pressure reverse osmosis most proven, practical, controllable today
- Unique challenges for POTWs:
  - High flow rates; millions of gallons per day
  - Interference from dissolved solids, trace pharmaceuticals, other chemicals
  - Added treatment costs passed to the public

Surface Engineering Statements of Need



Building Partnerships

Collaborators Partners for Identification through Solutions

Services & Components

DLA DCMA AF Navy Army USMC

Commercial Industry and Industry Associations

AIA ACC API NDIA

NGOs and Universities

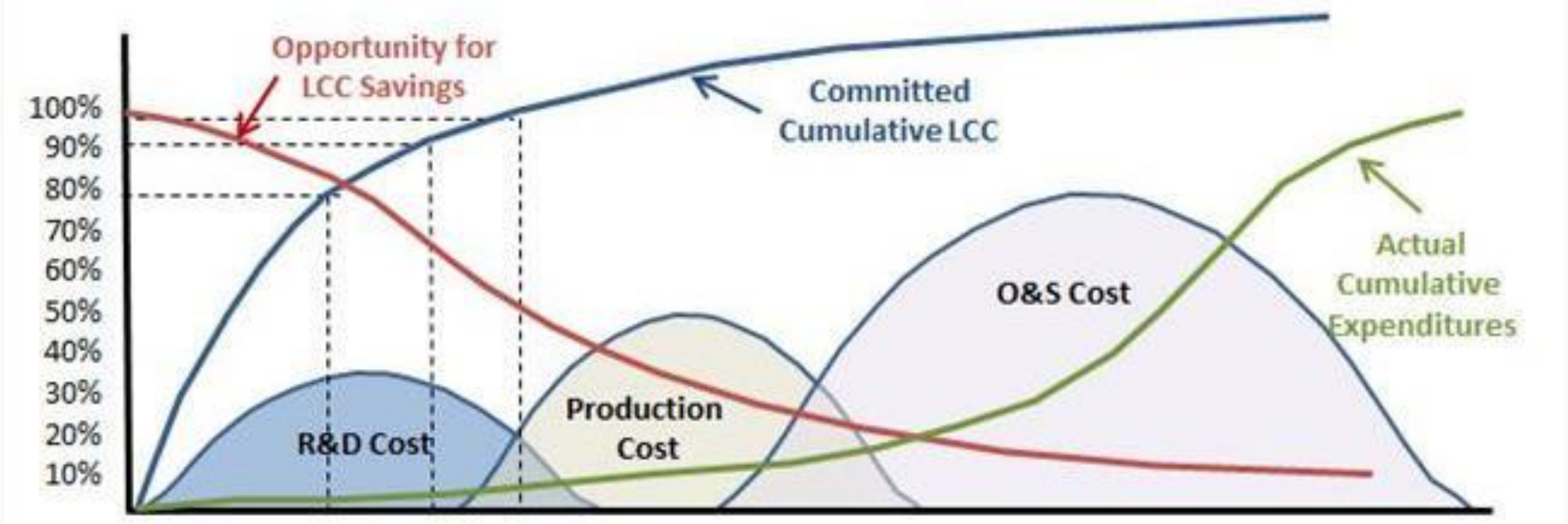
ACGIH Temple

Interagency

EPA NASA SBA GSA

❑ Backup Slides

Understand Life Cycle Cost Better & Earlier



- 80-90% of LCC committed during research and development (R&D)
- 60%-80% of LCC incurred during operations and support (O&S)