Volatile Times and Evolving Opportunities

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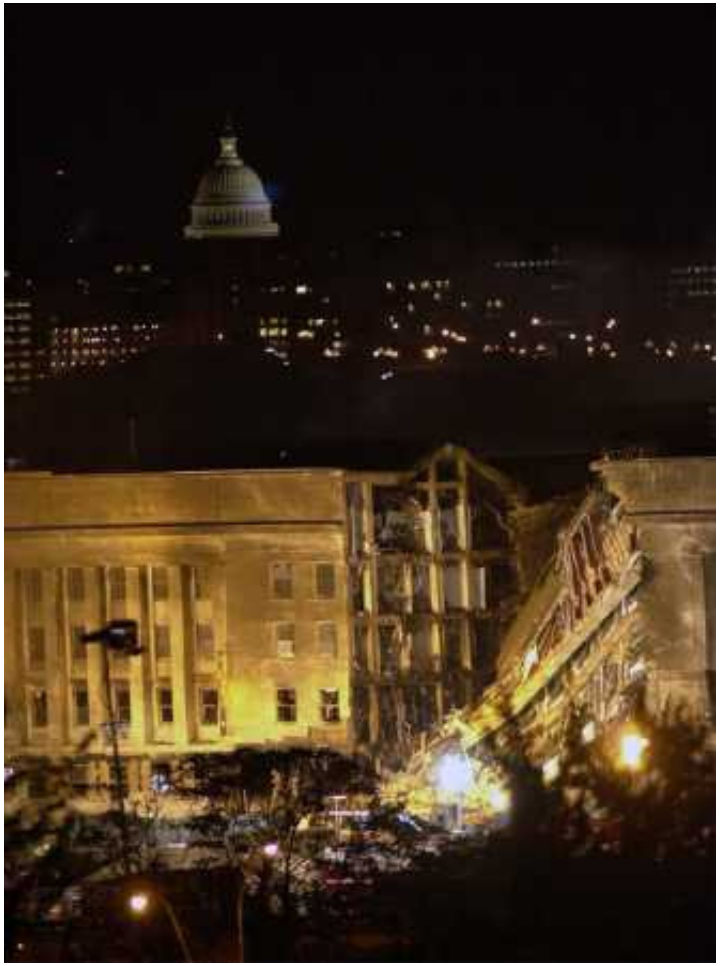
National Security Threats

- Current Conflicts
  - GWOT
  - Iraq & Afghanistan
  - Cyber Warfare
  - Piracy at Sea
- Global Hot Spots
  - Iran
  - North Korea
  - Others . . .
- The Global Economy
- Energy Resources
- Counterfeit Parts
- Pandemic Disease



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DoD Warfighter Perspective

- We are in a long, global war – measured in years!
- Our adversaries:
  - Place little or no value on human life, including their own
  - Are skilled at rapidly adapting "just good enough" technology at very low cost
- IEDs are still a major threat
- Energy demands for today's equipment must be reduced
- Weapon reliability is crucial

"Need quality products on time"

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Defense Manufacturing Mandates

- Rapidly field the very best new equipment
- Upgrade & modernize existing systems
- Rapidly incorporate new technologies into new and fielded systems

While . . .

- Adjusting to changes in warfighter requirements
- Maintaining a Viable Defense Industrial Base
- Ensuring product affordability

NDIA's Role

- **Vision:** America's leading Defense Industry association promoting National Security
- **Mission:**
  - Advocate Technology for War-Fighter and First Responder
  - Promote Government - Industry National Security Team
  - Provide Information flow between Government and Industry
- **About Us:**
  - Work with industry, government, all military Services, and academia
  - Over 1,478* corporate members, 62,000* individual members, 52 Chapters, 32 Divisions

* 10/03/08

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NDIA Manufacturing Division White Paper: "Maintaining a Viable Defense Industrial Base"

1. Manufacturing Technology:
   - The U.S. must continue to develop and implement advanced manufacturing process technologies, enabling new capabilities and greater productivity

2. Skilled Manufacturing Workforce:
   - The manufacturing workforce is aging and help is needed to attract, educate, and retain future generations of skilled workers

3. DoD Supply Chain:
   - Key technologies and components for increasingly complex weapon systems require new ways to communicate with an expanding global supply chain

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4. Modernizing Defense Manufacturing Facilities:
   - An Industrial Modernization Incentive Program (IMIP) for capital investments must be revisited to respond to changing global market conditions

5. Global Competition:
   - We must:
     a) Encourage U.S. companies to invest in manufacturing infrastructure
     b) Ensure all foreign companies that sell product in the U.S. or compete with U.S. firms are subject to the Foreign Corrupt Practices Act
     c) Promote foreign states to allow their currency to float

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6. Manufacturing and Local Economies:
   - Manufacturing employment needs to be revitalized to reverse the elimination of over 8 million jobs (36.3%) in the last 20 years
7. Environmental Protection:
   - The U.S. must monitor and influence the content of foreign and state environmental legislation, and provide investment for development of viable alternative, non-hazardous materials
   - Pb-free electronics require a focused government and industry response
   - Recycling of electronics is feeding Counterfeit trade
   - EU's "REACH" is growing! (**R**egistration, **E**valuation, **A**uthorization and Restriction of **CH**emicals)

Pb-Free Electronics – So What?

- Pb inhibits the growth of "tin whiskers"
  - Electrically conductive
  - Can metal vapor arc
- Pb-Free Solders
  - Less reliable in high shock & vibration environments
  - Have higher melting temps
  - Incompatibilities with SnPb Solder
  - Less repairable assemblies
- Configuration Control Nightmare!

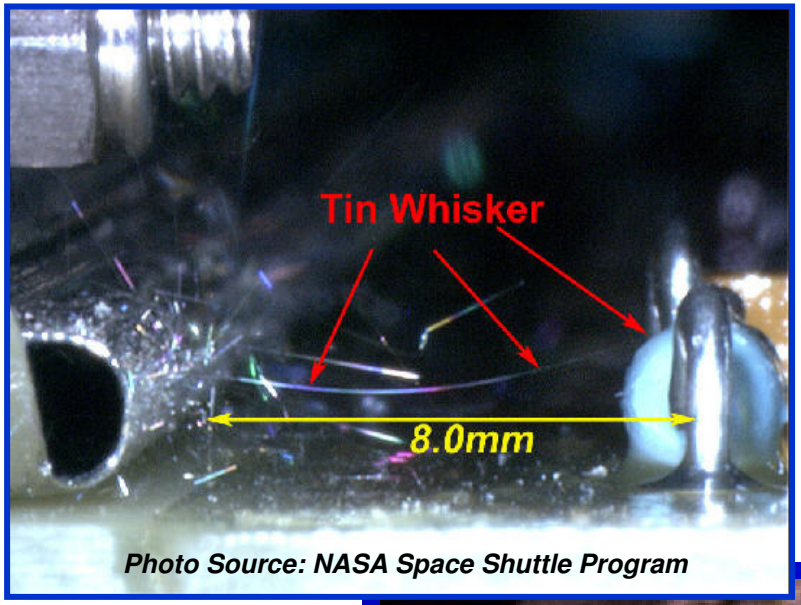
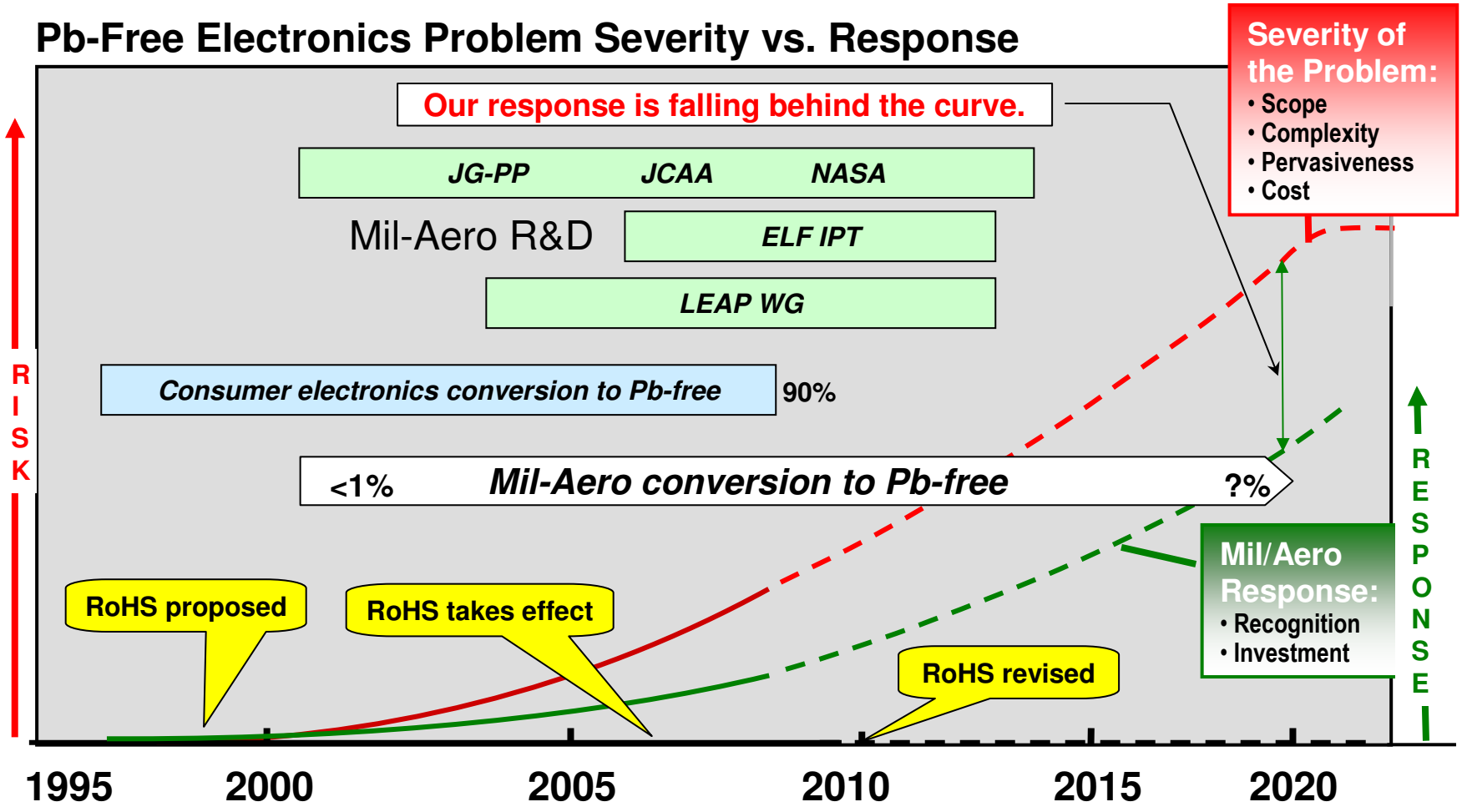


Photo Source: NASA Space Shuttle Program

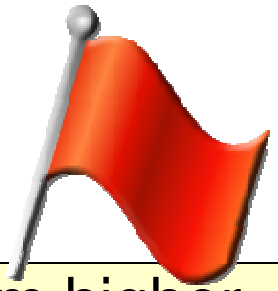

Electromagnetic Relay

Aerospace & Defense Response



Good progress has been made, but we need a more robust, coordinated National response

Counterfeit Parts



- Obsolescence and part scarcity are breeding ground for counterfeit parts
- Sophistication of counterfeiters growing… more capable and much harder to detect
- Milspec and Hi-Rel parts components are profitable targets
- Globalization of Supply Base increases opportunity for introduction of suspect parts into the A&D Supply chain

- Item coming from higher risk locations (China, Far East, Russia, etc.)
- Price too low / significantly different than history
- Scarce items are suddenly available
- Chain of ownership unverifiable
- No OEM certification

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NDIA Manufacturing Division 2009 Theme & Approach

"Advancing Defense Manufacturing for Affordability and Security"

Approach:

- Advocate the use of Manufacturing Readiness Levels and Assessments (MRLs & MRAs) throughout the DoD Acquisition community
- Promote the joint role of systems and manufacturing engineering to rapidly develop producible, affordable weapon systems
- Promote the development of manufacturing capabilities that enhance weapon system affordability and national security
- Foster the development of a DoD Supply Chain Network that consistently supports the ever-changing needs of the Defense community
- Provide a forum for focused attention on the actions required to ensure a viable defense manufacturing workforce
- Promote a total life cycle approach to product sustainment and sustainable manufacturing for environmental and economic stewardship

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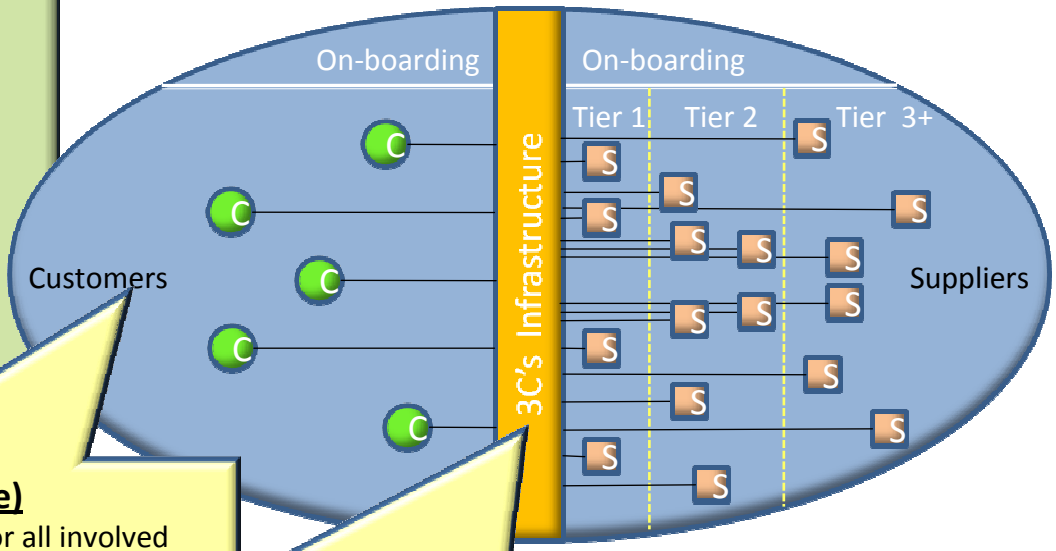
Network Centric Manufacturing

Network Centric Manufacturing (NCM)* is the rapid assembly and seamless coordination of dynamic supplier networks to accelerate production and reduce costs.

BENEFITS:

- Accelerated production
- Reduced cost
- Greater supplier network agility
- Suppliers in network are stronger
- Better collaboration drives innovation
- Reduced risk and obsolescence

Key NCM Components



Third-party Orchestrator (Blue)

1. Provide common, defined rules of governance for all involved
2. Onboard, train and facilitate activities for all parties
3. Ensure privacy as a neutral, unbiased orchestrator
4. Provide complete audit trail for all activities

Collaboration – Coordination – Communications

1. View/use files independent of original software (2D, 3D, etc.)
2. Provide complete security – protect intellectual property
3. Provide automated workflow between partner companies
4. Deliver visibility into manufacturing processes across suppliers
5. Manage regulatory compliance (ITAR, REACH, etc.)

*Also referred to as Global Collaborative Manufacturing (GCM)

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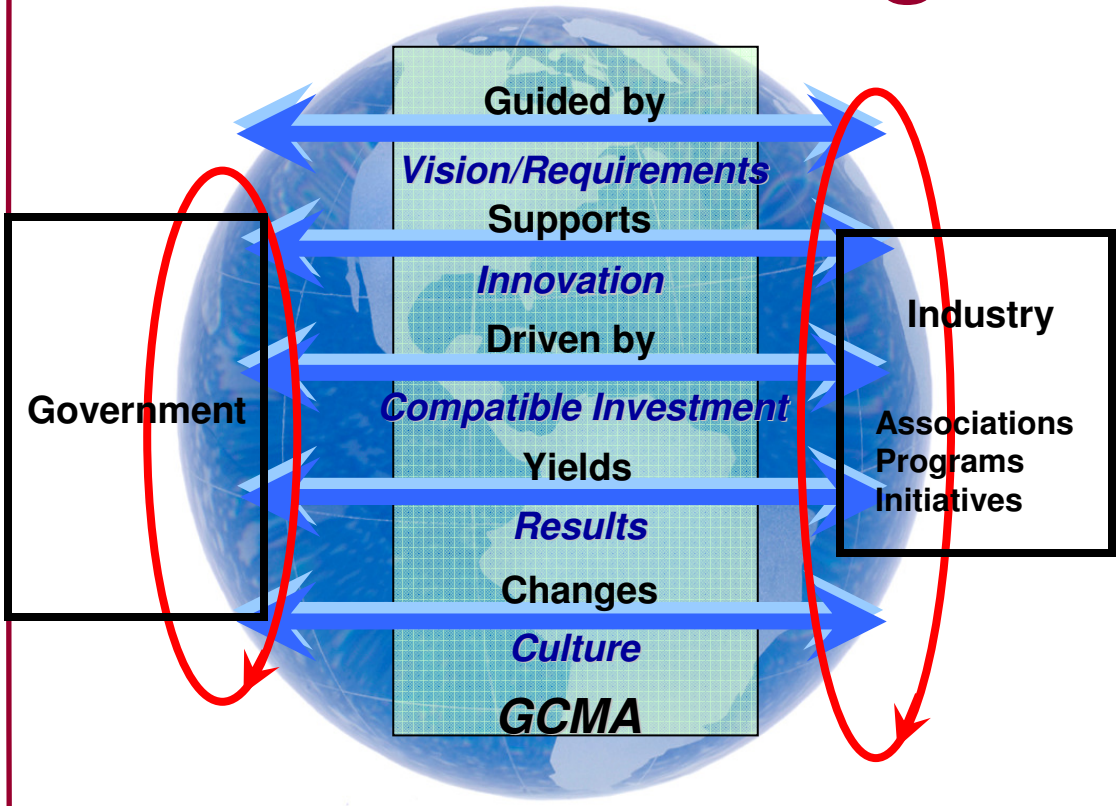
Global Collaborative Manufacturing Architecture



GCMA Vision:

An architecture that provides clear and cogent guidance for government and industry investment in manufacturing capabilities

Industrial Value Stream	Life-Cycle Phase					
	Establish Need	Refine Concept	Develop Technology	Develop & Demo System	Produce & Deploy	Operate & Support
End Items						
Air Craft						
Missiles/Space Vehicles						
Ships						
Ground Vehicles						
Weapons & Munitions						
Cross-cutting Items *(apply to multiple end-item categories)*						
Electronics						
Propulsion Systems						
Manufacturing Equipment						
Materials						
Energy Requirements						
Business Activities	Business Activities support all Phases and are a source of Value-Stream milestones, Government touch points, and Common Vocabulary (includes: Architecture Tools and Business Functions as deployed by the Business Enterprise Architecture (BEA), specifically; Acquisition, People, Material, and Financial Management.					

Goal: ***Facilitate the optimum translation of resources & practices from all levels of government and tiers of industry into Defense Industrial Base manufacturing capabilities***

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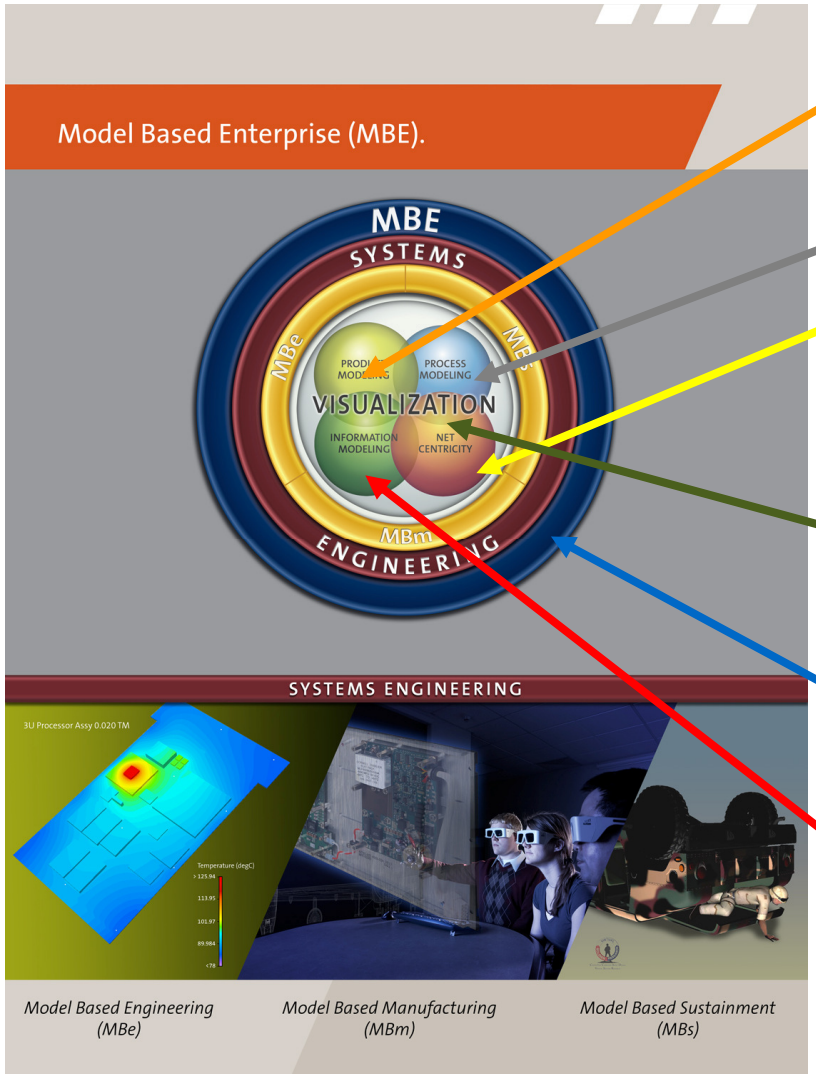
Model Based Enterprise (MBE)



Product modeling assesses end item performance against life cycle requirements

Process modeling assesses process related performance against life cycle requirements

Whether MBe, MBm or Mbs, Net Centricity ensures the availability of managed information at the right place and time, supporting multi functional decision making and execution across the extended enterprise

Improved effectiveness of the MBE is achieved through state of the art visualization

The wrapper around MBe, MBm and Mbs is Systems Engineering which manages and provides traceability of requirements throughout the life cycle

Information modeling incorporates standard formats to ensure interoperability of like and cross domain decision making tools and processes

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Manufacturing Readiness Levels

- MRLs fill the gap created by Technology Readiness Levels (TRLs)
  - TRLs are valuable measures of the maturity of a technology being developed from a design and performance perspective
  - MRLs give crucial insight into whether the manufacturing aspects of a new technology are maturing in sync with the design and performance
  - MRLs ultimately determine the implementation unit cost in DoD Weapon Systems
- MRLs level the playing field between design engineering & manufacturing engineering for program execution and funding priorities
  - Government and Contractor PMs expend resources in accordance with system acquisition requirements; anything more is “waste”
  - TRLs without MRLs sends a message that the manufacturing issues are secondary at best

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Closing Thoughts

- *Affordability is achievable, but at a cost – up-front MRL investment will pay dividends in production*
- *The rapid pace of commercial technology (COTS) growth is an asset and a liability to the defense community*
- *Maintaining a US edge in innovation requires investment in education & basic research*
- *Globalism is here, but it has costs & risks*
- *Volatility = Change = Opportunity*

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