Engineered Resilient Systems and Prototyping

Advancing Emerging Capabilities

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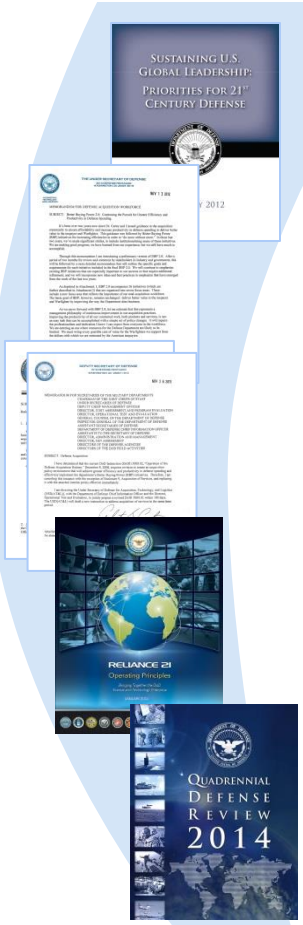
Strategic Guidance



Quest for agility, innovation, and affordability

"As we end today's wars and reshape our Armed Forces, we will ensure that our military is agile, flexible, and ready for the full range of contingencies."

"This country is at a strategic turning point after a decade of war and, therefore, we are shaping a Joint Force for the future that will be smaller and leaner, but will be agile, flexible, ready, and technologically advanced."

– Sustaining US Global Leadership: Priorities for the 21st Century Defense

"Achieving Dominant Capabilities through Technical Excellence and Innovation:

1. Achieve affordable programs;
2. Achieve dominant capabilities while controlling lifecycle costs;
3. Incentivize productivity in industry and Government;
4. Incentivize innovation in industry and Government;
5. Eliminate unproductive processes and bureaucracy;
6. Promote effective competition;
7. Improve tradecraft in acquisition of services; and
8. Improve the professionalism of the total acquisition workforce.

Continue strengthening our culture of: Cost Consciousness, Professionalism, and Technical Excellence"

– Better Buying Power 3.0

"The goal of Reliance 21 is to ensure that the DoD S&T community provides solutions and advice to the Department's senior-level decision makers, warfighters, Congress, and other stakeholders in the most effective and efficient manner possible. This is achieved through an ecosystem and infrastructure that enables information sharing, alignment of effort, coordination of priorities, and support for scientists and engineers across the Department."

– Reliance 21, January 2014

"When there is a strong threat-based or operationally driven need to field a capability solution in the shortest time, MDAs are authorized to implement streamlined procedures designed to accelerate acquisition system responsiveness. Statutory requirements will be complied with, unless waived in accordance with relevant provisions."

– Interim DoDI 5000.02, November 26, 2013

"Staying ahead of security challenges requires that we continue to innovate, not only in the technologies we develop, but in the way the U.S. forces operate. Innovation – within the Department and working with other U.S. departments and agencies and with international partners – will be center stage as we adapt to meet future challenges."

– Quadrennial Defense Review 2014

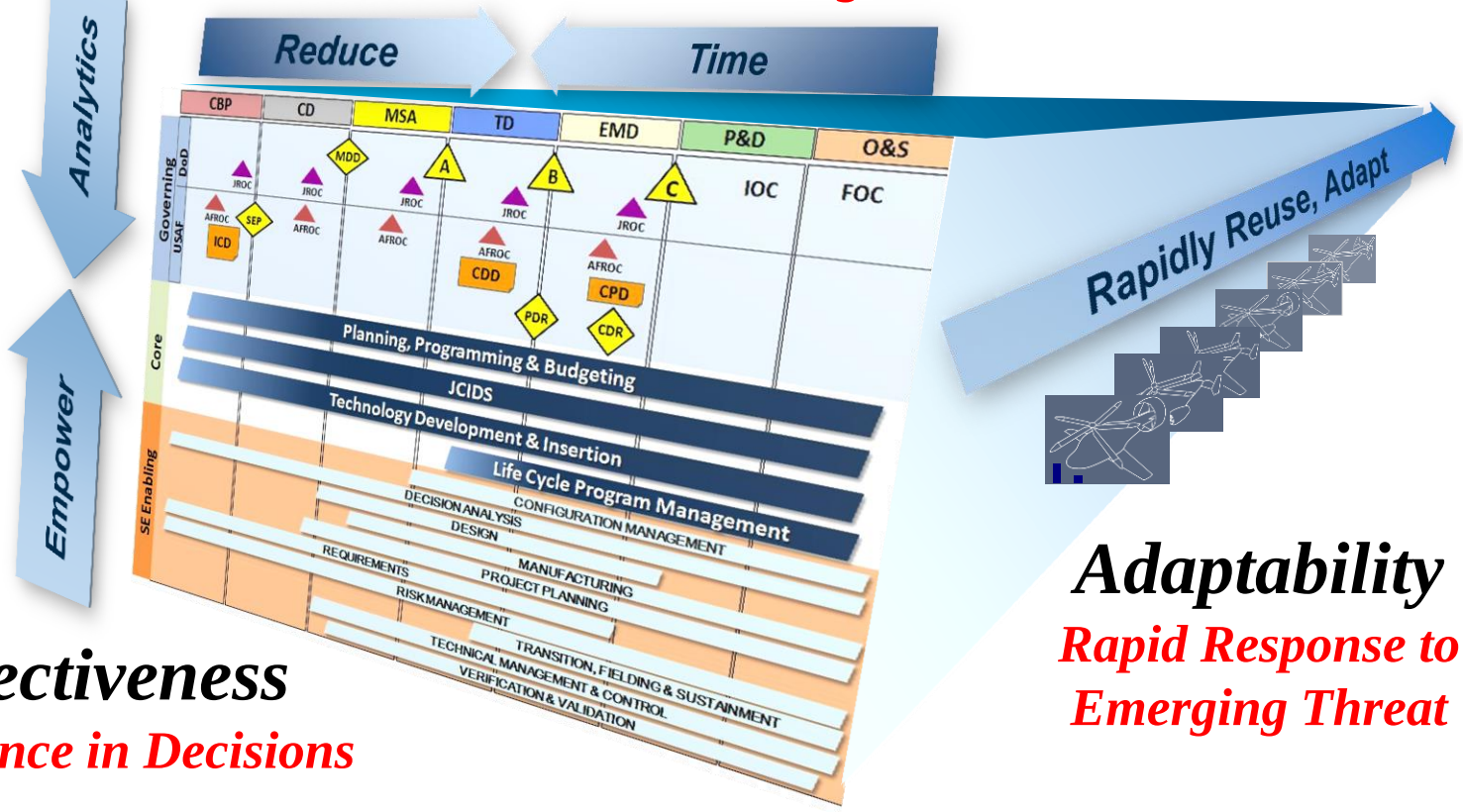
Towards Capability Development

from DSB report on Technology and Innovation Enablers for Superiority in 2030

21st Century Acquisition Challenges

Affordability

On Time, on Budget



Effectiveness

Confidence in Decisions

Adaptability

Rapid Response to Emerging Threat

ERS Major Work Area Investments

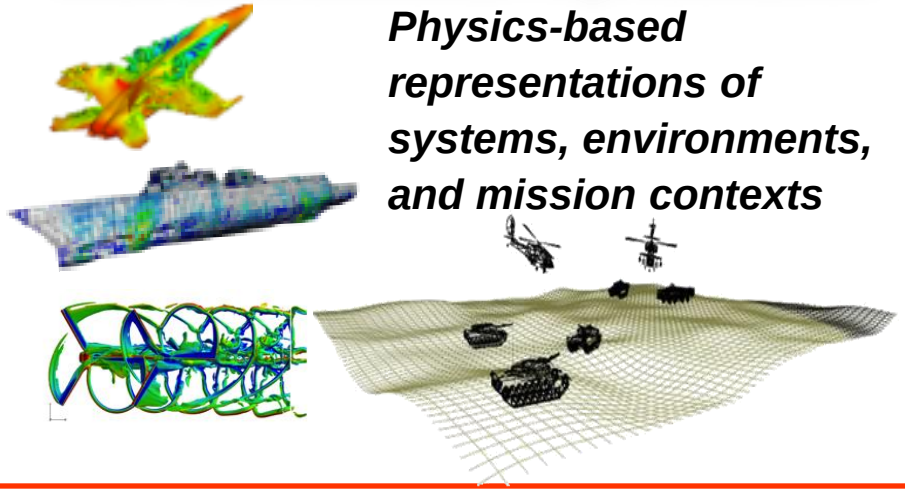
Mission-Relevant Tradespace Analysis

Cross-domain Tradespace Analytics, Cost/Lifecycle Analysis, Integration of Manufacturability, Producibility, and other "-ilities"

Collaborative Analysis and Decision-Making

Knowledge management and decision support across communities

Conceptual, Computational, and World-Wide Environmental Representation



Physics-based representations of systems, environments, and mission contexts

ERS Capability Integration and Demonstration

Open, extensible architectural framework that integrates representations, tradespace, and analysis tools

Continual technology insertion -- Continual demonstration

Prototyping

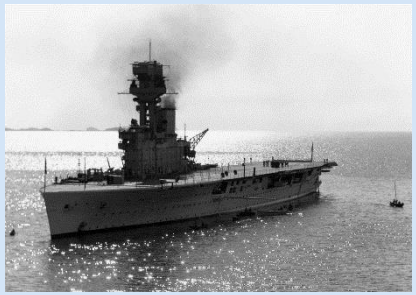
Prototyping defined

"… a set of design and development activities intended to reduce technical uncertainty and to generate information to improve the quality of subsequent decision making"

RAND, 2009

AGILITY

Paul MacCready wins the Kremer prize in 1977 for human powered flight by designing an aircraft that can quickly be reconfigured, saving time during the prototyping process.



INNOVATION

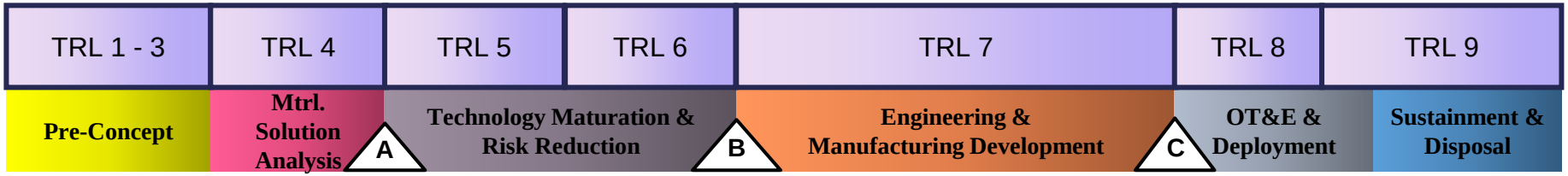
Declining budgets following WWI coincided with the rise of air power.

HMS Hermes is the first official aircraft carrier.

AFFORDABILITY

In 1947, Chuck Yeager breaks the sound barrier in the Bell X-1 prototype – the start of big budget prototyping efforts.

EC&P Prototyping Categories



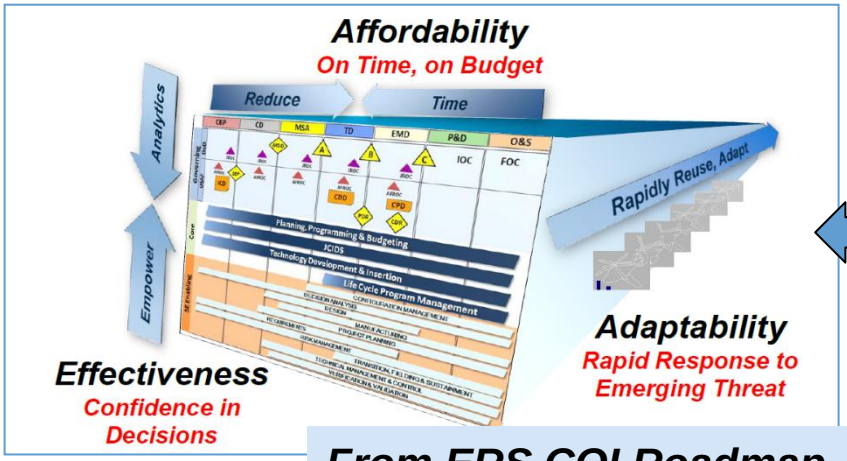
Developmental Prototypes

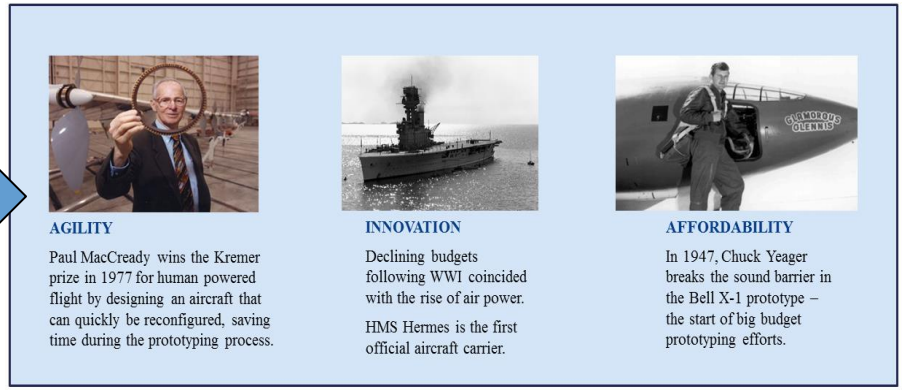
- Art of the possible
- Demonstrate feasibility of an integrated capability
- Provide evidence of overcoming specific technical risk barriers
- Develop sufficiently detailed cost data to enable cost-capability trades

Operational Prototypes

- State of the art
- Demonstrate military utility of integrated capability solutions
- Demonstrate robust fabrication processes
- Demonstrate performance in specific operational environments
- Define form, fit, function and “ilities”
- Enable business case analyses

Similar Objectives and Benefits



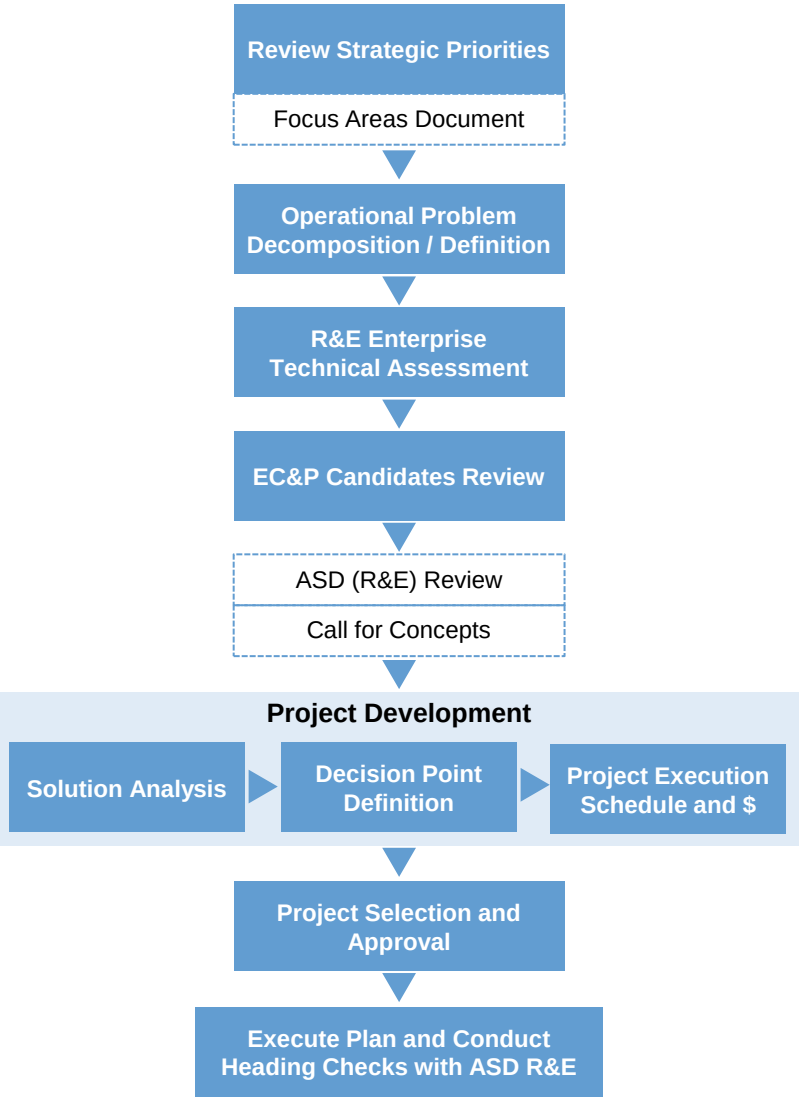


Benefits

- Reduce technical risk
- Validate designs
- Validate cost estimates
- Evaluate manufacturing processes
- Refine requirements

Rand 2009

ERS Support to the EC&P Prototyping Selection Process



ERS Enabling Emerging Capability Development:

- Trade space studies to inform requirements
- Set-based design to explore solution options
- Collaborative tools to bring partners into the conversation
- Architectural framework to identify OSA possibilities and integration challenges

Prototyping and ERS Supporting BBP 3.0

ERS and Prototyping working synergistically

Achieve Affordable Programs
- Continue to set and enforce affordability caps

Achieve Dominant Capabilities While Controlling Lifecycle Costs
- Strengthen and expand "should cost" based cost management
- Build stronger partnerships between the acquisition, requirements, and intelligence communities
- Anticipate and plan for responsive and emerging threats
- Institutionalize stronger DoD level Long Range R&D Planning

Incentivize Productivity in Industry and Government
- Align profitab
- Employ appro incentive type
- Expand the s
- Increase effe
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- Improve the r
- Increase the

Incentivize Innovat
- Increase the
- Emphasize te
- Use Modular
- Increase the r
- Provide draft industry in fu definition
- Provide clear DoD can cho

Eliminate Unproductive Processes and Bureaucracy
- Emphasize Acquisition Executive, Program Executive Officer and Program Manager responsibility, authority, and accountability
- Reduce cycle times while ensuring sound investments
- Streamline documentation requirements and staff reviews

Promote Effective Competition
- Create and maintain competitive environments
- Improve technology search and outreach in global markets

- **Achieve Affordable Programs**
- **Achieve Dominant Capabilities While Controlling Life Cycle Costs**
- **Incentivize Productivity in Industry and Government**
- **Incentivize Innovation in Industry and Government**
- **Promote Effective Competition**

Broad Spectrum of Capabilities