



Evaluating Capability: The Importance of Mission Context in DT&E

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Overview



During design and development,
use mission context in DT&E to:

- Assess how capability will be affected by design features
- Understand the design and identify issues before modifying the design becomes costly
- Examine technical performance and predict the effect of operations for the warfighter



Mission Environment



What is a mission?

- The task or duty assigned, together with the purpose, that clearly indicates the action to be taken and the reason therefore (JP 3-0)

What is the environment?

- Operational: A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander (JP 3-0)
- Induced: Manmade or equipment-made environment that directly or indirectly affects the performance of man or materiel (The Free Dictionary)



What is Mission Context?



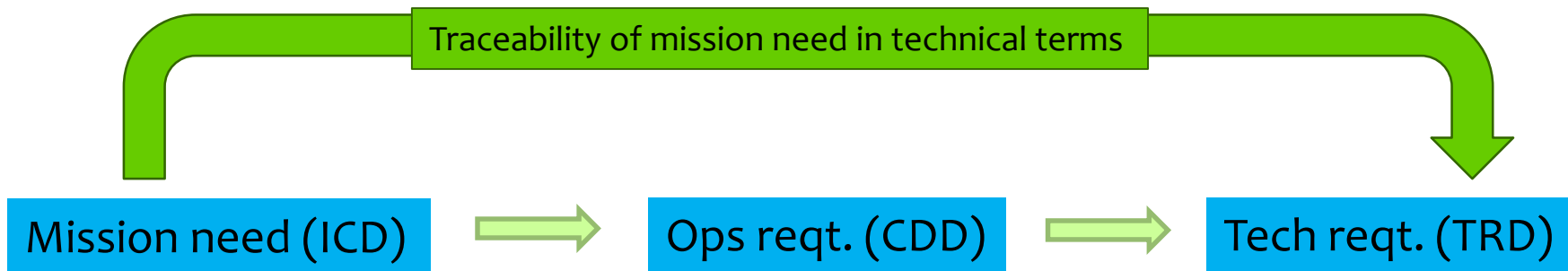
Mission context identifies the expected effect of a system characteristic with respect to:

- Operational users (operators and maintainers)
- Operational environment (threat, interoperable systems, temperature, etc.)
- Induced environment (EMI, vibration, heat, etc.)
- End item configuration (production representation)

Evaluation in a mission context is accomplished during design and development



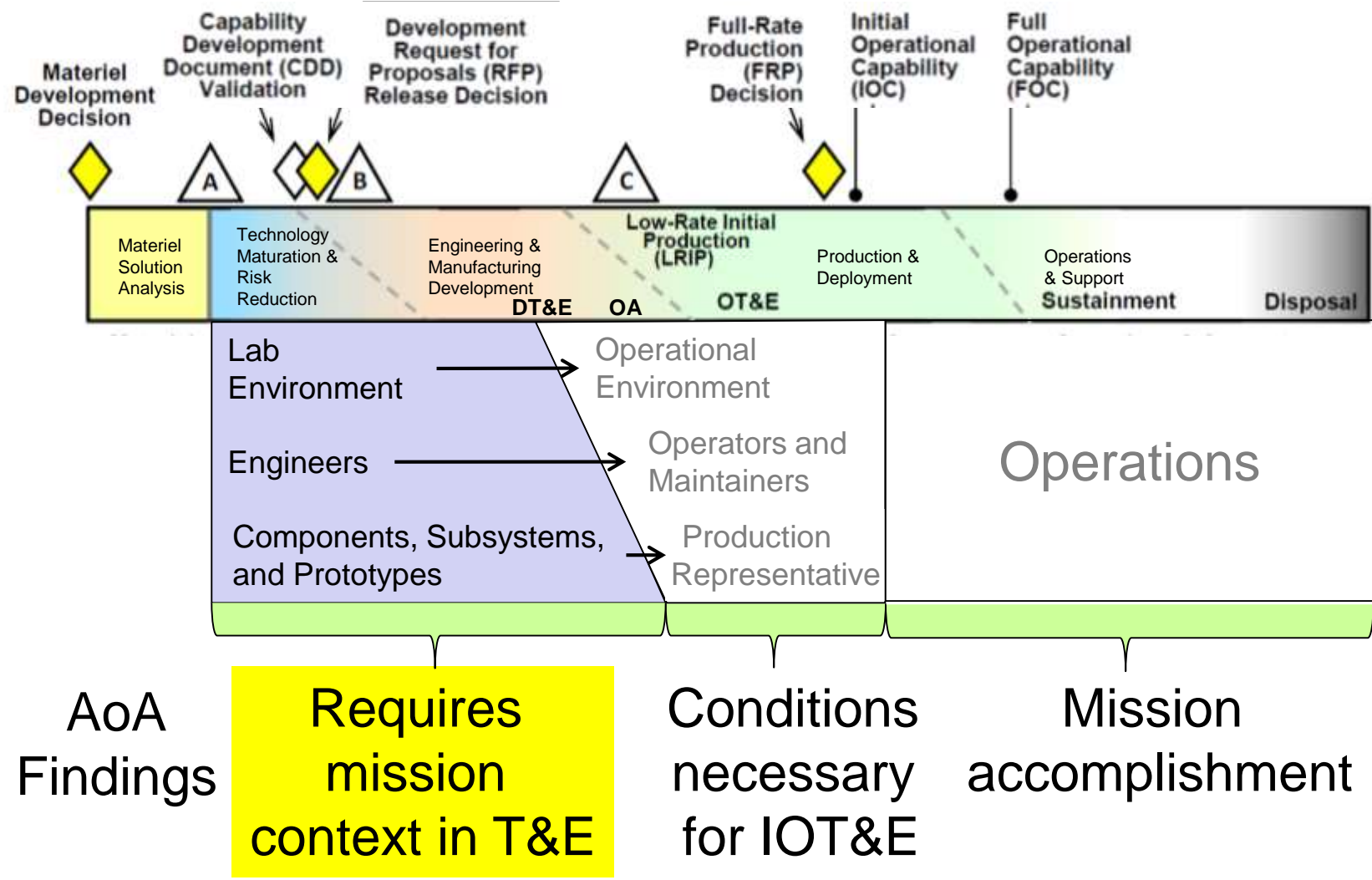
“Translation” Process



- Translate mission need to tech requirement as foundation; is basis for technical measures
- Maintain awareness of operational capabilities and environment to put tech performance in mission context (CDD, STAR, CONOPs)
- Provide decision-maker with technical capability information, with operational “So what?”



Mission Context in T&E





Applying Mission Context



- Assess the design, development, and operations of a combat system
- Evaluate the systems, subsystems, and components during design and development
- Identify what we built and quantify the system's capabilities and limitations
- Evaluate performance early; project how technical performance of all components will affect the end capability



Air Example



- T&E quantifies system performance across flight envelope
 - *DT&E varies airspeed, altitude, stores separation dynamics across technical performance envelope*
- DT&E technical capabilities and limitations stated in “so what?” operations terms; a non-specific example is:
 - *Aircraft stability at low altitudes precludes safe and accurate low-level munitions delivery*





Space Example



- T&E quantifies sensor/system performance across field of view
 - DT&E M&S scenarios vary geometry, intensity, environment across FOV envelope
- DT&E technical capabilities and limitations stated in “so what?” operations terms; a non-specific example is:
 - Combined induced and natural environments precludes detection of threat in a particular geographic region





Additional Detail



Capability/ Performance	<ul style="list-style-type: none">- Probability of collection- Warning- Coverage- Magnitude of attack
	<ul style="list-style-type: none">- Accuracy, data fidelity- Data fusion- Ephemeris- Reporting- Environmental characteristics
Reliability	Design for reliability--component, subsystem, system and system-of- system level
Cybersecurity	Design, conduct DT&E at all levels



DT&E MS A to MS C



- Address design and development aimed at technologies, components, subsystems, and systems
- Allow for informed improvements to the design during development
- Systematically introduce characteristics of the combat environment
- Just like OT&E, ensure timely delivery of capable systems to the Warfighter



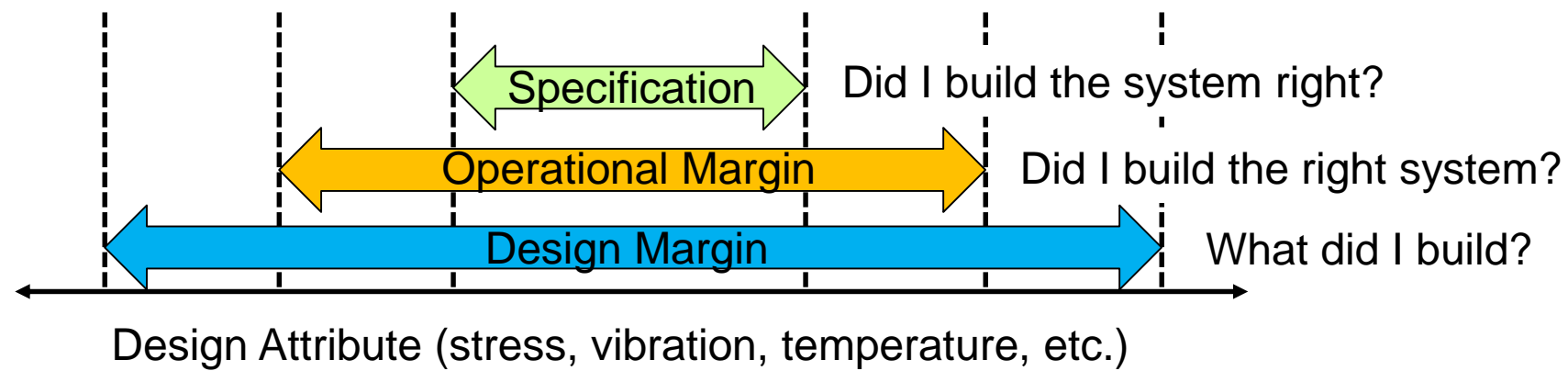
DT&E & Design

- Understand the impact of design features: design for reliability, interoperability, cybersecurity, anti-tamper, etc.
- Examine design margin and robustness, and evaluate before entire system exists
 - Accounts for severity of the environments
 - Minimizes redesign costs
- Incentivize through the RFP/contract



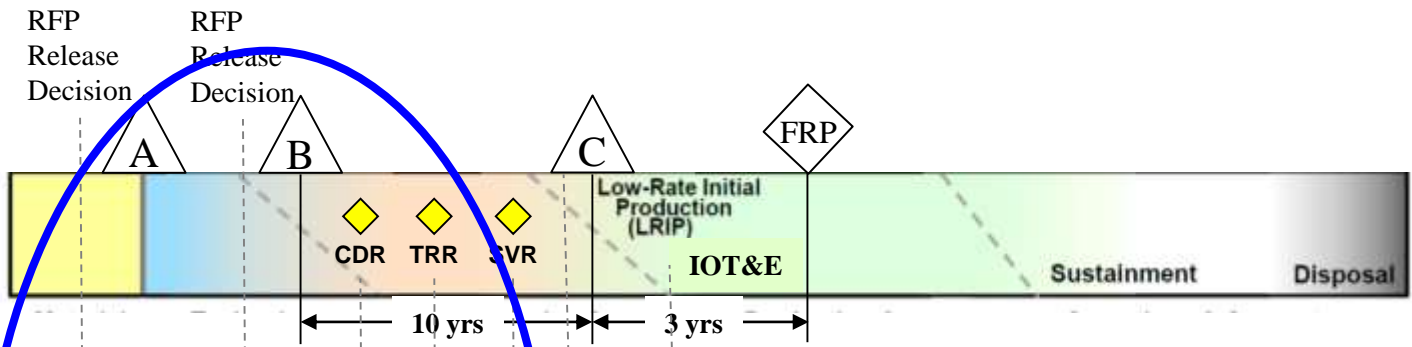
Stress the Design

- Shake out design and fabrication deficiencies
- Conduct environmental stress screening
- Test beyond worst expected environment, ensure design margins exist





Timely DT&E



Timeframe	ODASD(DT&E) Concentration	Leadership Direction
June 2009 – March 2010	DT&E Input for LRIP	DT&E Policy Development/Select Program Oversight in Support of MS C
April 2010 – December 2012	In Time!	Late to Need!
January 2013 – August 2013	Shift left	Shift Left (Cybersecurity, Interoperability Reliability)/DT&E Assessment at MS C
September 2013 – Present	RFP Development, RFP Development, DEF to Support Development, DT&E Assessment, DT&E Assessment	Shift Left/DT&E Assessments to Support Decisions/Developmental Evaluation Strategy (DES) to inform RFPs



Summary



- Mission context evaluation occurs during technology, component, and subsystem development and design
- Information generated through DT&E consists of capabilities, limitations, and unknowns
- Testing in mission context demonstrates how equipment functions in the intended environments
- DT&E identifies prospects to influence design, increase reliability, performance