



Mission Context in Developmental Testing

32nd Annual ITEA Symposium

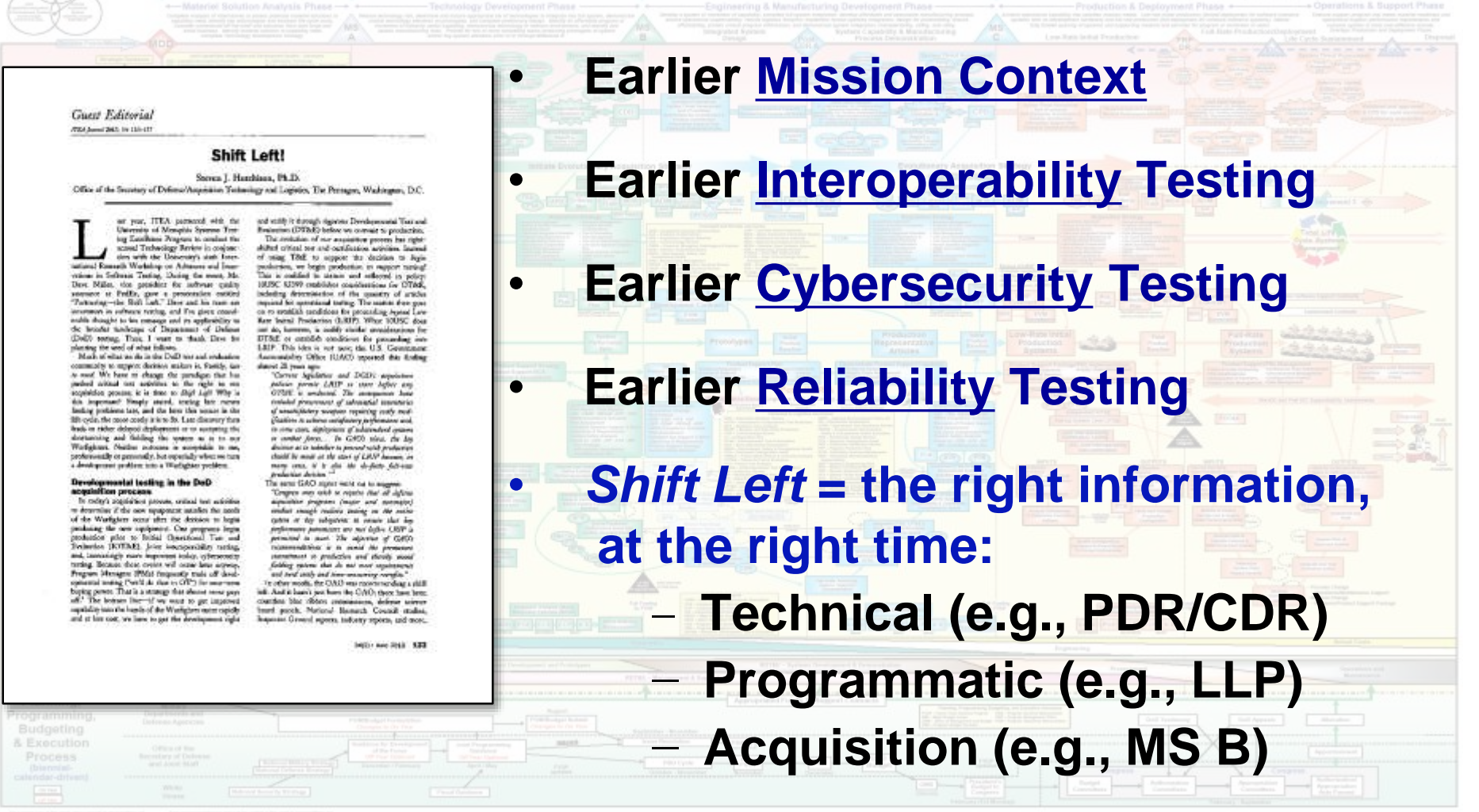
**Dr. C. David Brown, PE, CTEP
Acting Principle Deputy ASD(R&E)
DASD(DT&E)**

**Director, Defense Test Resource Management Center
Crystal Gateway Marriott
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Shift Left

Initial focus areas:



Guest Editorial
 2724 JOURNAL 2015, 10:11-17

Shift Left!

Steven J. Hartzman, Ph.D.
 Office of the Secretary of Defense/Acquisition Technology and Logistics, The Pentagon, Washington, DC.

Last year, ITEA partnered with the University of Memphis Systems Engineering Excellence Program to conduct the second Technology Review to complement with the University's new International Research Workshop on Advances and Innovations in Software Testing. During the event, Mr. Dave Miller, vice president for software quality assurance at Intel, gave a presentation entitled "Partnering—the Ball Is In Their Court" and his team announced in reference testing, and I've given considerable thought to his message and its applicability to the broader audience of Department of Defense (DoD) testing. Thus, I want to thank Dave for sharing the word of other fellows.

Much of what we do in the DoD test and evaluation community to support decision makers is, frankly, late to word. We have to change the paradigm that has pushed actual test activities to the right as an acquisition process; it is time to Shift Left! Why is this important? Simply stated, testing late means finding problems late, and the later the issues in the life cycle, the more costly it is to fix. Late discovery thus leads to either delayed deployment or to accepting the shortcomings and building the system as is to our Warfighters. Our test activities are acceptable to us, professionally or personally, but especially when we turn a development problem into a Warfighter problem.

Developmental testing in the DoD acquisition process

In today's acquisition process, actual test activities in development of the new equipment occur at the end of the Warfighter's story after the decision to begin procuring the new equipment. One program begins production prior to Initial Operational Test and Evaluation (IOT&E), joint interoperability testing, and, increasingly more, systems testing, cybersecurity testing. Because that system will come later anyway, Program Managers (PMs) frequently make all developmental testing (P&D & test in CDR) in near-time buying power. That is a strategy that almost never pays off. The better the test we want to get integrated capabilities into the hands of the Warfighters more rapidly and at less cost, we have to get the development right

and verify it through rigorous Developmental Test and Evaluation (DTE&E) before we commit to production. The evolution of our acquisition process has right-shifted critical test and evaluation activities, instead of using DTE&E to support the decision to buy—producers, we begin production to support testing. This is coupled to status and referred to policy H&C. H&C establishes conditions for DTE&E, including determination of the quantity of articles required for operational testing. The status does give us to establish conditions for providing beyond Level-1 test Production (L1P). While DTE&E does not do, however, a costly waste of resources for DTE&E or similar activities for providing new L1P. This view is not new; the U.S. Committee on Acquisition Reform (H&C) reported that finding should 23 years ago.

"Current Acquisition and DTE&E acquisition policies permit L1P to start before any DTE&E is conducted. The acquisition team instead procurement of substantial quantities of unsatisfactory equipment requiring costly modifications to achieve satisfactory performance and, in some cases, shipments of substantial quantities of unusable items. In H&C's view, the key element in its solution to prevent such problems should be made at the start of L1P. As such, as many cases, it is also the objective of our production decision."

The same H&C report went on to suggest:

"Congress may wish to require that all flying equipment programs (major and minor) conduct enough testing during the development or fly subjective to ensure that the performance parameters are met before L1P is permitted to start. The objective of DTE&E is to ensure that the program is production and thereby avoid finding systems that do not meet requirements and avoid costly and time-consuming rework."

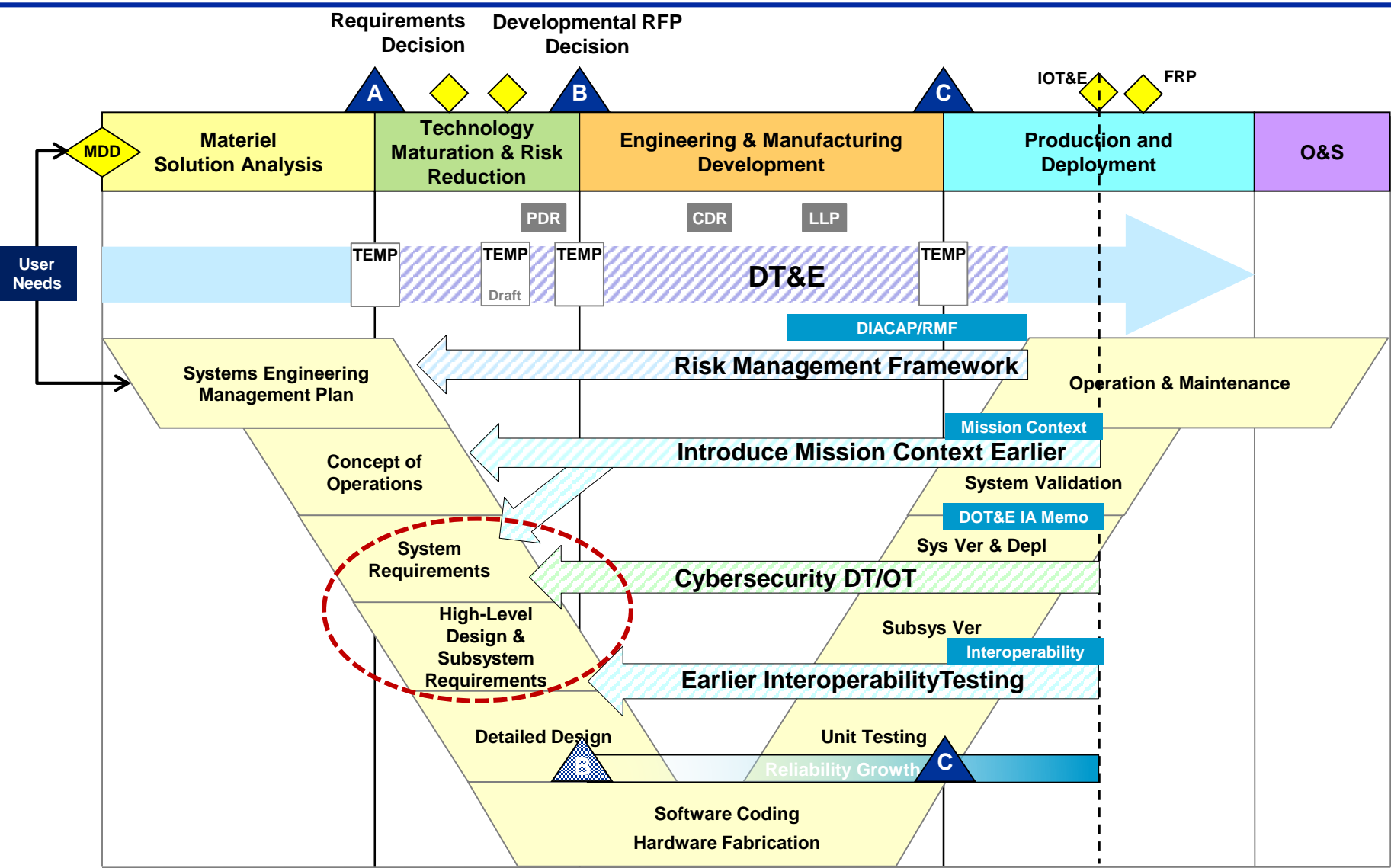
In other words, the OASD was recommending a shift left. And it hasn't been the OASD that has been successful in doing so. However, defense reform has not been successful. National Research Council studies, however, General Reports, testify to this, and more.

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- Earlier Mission Context
- Earlier Interoperability Testing
- Earlier Cybersecurity Testing
- Earlier Reliability Testing
- **Shift Left = the right information, at the right time:**
 - Technical (e.g., PDR/CDR)
 - Programmatic (e.g., LLP)
 - Acquisition (e.g., MS B)

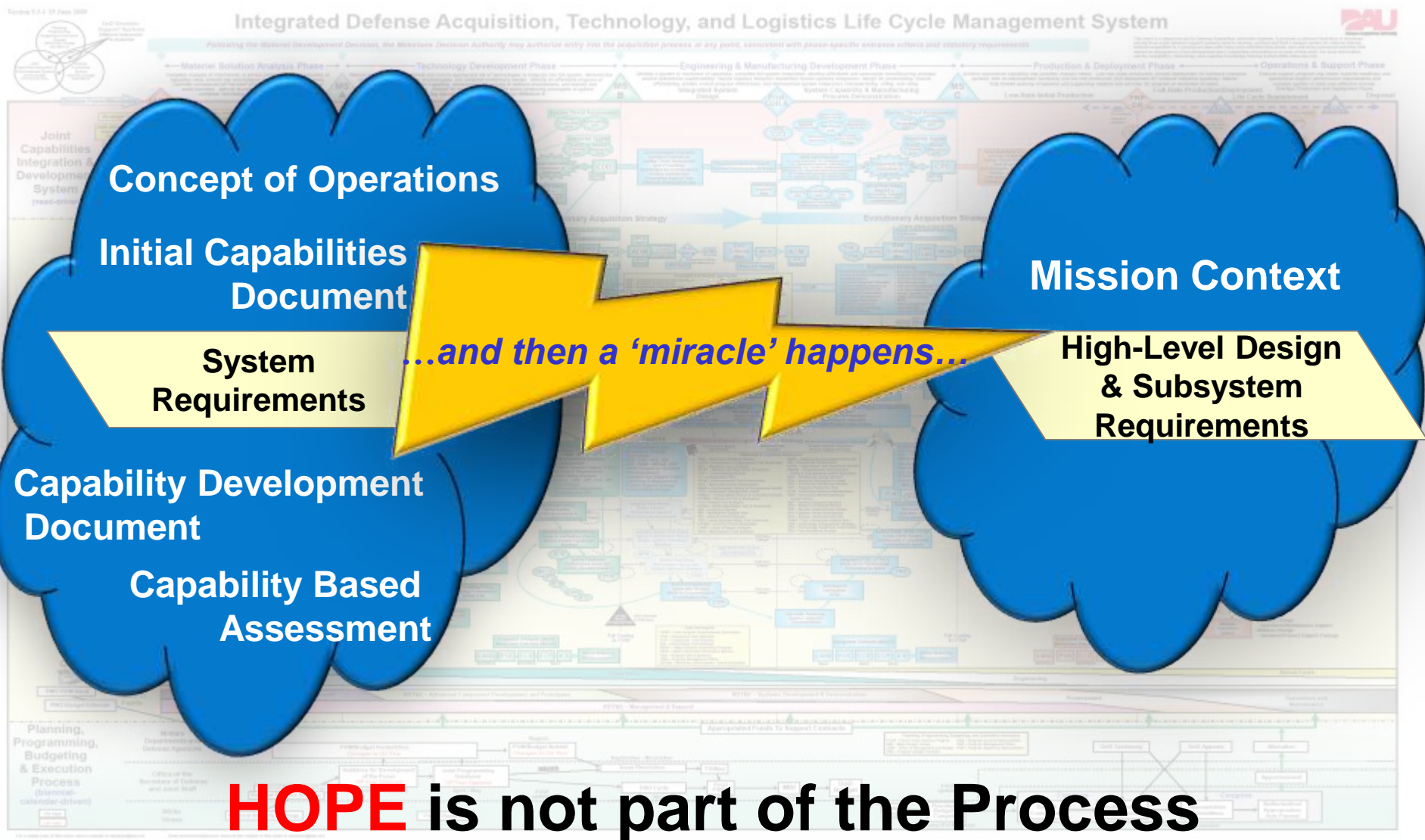


DT and SE Role in Shift Left





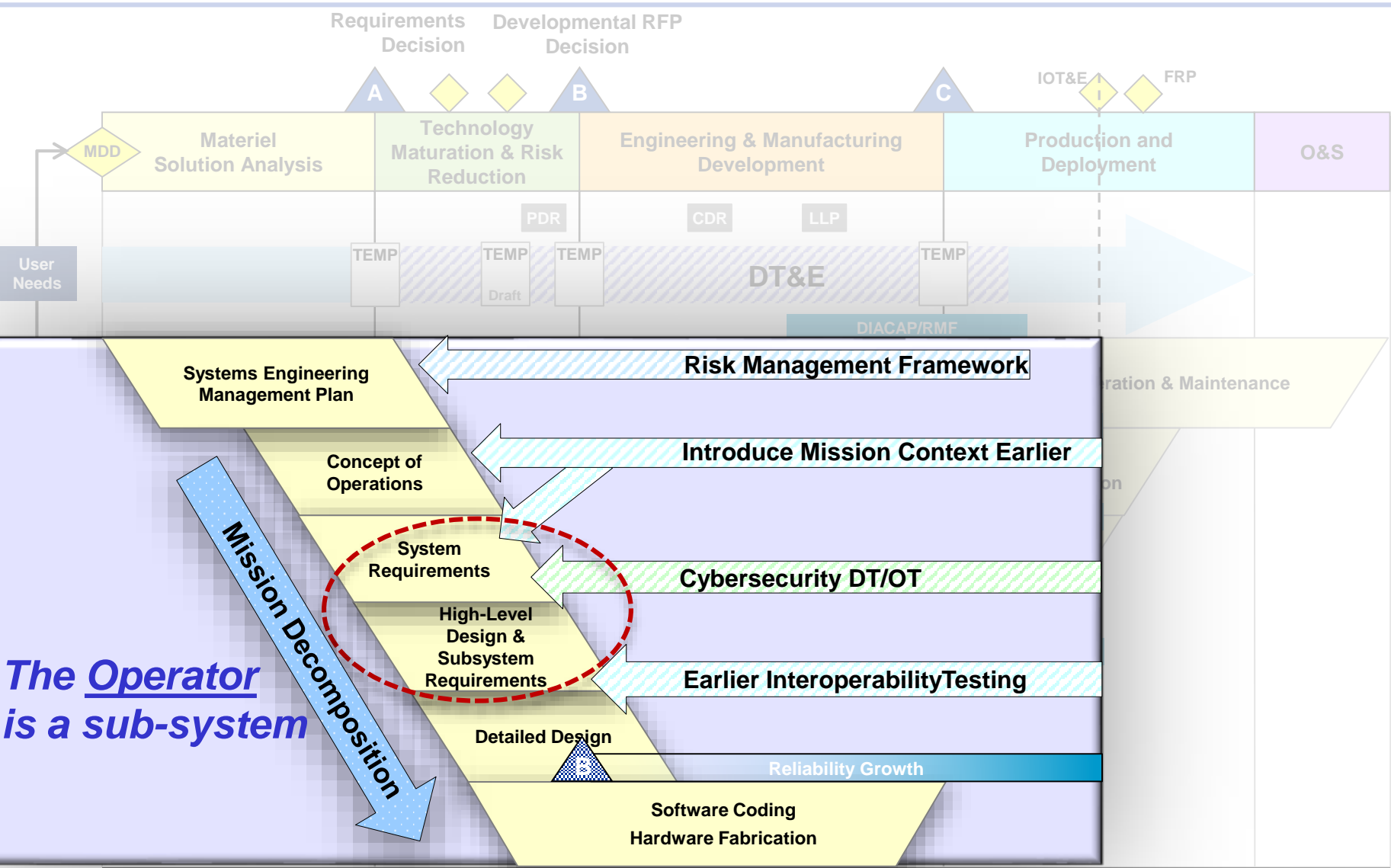
Measurable, Testable Requirements



HOPE is not part of the Process

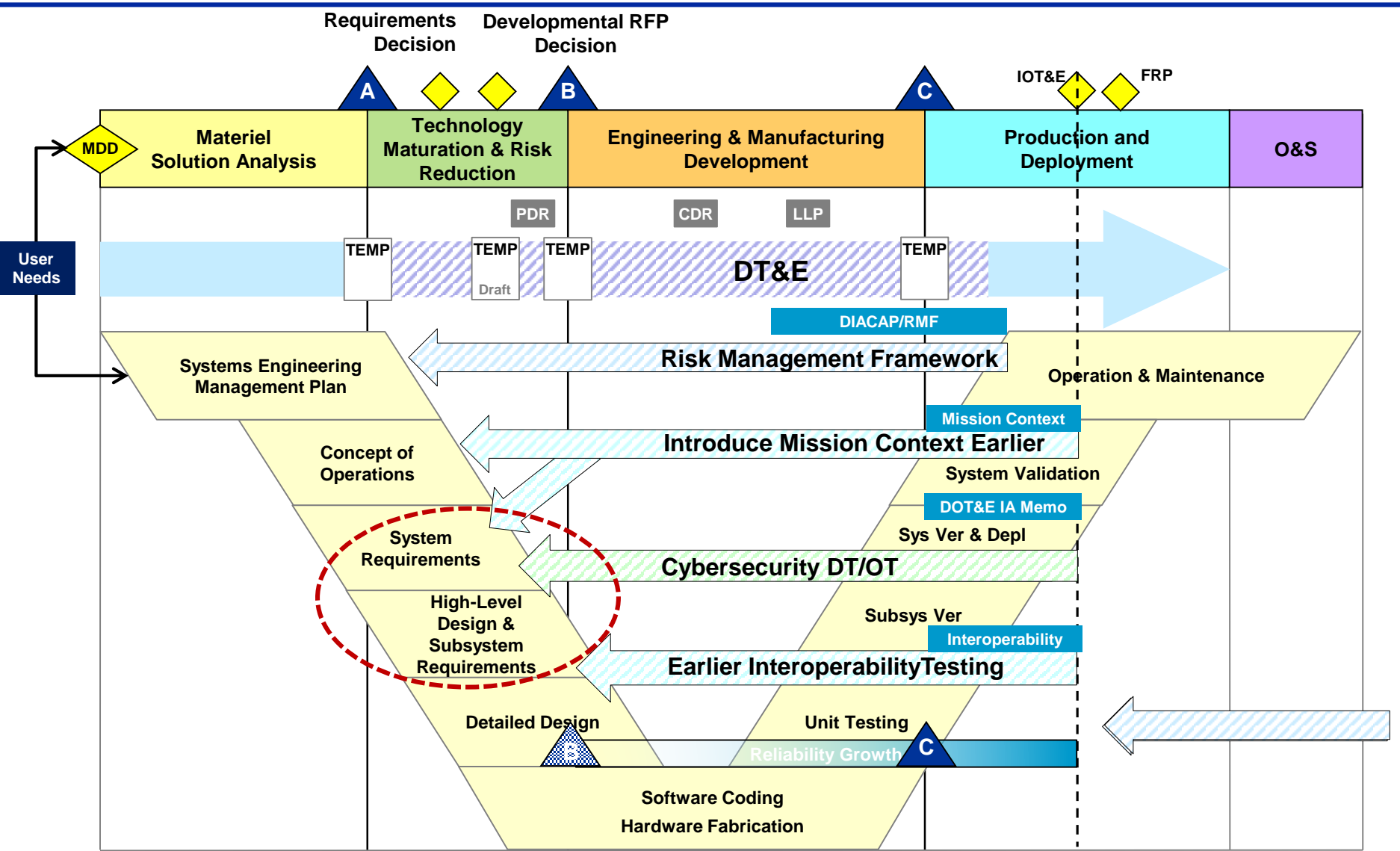


DT and SE Role in Shift Left



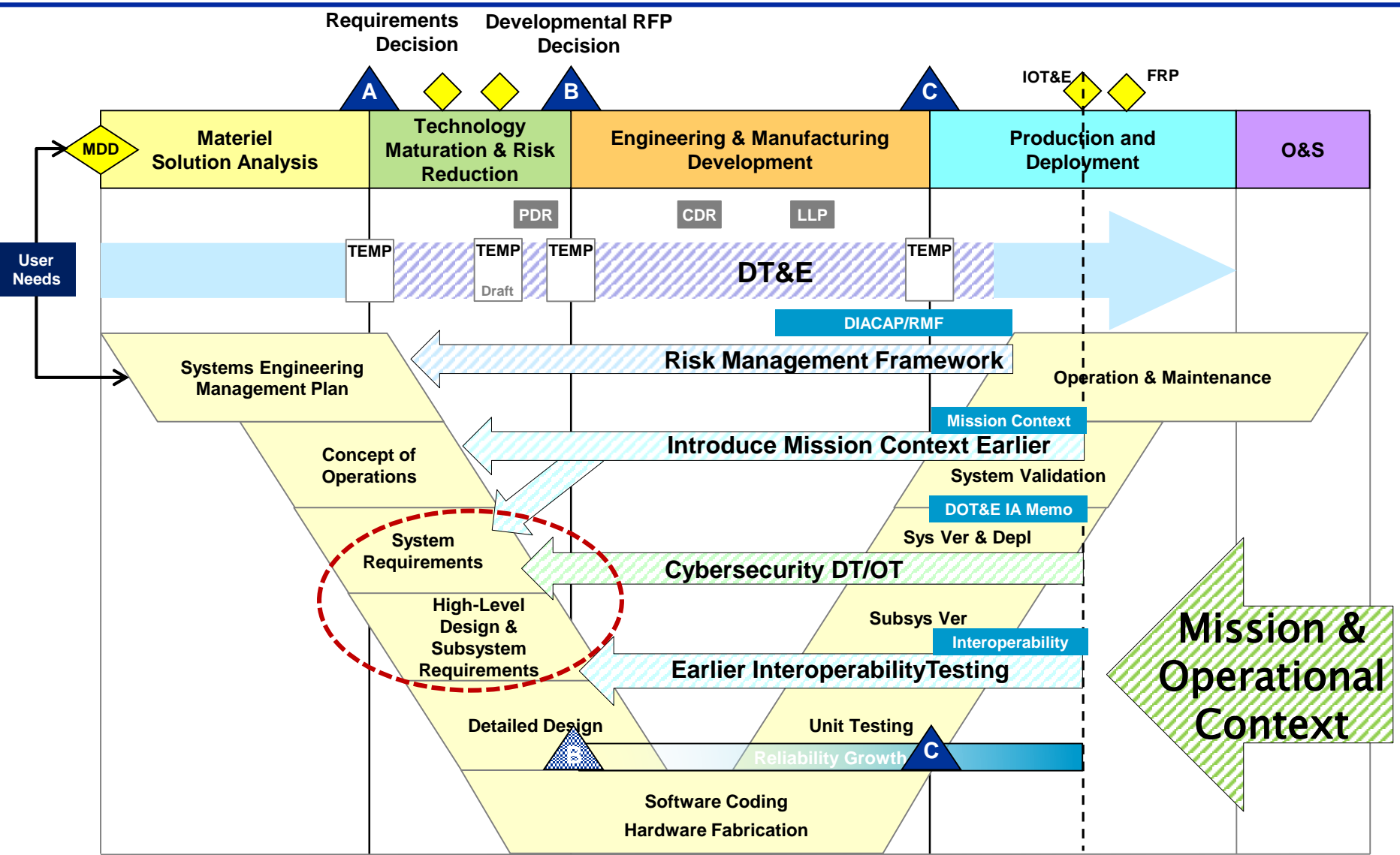


MISSION and OPERATIONAL CONTEXT DT&E





DT and SE Role in Shift Left





Chief Developmental Tester's Role



- ***Be part of making the 'miracle' happen!*** CDTs and their staff must:
 - **Be part of the SE work to get the mission aspects into the specifications**
 - **Ensure the derived specs:**
 - **Represent the impact of the mission and its environment,**
 - **Are verifiable in a mission based environment**
 - **Ensure DT throughout the SE Process**

If the technical requirements and specs are informed by the mission, then verifying the technical requirements and specs is doing *testing in a mission context!*



Test and Evaluation Resources



• Workforce

- Government civilians, military, and contractors are a **critical resource**
- Test organizations and testers must **understand the operational missions**
- Leverage available expertise: **create opportunities** for testers



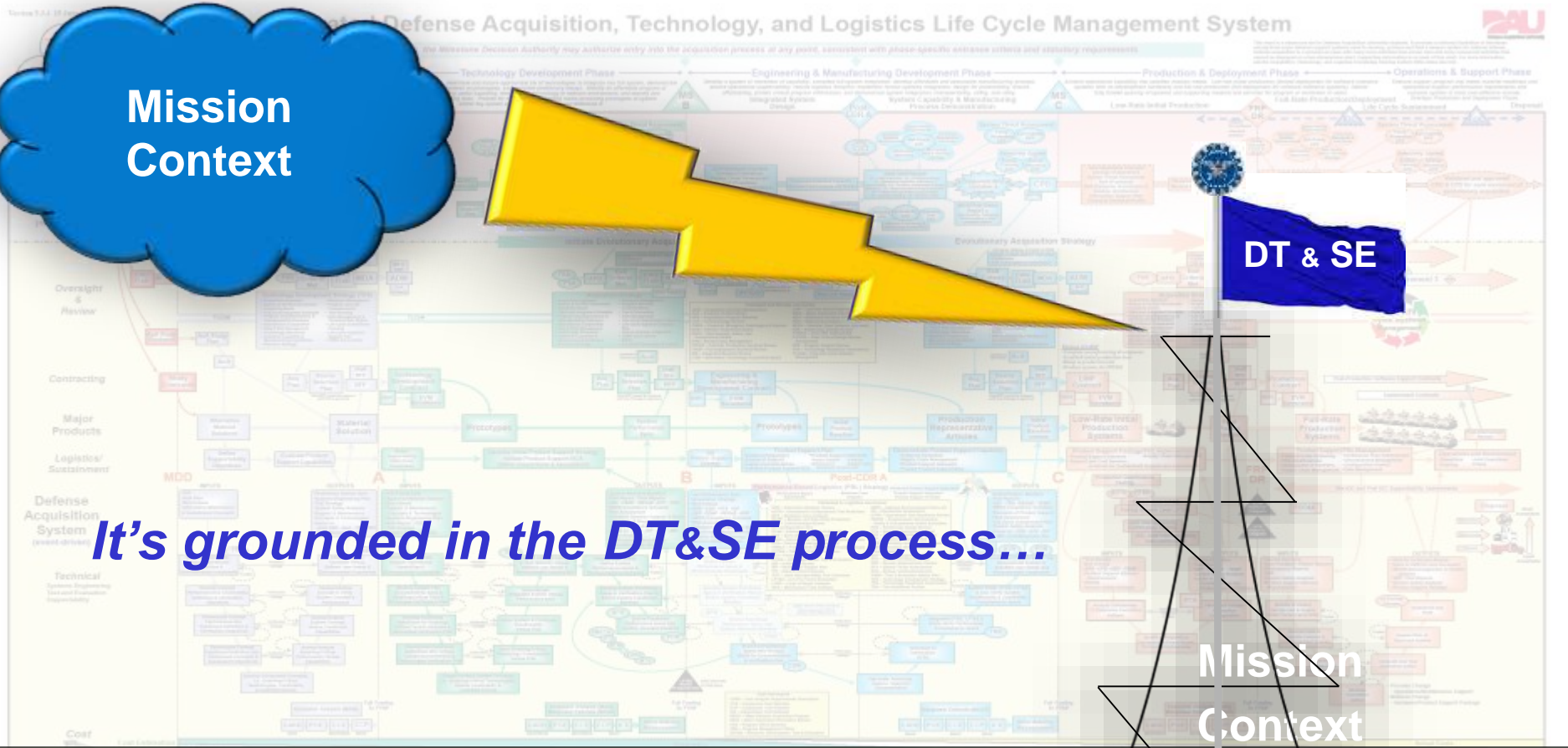
• Test Capabilities

- **Understand and simulate** the operational environment
- Emerging weapons technologies are **straining the capabilities** of our infrastructure





It's no miracle...



It's grounded in the DT&SE process...

...doing the right things, at the right time (SE).

...having the right information, at the right time (DT).



Questions