Transformation of Army Test and Evaluation

Army Views on T&E/SE Interactions

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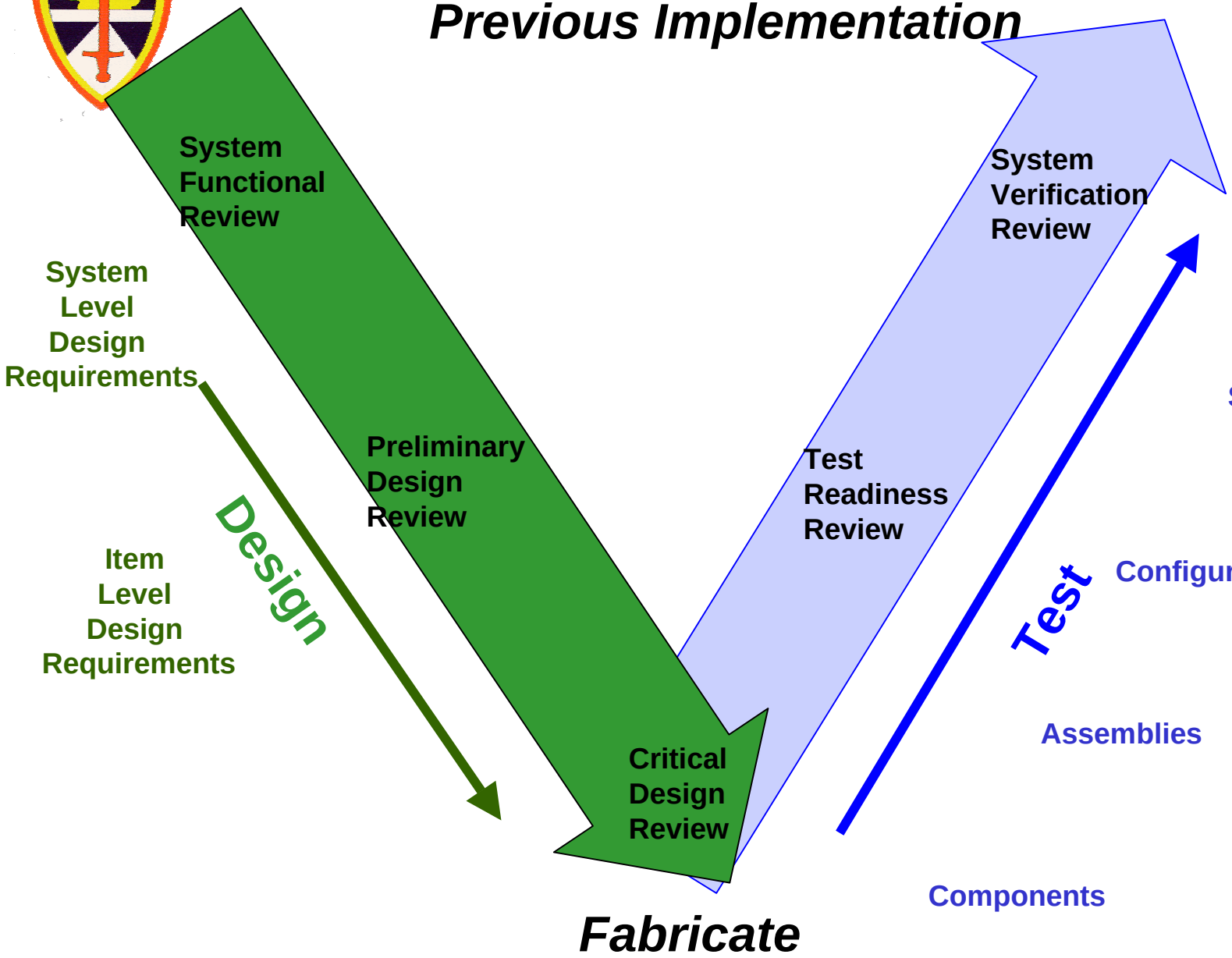
Outline

- Systems Engineering and Verification
- Future Combat Systems (FCS) Overview
- FCS “V Chart” w/ Tools Links
  - Combined Test Organization
  - SoSIL
  - Distributive Test Capability
  - Synthetic Test Capability
  - Built-in Test (BIT) and Training
- Highlights

Systems Engineering and Verification
Previous Implementation



FCS Combat Systems Increment 1

Manned Systems

1,530
Infantry Combat Vehicle

735
Command and Control Vehicle

900
Mounted Combat System

450
Recon and Surveillance

270
Non-Line of Sight Cannon

360
Non-Line of Sight Mortar

150
10 Ton HEMMT Wrecker
FCS Maintenance and Recovery Vehicle

435
Medical Treatment and Evacuation

Unmanned Air Platforms

Class I
810

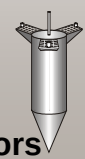
Spiral Forward

Class II
540

Spiral Forward

Class III
180

Class IV
450



- Unmanned Payloads
- Unattended Munitions
  - NLOS LS - 900
  - Intelligent Munitions
- Unattended Ground Sensors

NETWORK

Unmanned Ground Vehicles

Spiral Forward

Armed Robotic Vehicle
ARV R - 405
ARV A - 270

1,215
Small Manpackable UGV

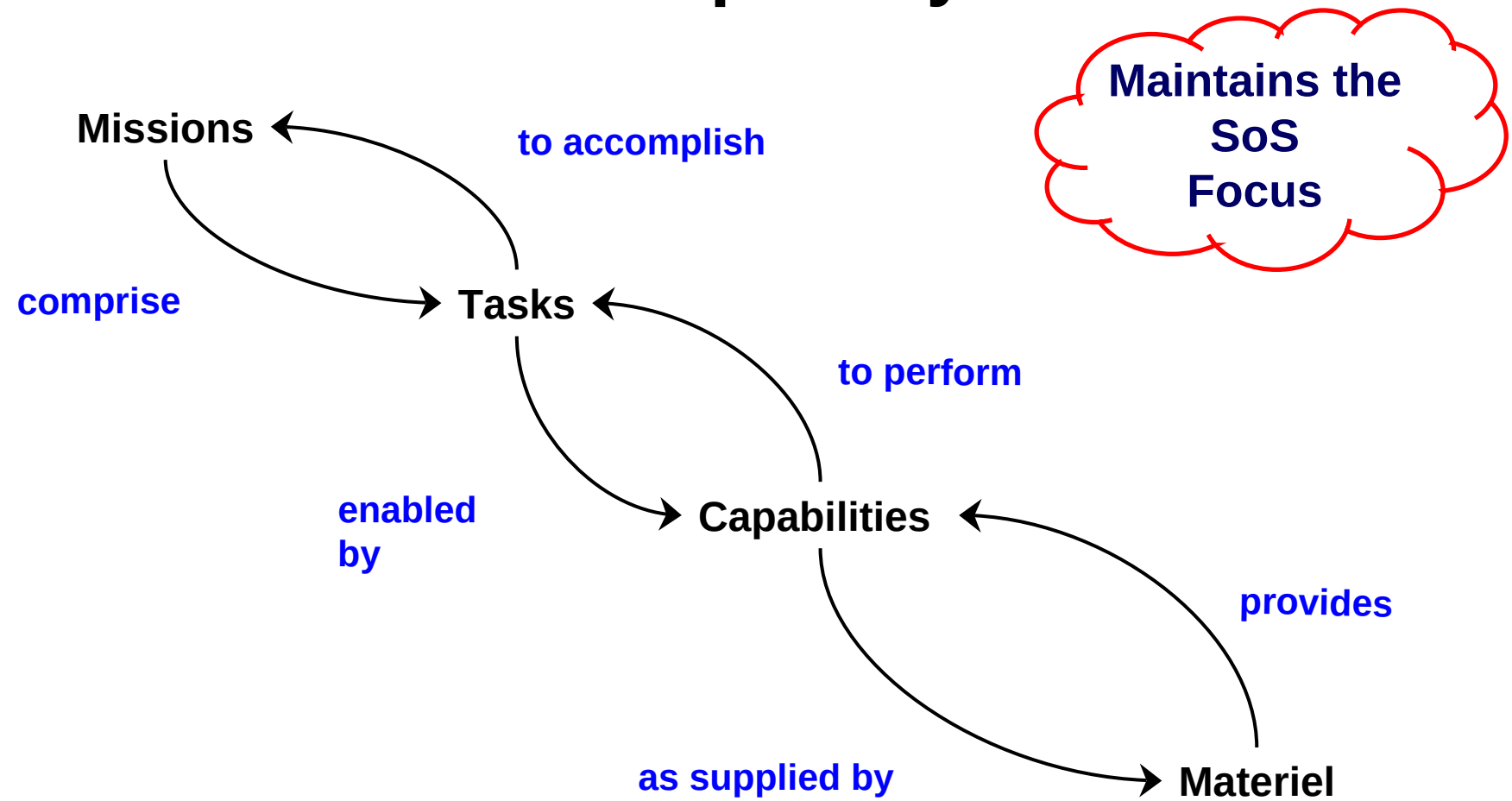
Mule - 900
ARV-L - 270

Mission Need for Future Combat Systems

Validated 31 Oct 02 (AROC); 23 Jan 03 (JROC)

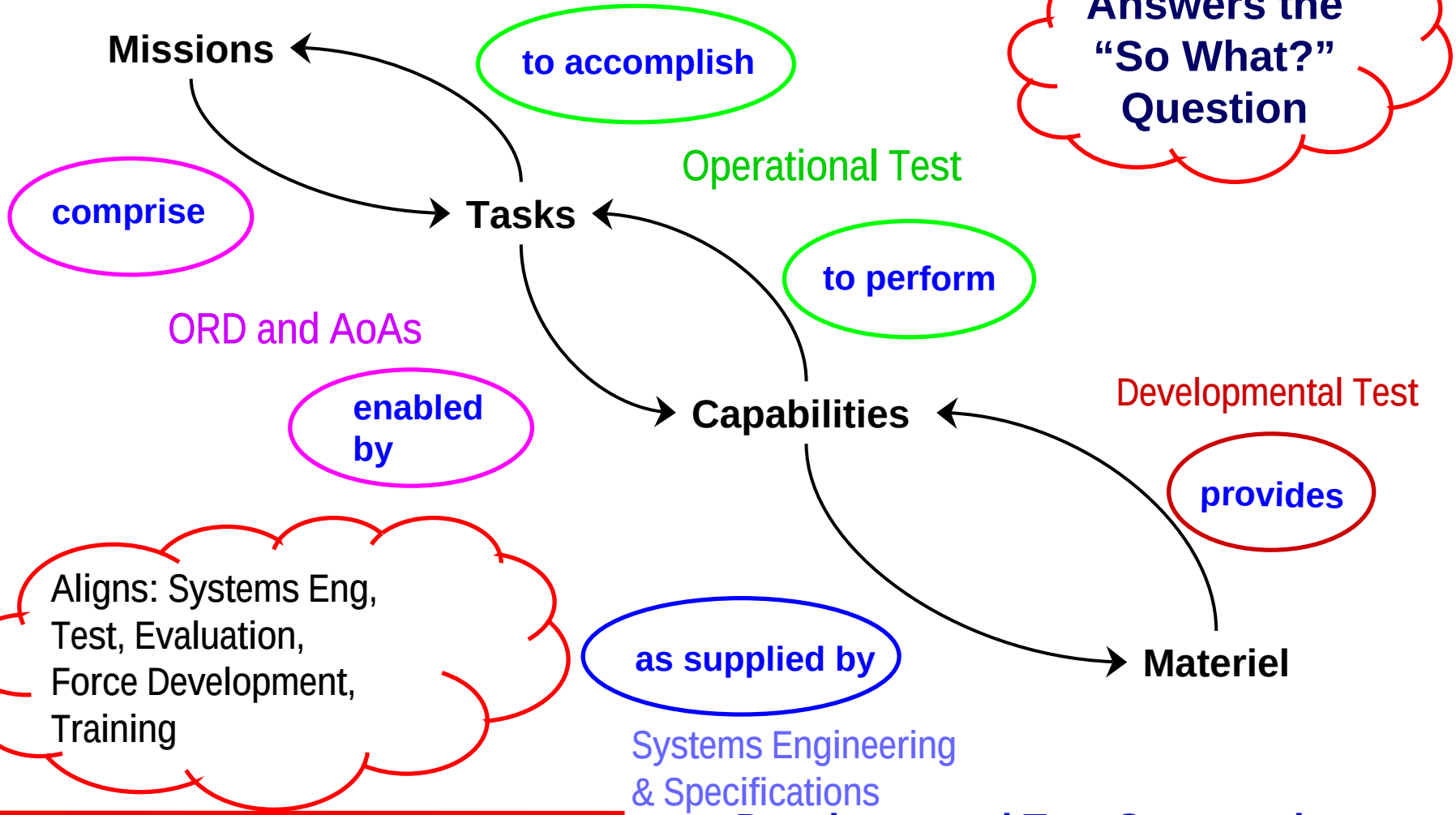
- FCS Description:
  - *Comprised of* a **Family of Systems**
    - Advanced, networked air- and ground-based maneuver, maneuver support, and sustainment systems
    - Includes manned and unmanned platforms
    - Networked via a C4ISR architecture
  - *Will operate as* a **System of Systems**
    - Network existing systems, systems already under development, and new systems to be developed to meet the needs of the UA.
    - Network will enable:
      - improved Information Surveillance Reconnaissance, enhanced analytical tools, joint exchange of blue and red force tracking down to the tactical level, real time sensor-shooter linkages, and increased synergy between echelons and within small units
      - the UA to connect to UE, joint capabilities, and national assets

Army FCS Transformation
Mission to Capability Trace



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

Army FCS Transformation
Mission to Capability Trace



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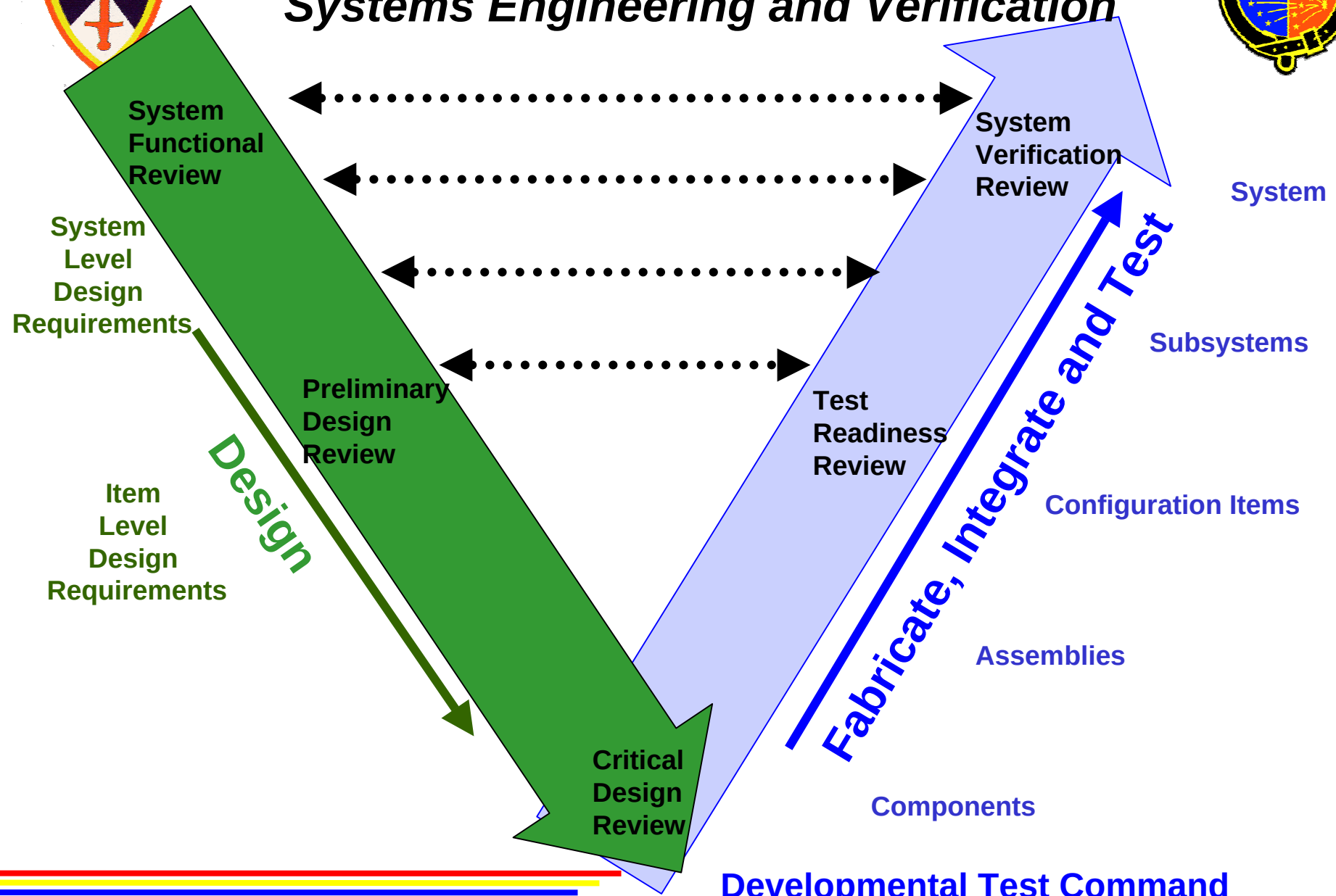
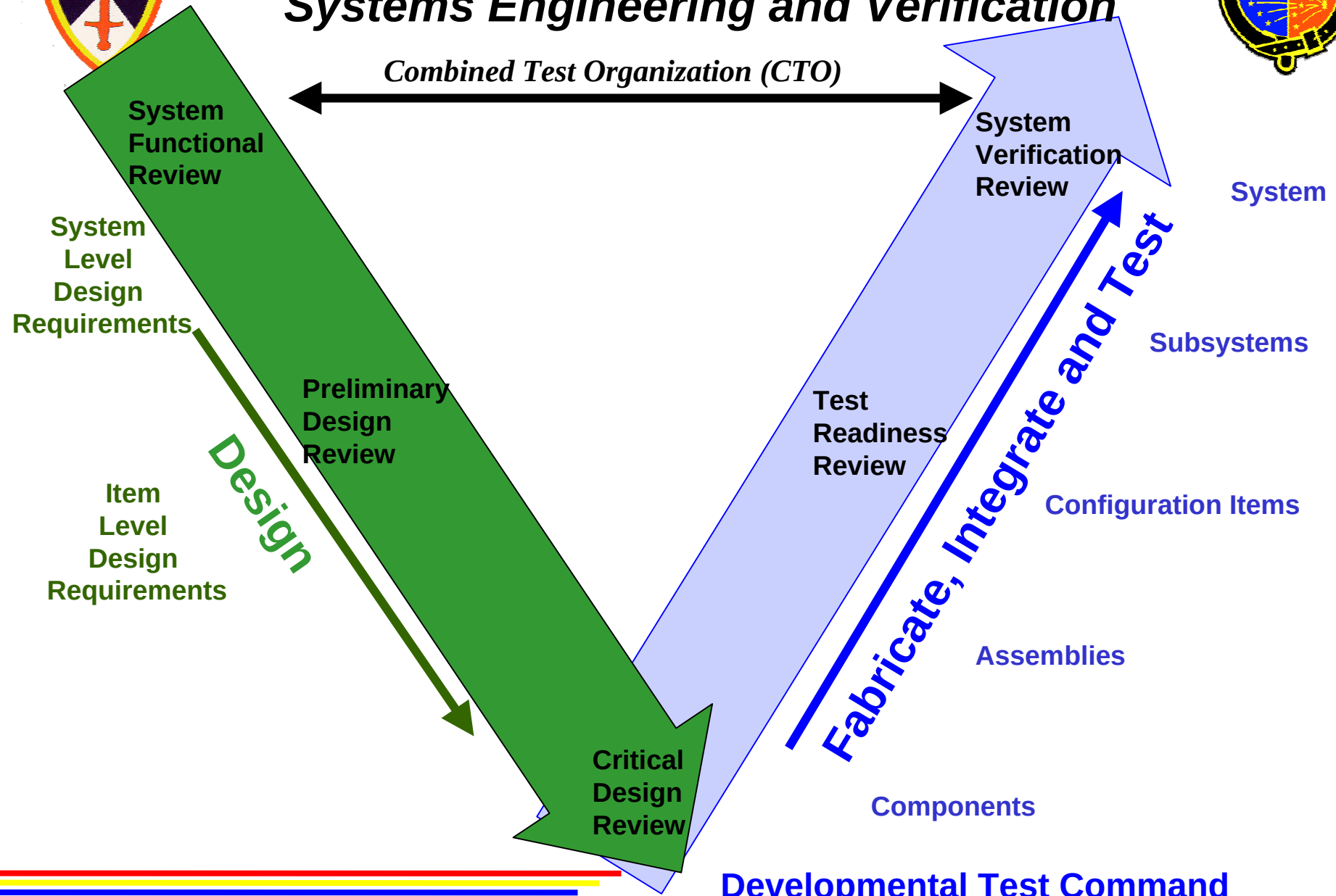
Systems Engineering and Verification



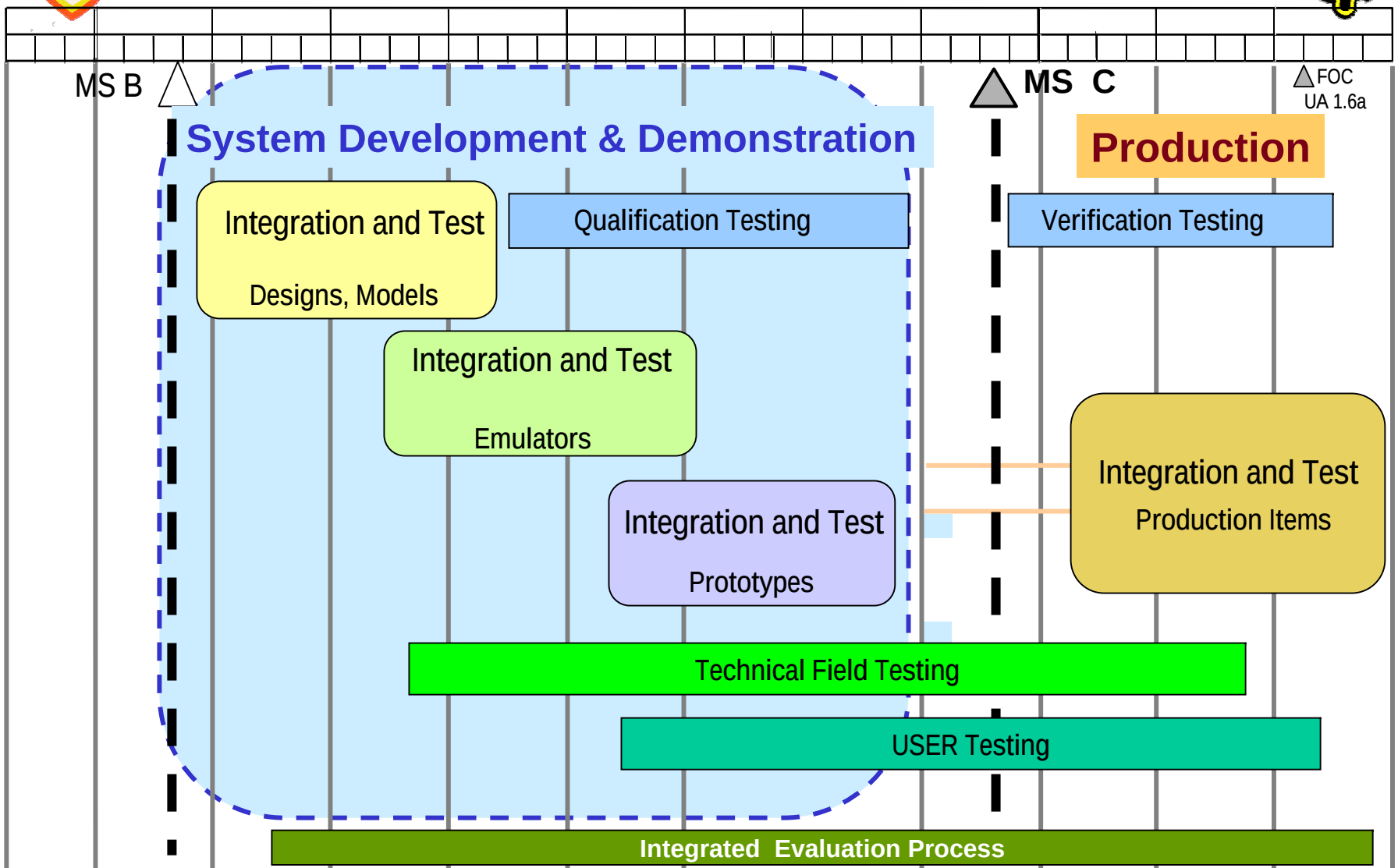
Systems Engineering and Verification



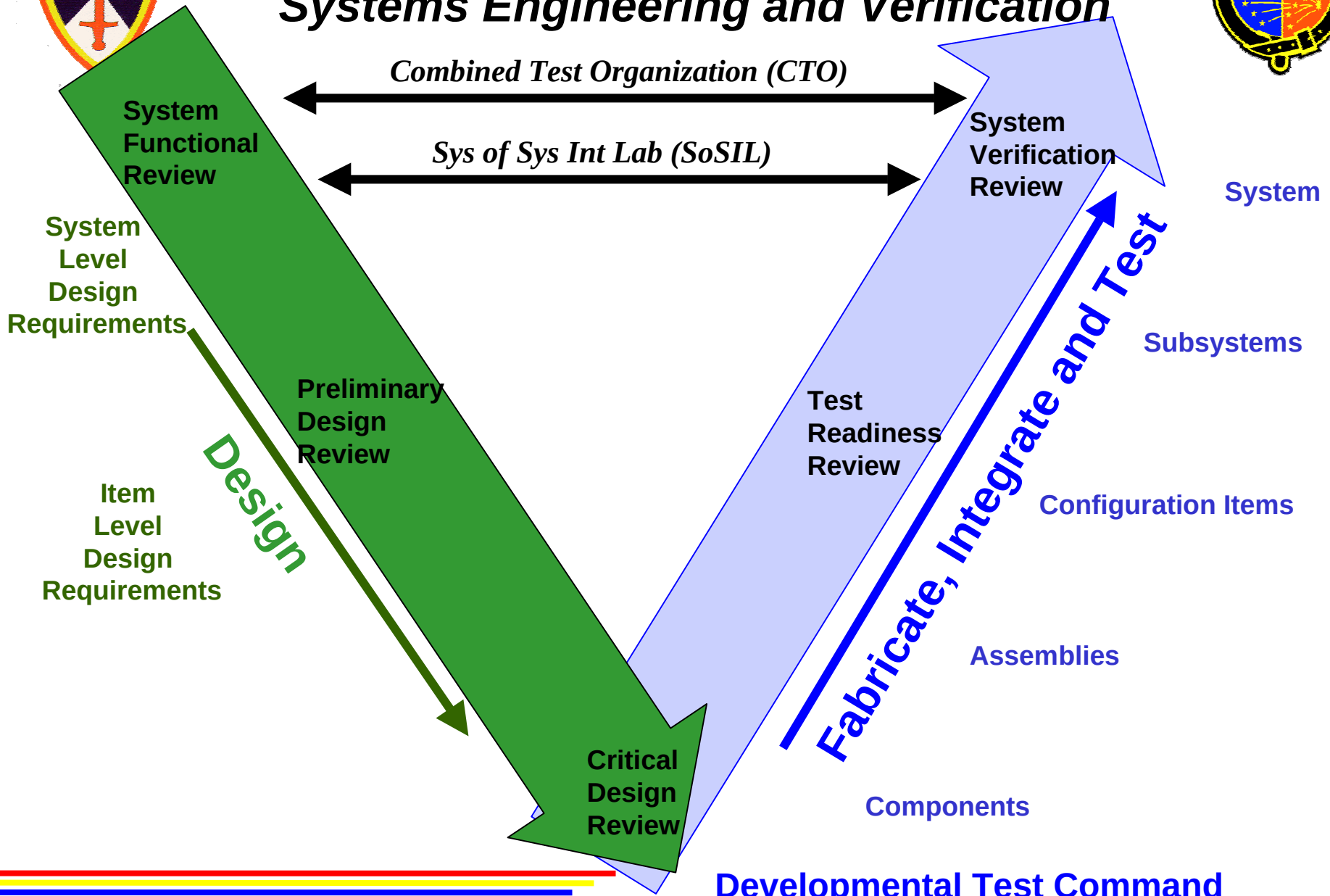
Combined Test Organization (CTO)

- **Equal Partnership – PMO / ATEC / LSI**
- **Supplants PMO Test Management and Augments ATEC and LSI Top Level Test Management**
- **Strives for Most Efficient Testing Through Integration, Combination, and Sharing**
- **PMO, ATEC, and LSI have Pledged Commitment and Support**

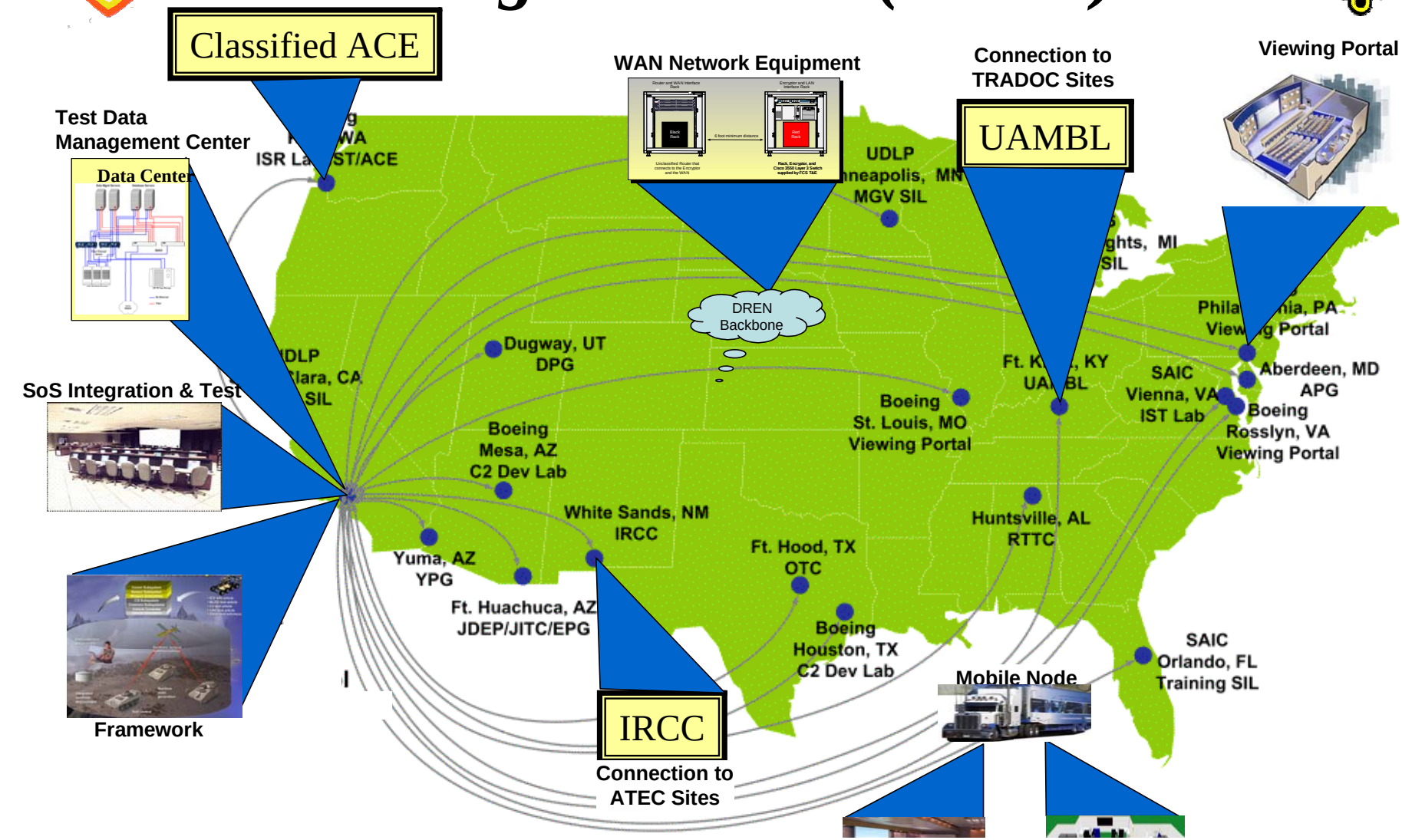
FCS Test & Evaluation Plan



Systems Engineering and Verification

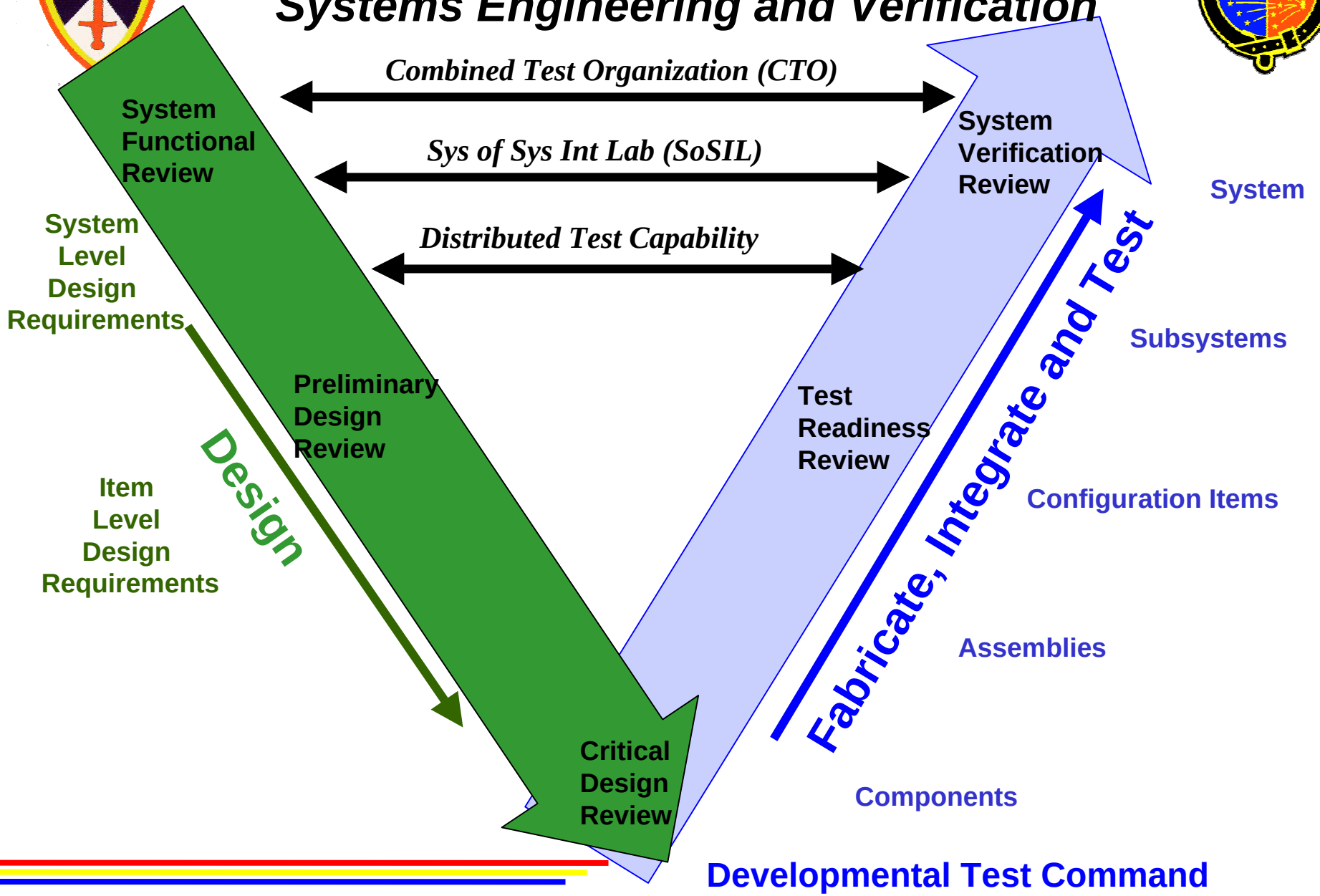


System of Systems Integration Lab (SoSIL)



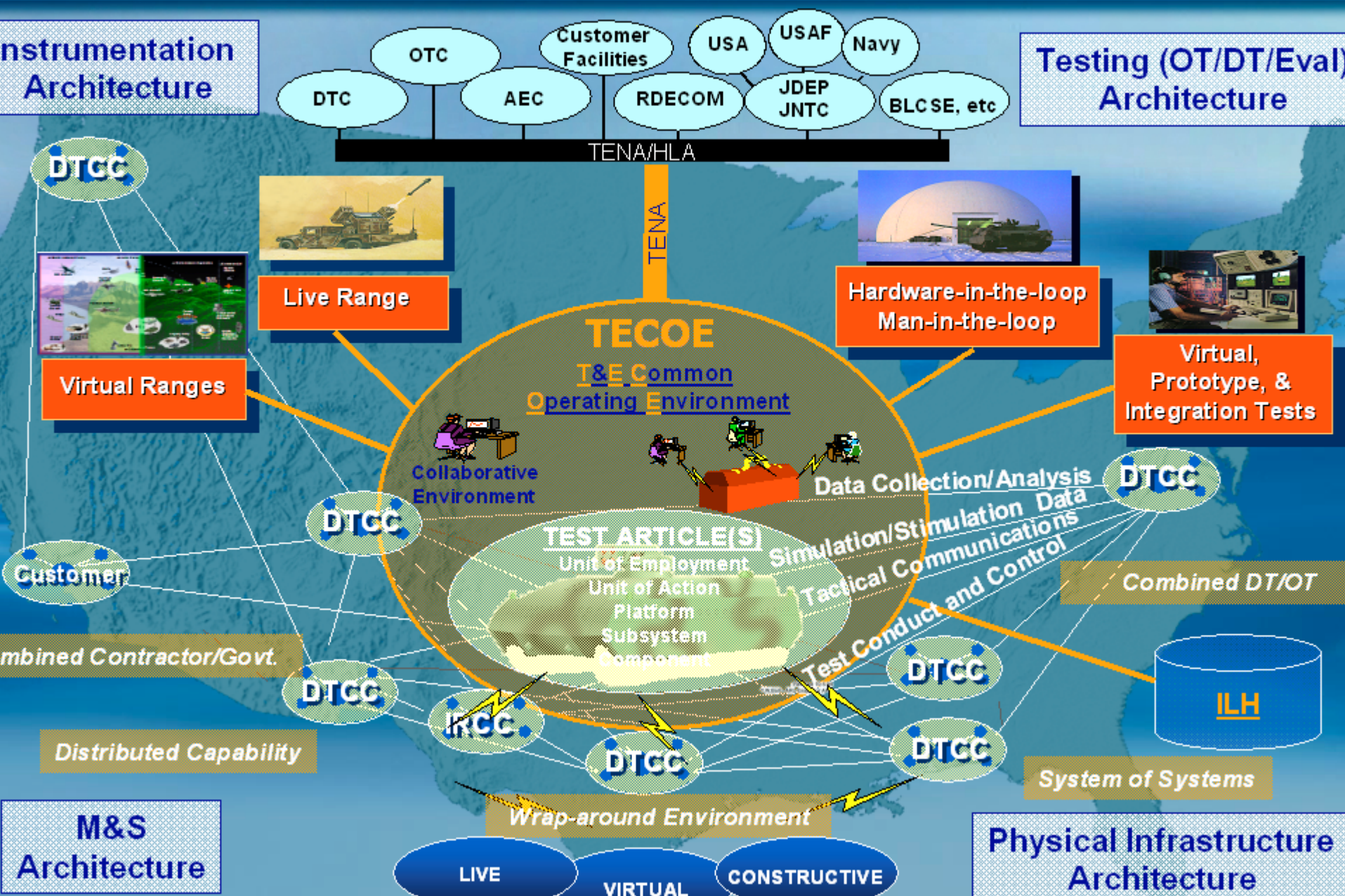
Nationwide Distributed FCS Test Environment

Systems Engineering and Verification

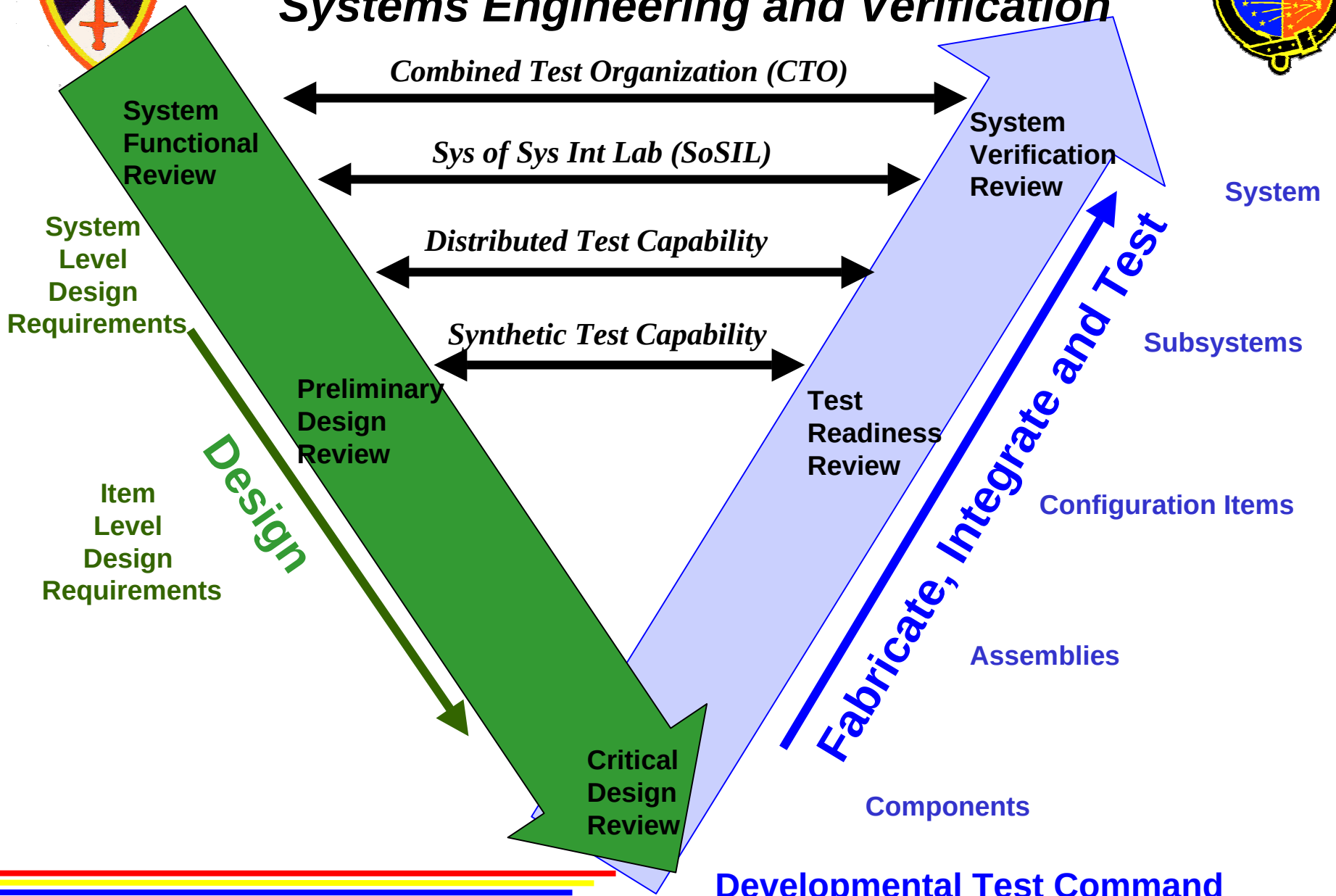


ATEC Distributed T&E Architecture

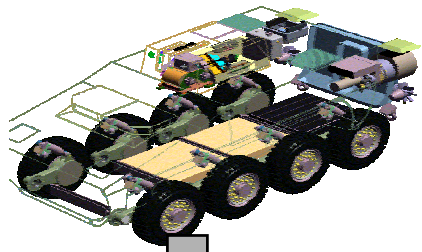
OV-1



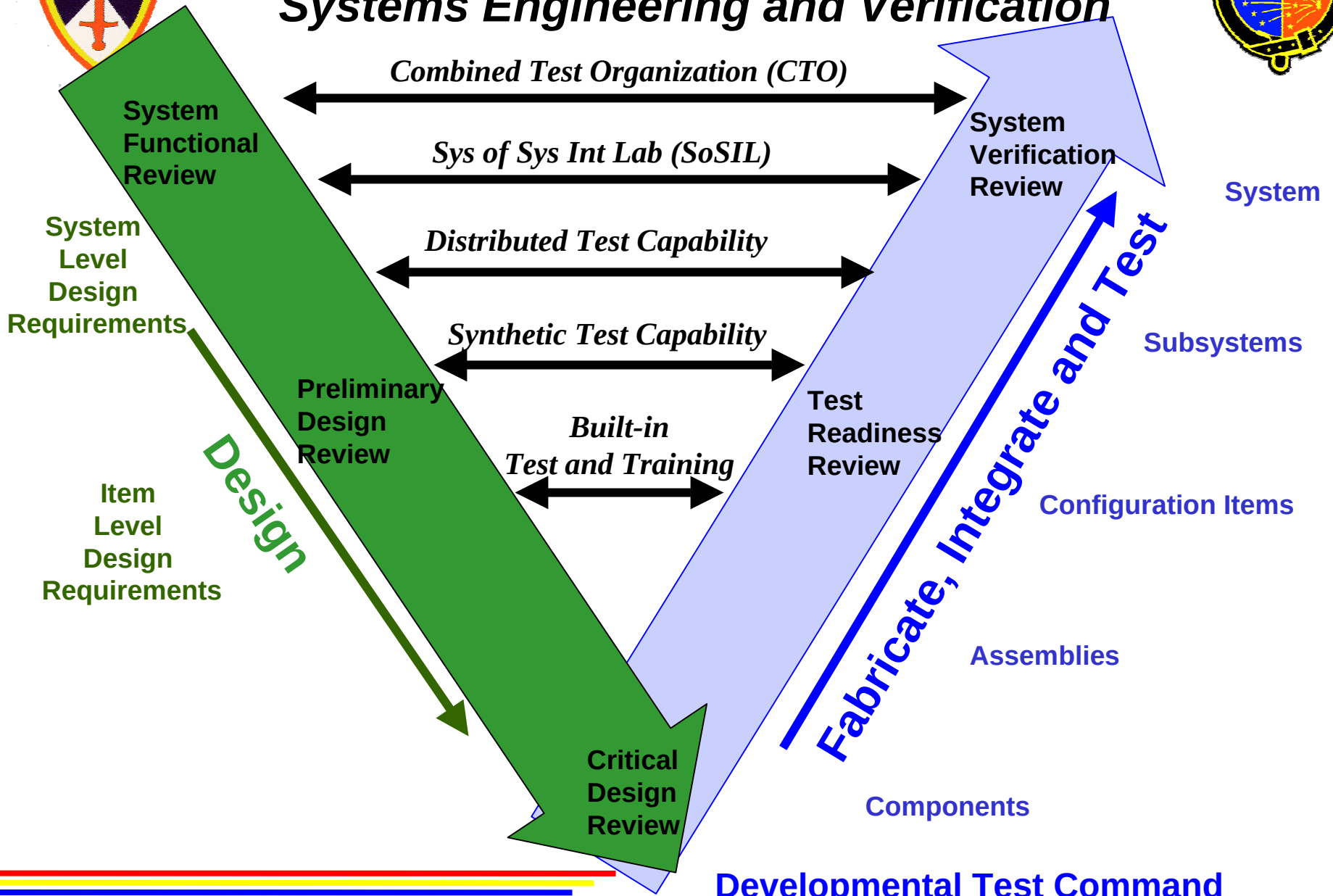
Systems Engineering and Verification



Synthetic Test Capabilities



Systems Engineering and Verification



Built-in Test and Training

- Embedded Instrumentation
  - Design-in test and training instrumentation

- Test instrumentation
  - Data bus capture
  - Specialized critical test requirements

- Training instrumentation
  - Real-Time Casualty Assessment
  - Tactical Engagement Simulation
  - Embedded training

Highlights

- How do we ensure that T&E planning process is integrated into the SE process?
  - Early involvement of the tester.
- How do we integrate the SEP and TEMP?
  - Build them together using a CTO approach.
- How do we ensure the tester is part of the SE process?
  - Get the CTO involved early
- How do we make T&E support verification of the SE process?
  - T&E is the verification part of SE
  - Implement the right tools and proactive planning
- Are there process changes need by industry and Govt?
  - CTO ensures an effective, integrated T&E strategy

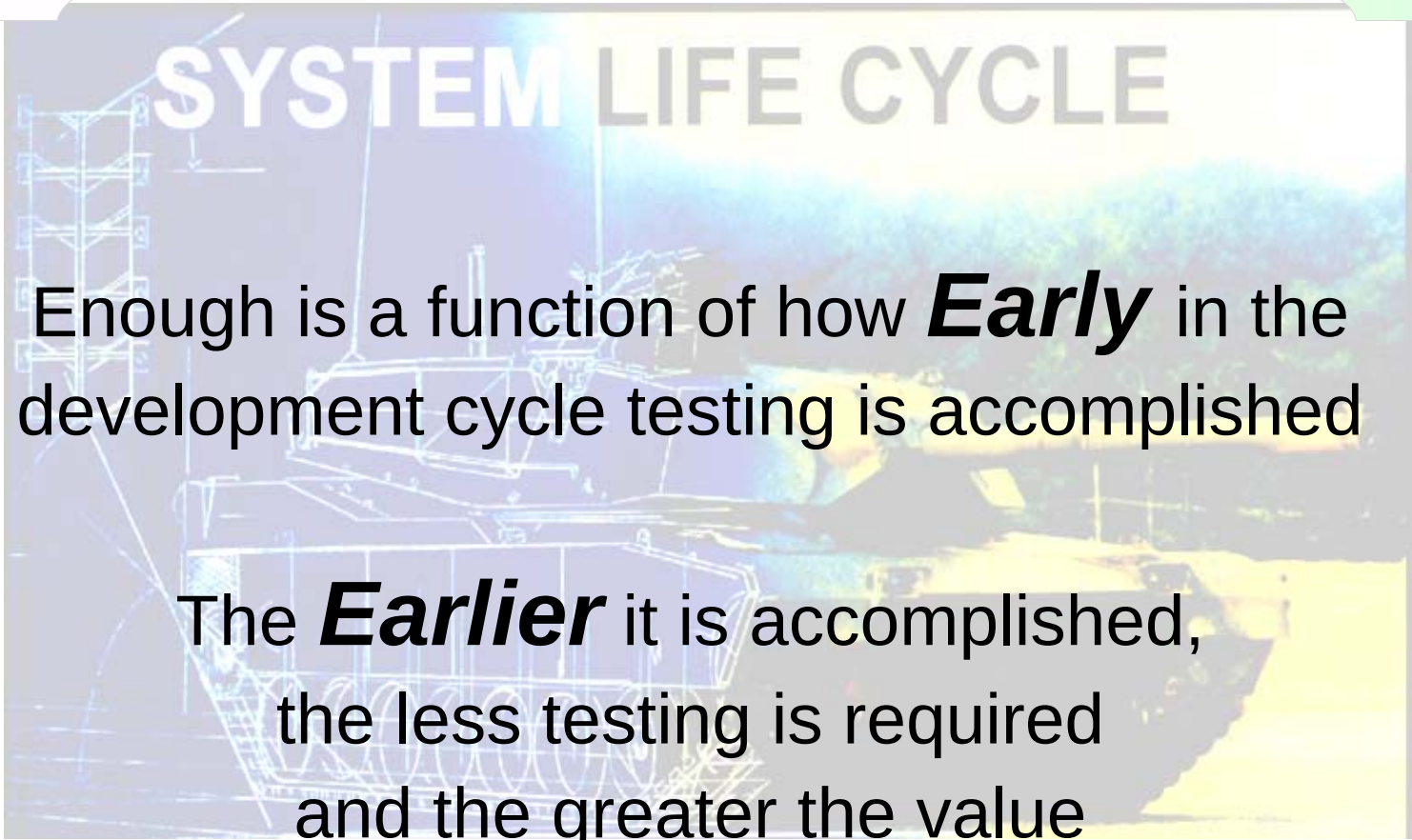
How Much is Testing Enough

- To gather information to reduce the risk to a level acceptable to those responsible for the application
- Who is really responsible for the application and can determine the acceptable risk; tester, evaluator, contractor, PM, developer, user, Congress, media, taxpayer, or a combination of these?

- To test until risk has been adequately reduced
- What determines adequately reduced risk; resource constraints, schedule constraints, environmental and safety concerns, a driving requirement to immediately employ the technology, political or social considerations?

How much testing is Enough*?*

Concept Development Production Post-Production



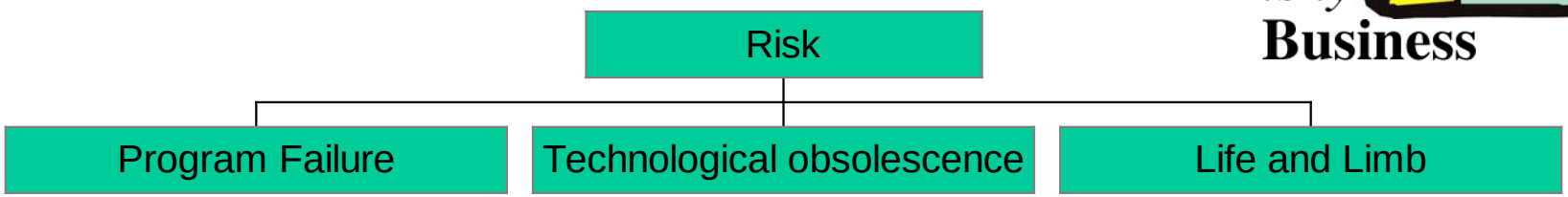
Enough is a function of how ***Early*** in the development cycle testing is accomplished

The ***Earlier*** it is accomplished, the less testing is required and the greater the value

Understand the Risk

How much ~~Testing is Enough?~~

Risk are we willing to accept?



Testing must be conscious of, highlight, and explore all risk areas.

Thank you for the invitation to speak here today…
any questions?