An Approach to Achieving Digital Interoperability for the DoD:

A discussion of the Joint Staff J6 Coordinated Implementation Methodology

Marsha Mullins, JS J6 DDC5I Joint Fires Division

marsha.d.mullins4.civ@mail.mil

29 October 2014

NDIA 17th Annual Systems Engineering Conference

Problem Statement and Discussion (U)

- **Programs continue to field non-standard, non-interoperable, Service-specific digital data exchange capabilities**
  - **Negatively impacts mission performance in Joint and Coalition environments**
  - **Supported by 28+ years of GAO Reports (ex. 2003, Interoperability Issues of Digital Systems)**
  - **True despite DoD increased emphasis on Interoperability Certification**
- **Existing interoperability certification is program-centric**
  - **Enforces development of architectures and relies heavily on Standards compliance testing**
  - **Programs often "architect the world around themselves"**
  - **Standards often do not provide details on "how" to implement communications to meet mission IERs and end-to-end mission processes**
  - **Two systems can be compliant with the same standard, yet not be interoperable due to varied implementation decisions.**
  - **Provides Programs the autonomy to select standards options independently resulting in non-interoperability**

"Within Joint Forces, interoperability should be widespread and should exist at all echelons. It should exist among Services and extend across domains and to partners" *~Capstone Concept for Joint Operations: Joint Force 2020*

Interoperability Challenges (U)

- **No single organization responsible for defining and *funding* Joint and Coalition interoperability requirements**
- **Joint and Coalition requirements often do not make the threshold for resourcing during prioritization 'rack and stack'**
- **Coalition interoperability is only addressed by programs with active Foreign Military Sales (FMS) cases**
- **Programs are constrained by resources to addressing first-order interface requirements rather than considering end-to-end process**
  - **System A ---> System B --->System C**
- **Lack of development lifecycle synchronization across multiple program offices**
  - **Legacy technology/communications**
  - **Emerging technology (wide-band nets, XML, services)**
  - **Bridging air and ground environments**
  - **Constrained by least common denominator**

Proven Solution (U)

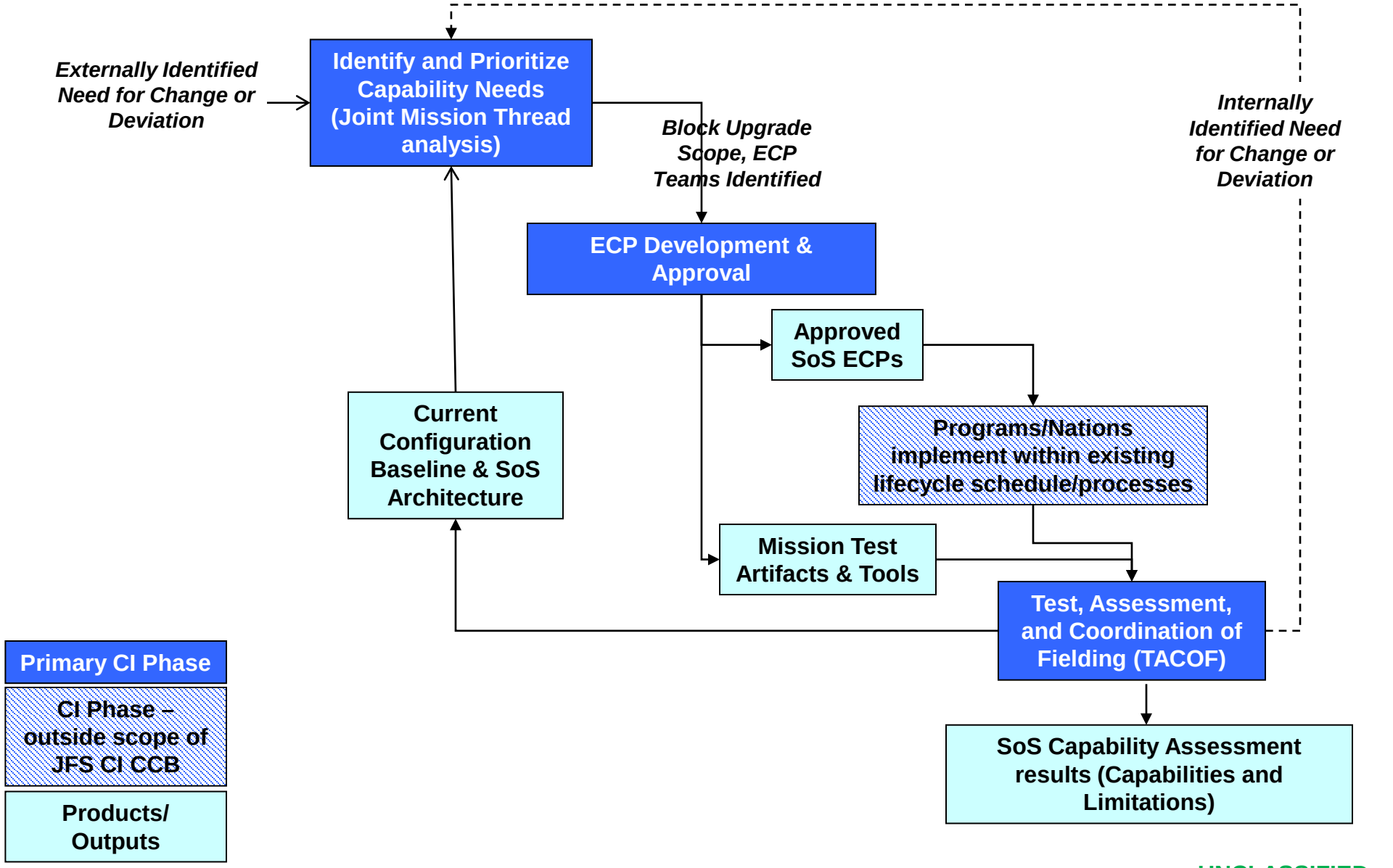
- **Achieve Joint and Coalition interoperability through coordinated implementation of digital communications standards**
  - **Use of configuration managed standards (Military, NATO, Industry, open)**
  - **Communities define standards-profiles to meet mission information exchange requirements (IER); profiles state exactly which options are to be implemented by all participants**
  - **Mission-based measures/metrics for interoperability (vice Program-based)**
  - **Collaborative development, testing, and assessment**
- **Examples of Coordinated Implementation (JS J6-led efforts)**
  - **Coordinated Implementation (CI) of Digitally-Aided Close Air Support (DACAS)**
  - **Digitally-Aided Personnel Recovery (DaPR) Integrated Product Team (IPT)**
  - **Coordinated Implementation of Digitally-Aided Fire Support (DAFS)**

Coordinated Implementation (U)

- **CI fills a gap between traditional standards management/compliance and desired interoperability by:**
  - **Defining "HOW" digital communications standards will be implemented**
  - **Defining end-to-end combination of digital messages to achieve a SoS capability**
  - **Focusing on shared mission-specific Information Exchange Requirements (IER)**
  - **Considering the minimum implementation to achieve a capability within the architectural constraints and limitations of the SoS**

Bringing disparate stakeholders together in a *collaborative* effort is the *cornerstone* of the Joint Staff J6's Coordinated Implementation (CI) approach to achieving digital interoperability within *mission-specific* Systems of Systems (SoS).

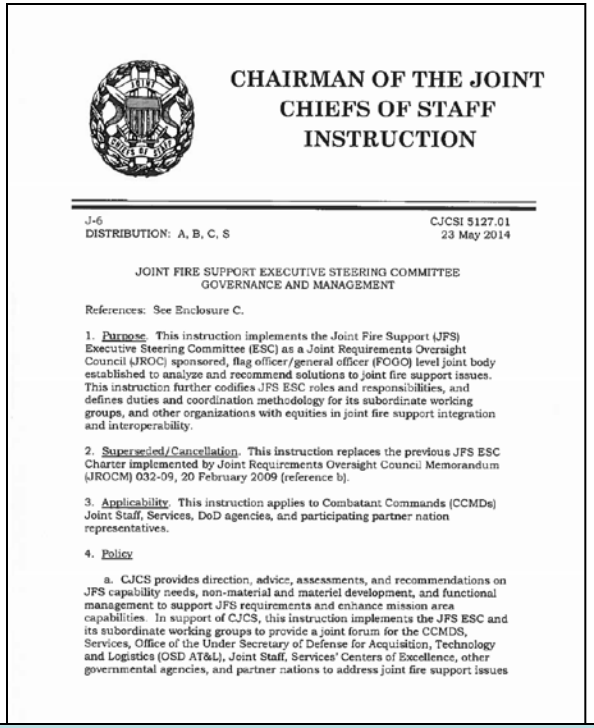
Existing Coordinated Implementation (CI) Process (U)



JFS ESC Establishment

"The JROC approves the transition of the JCAS ESC to a newly chartered JFS ESC effective 1 March 2009. The JFS ESC expands the JCAS ESC to a more comprehensive Joint Fire Support forum addressing specific end-to-end joint solutions."

"This instruction implements the JFS ESC as a JROC sponsored, FOGO level joint body…"



CHAIRMAN OF THE JOINT CHIEFS OF STAFF INSTRUCTION

J-6
DISTRIBUTION: A, B, C, S

CJCSI 5127.01
23 May 2014

JOINT FIRE SUPPORT EXECUTIVE STEERING COMMITTEE GOVERNANCE AND MANAGEMENT

References: See Enclosure C.

1. Purpose. This instruction implements the Joint Fire Support (JFS) Executive Steering Committee (ESC) as a Joint Requirements Oversight Council (JROC) sponsored, flag officer/general officer (FOGO) level joint body established to analyze and recommend solutions to joint fire support issues. This instruction further codifies JFS ESC roles and responsibilities, and defines duties and coordination methodology for its subordinate working groups, and other organizations with equities in joint fire support integration and interoperability.

2. Superseded/Cancellation. This instruction replaces the previous JFS ESC Charter implemented by Joint Requirements Oversight Council Memorandum (JROCM) 032-09, 20 February 2009 (reference b).

3. Applicability. This instruction applies to Combatant Commands (CCMDs) Joint Staff, Services, DoD agencies, and participating partner nation representatives.

4. Policy

a. CJCS provides direction, advice, assessments, and recommendations on JFS capability needs, non-material and materiel development, and functional management to support JFS requirements and enhance mission area capabilities. In support of CJCS, this instruction implements the JFS ESC and its subordinate working groups to provide a joint forum for the CCMDS, Services, Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (OSD AT&L), Joint Staff, Services' Centers of Excellence, other governmental agencies, and partner nations to address joint fire support issues

JFS ESC Mission: "To assist Services and Combatant Commands in providing enhanced, jointly integrated, interoperable, and cost efficient Joint Fire Support capabilities to the warfighter."

CI ECP Development Process(U)

- **Only initiated after Services/COCOM/Partner Nation operational communities endorse scope of Block upgrade Warfighter Requirements through the Joint Fire Support Executive Steering Committee (JFS ESC)**
- **Program offices provide engineering representatives to participate on ECP Teams who develop their respective ECP**
  - **Familiar with their systems' architecture, including capabilities and limitations**
- **ECP Team Leads submit Problem Reports to Requirement Working Group (RWG); worked through the JFS ESC JCAS or JFS Action Officer Working Group for resolution**
- **CI participating programs approve ECP content**
- **JFS ESC Chair sign ECPs verifying that consensus was reached**
- **Post approval, ECPs are only modified to correct/clarify content using the Problem Report mechanism (submitted to RWG when operational inputs are needed)**

Key Tenets for CI Test & Assessment (U)

- **CI coordinates the SoS (Joint & Coalition) test environment**
- **CI provides SoS T&A tailorable "packages" (including scenarios, test threads, measures, etc.) and test/assessment tools to the PMs**
- **Programs adopt the SoS T&A procedures, artifacts, measures, etc.**
- **Services and Programs conduct the demos, tests and assessments**

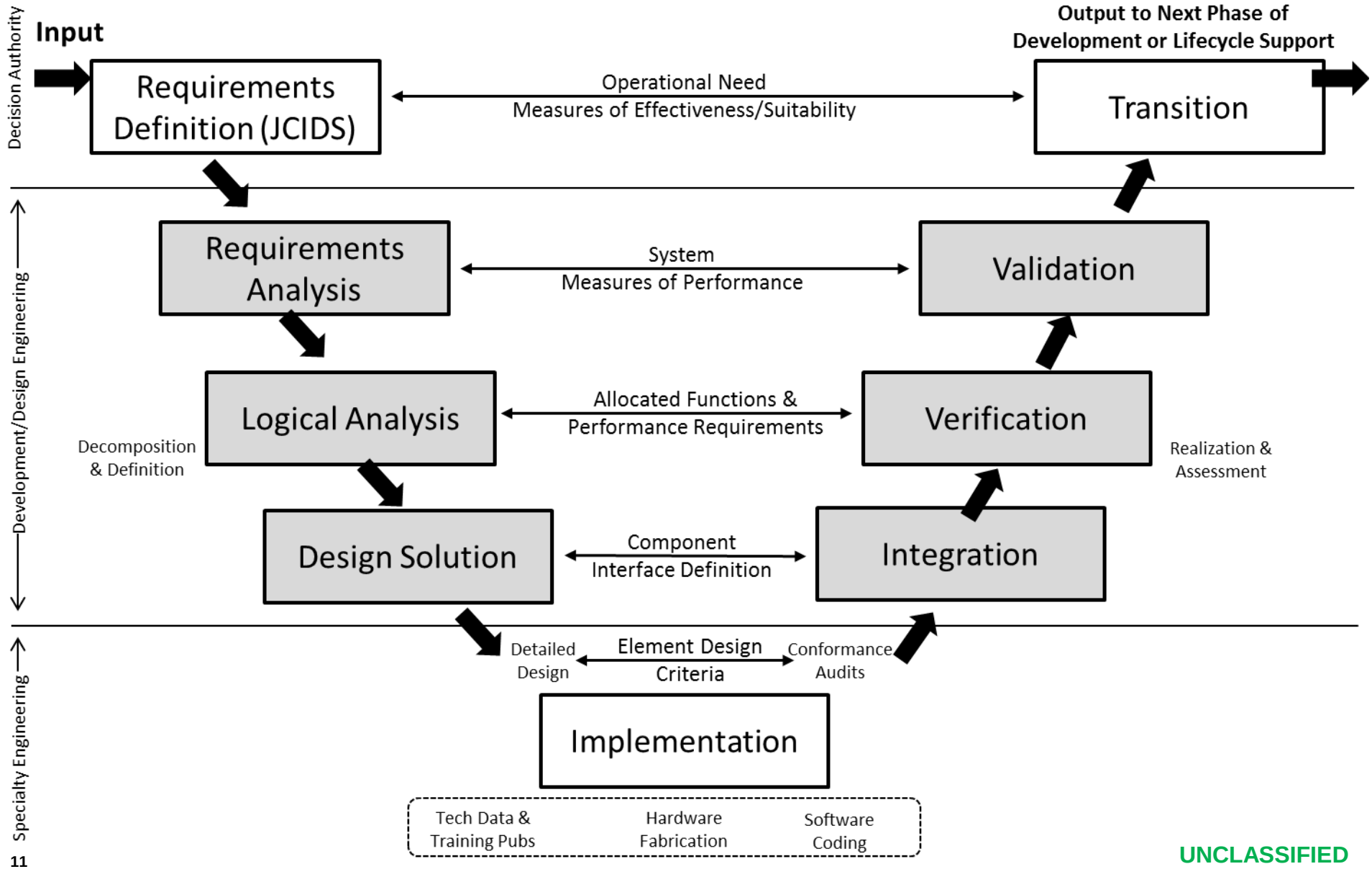
We do not dictate
how to accomplish the mission…
We offer up tools and a process for the entire System of Systems

Test Packages and DACAS VMF Messaging Tool (U)

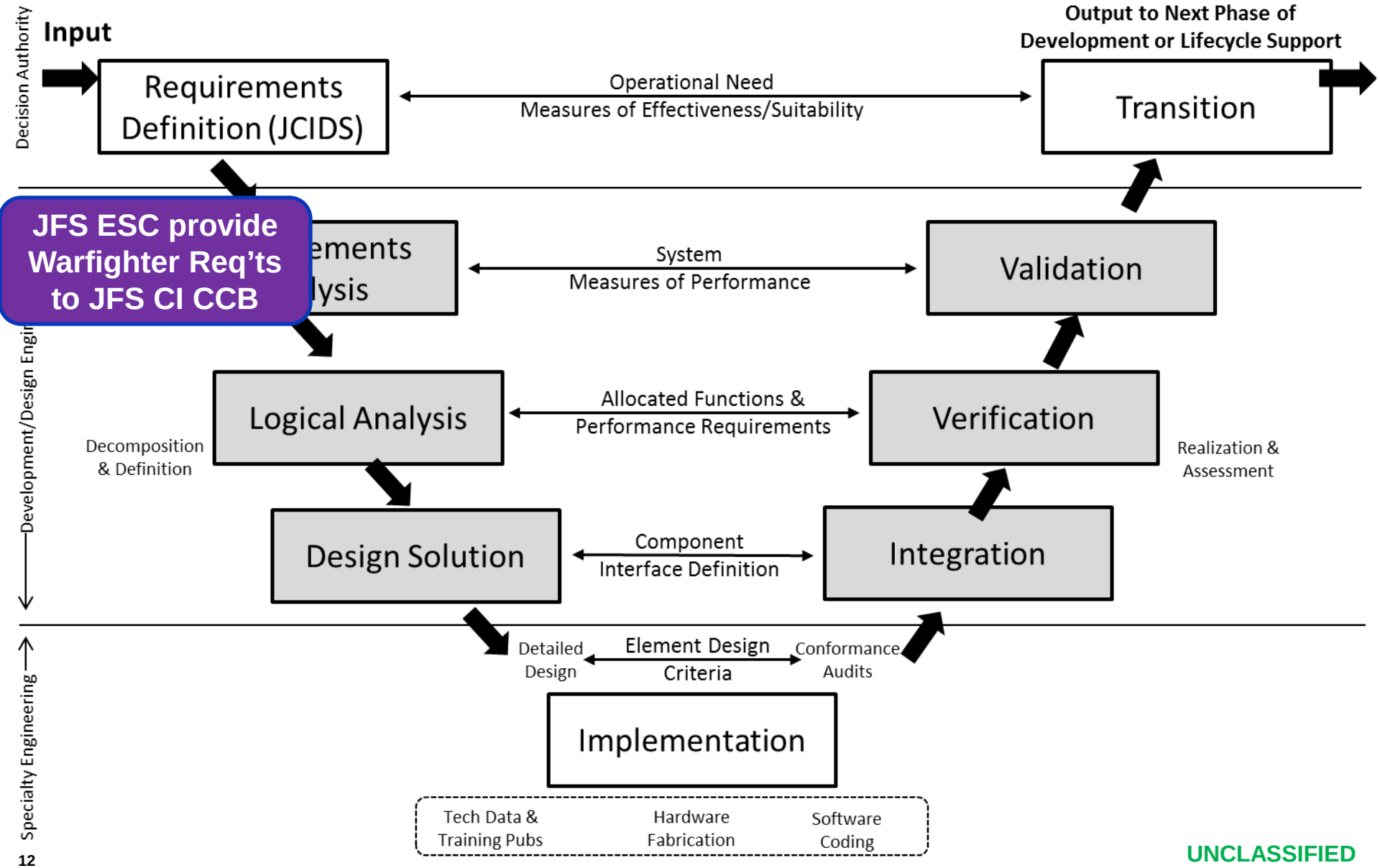
- Test packages include:
  - Mission and technical measures/metrics
  - Test threads
  - Engineering/Development Test Tools
- DVMT developed by JITC; funded by JS
- The tool supports positive testing of compliance to:
  - Mil-Stds as codified by DACAS Block 1 ECPs
- Supports negative testing (error handling)
- Pre-test, test, and post-test modes
  - Test includes passive or active operations
- Made available to U.S. Programs and Nations (via existing FMS)

During Bold Quest 13-2 ***live-fly*** demonstration achieved successful ***machine-to-machine*** data exchanges with ***216 unique CAS system/system pairings***, including all U.S. Services and seven (7) Partner Nations.

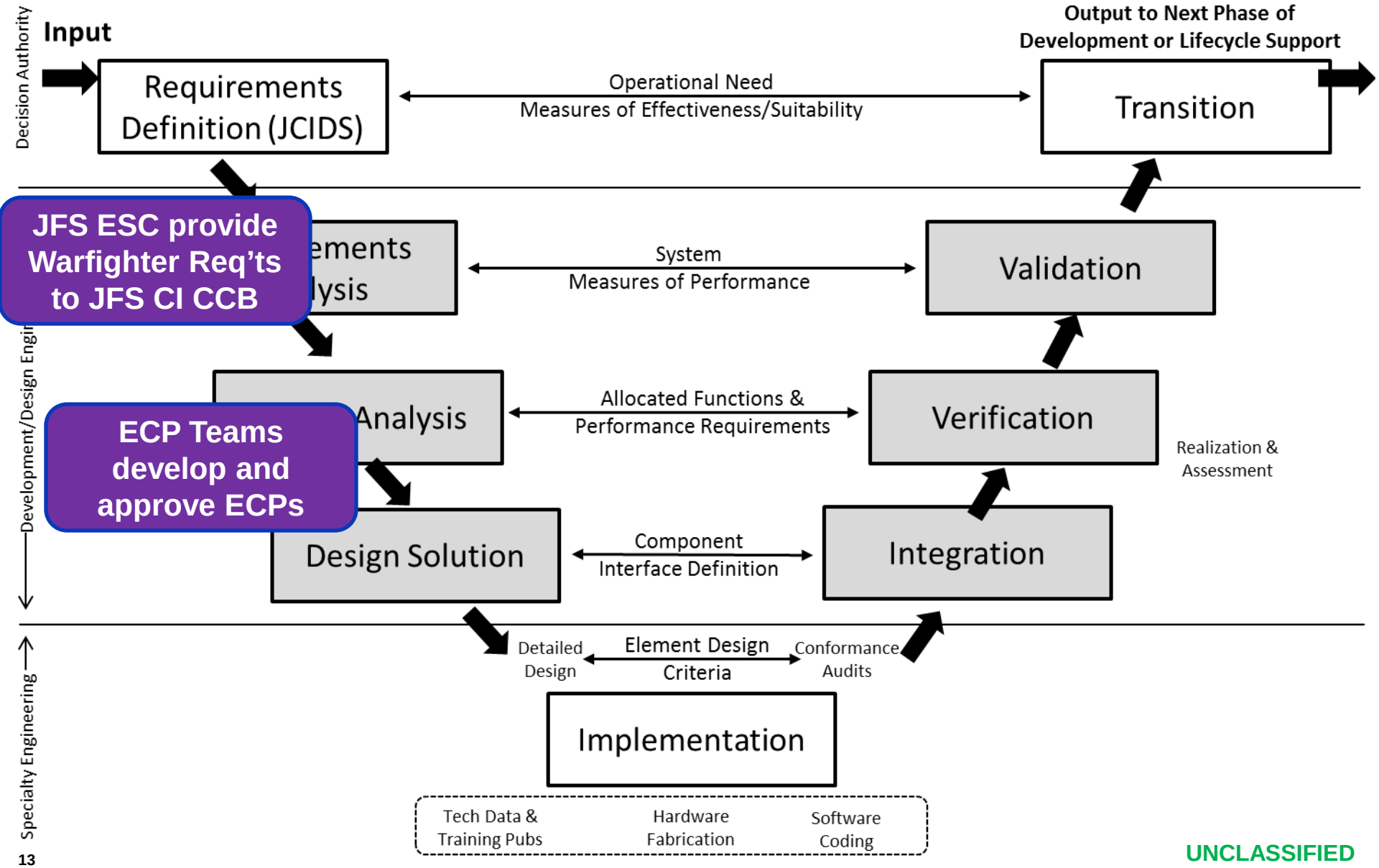
CI and the Systems Engineering V (U)



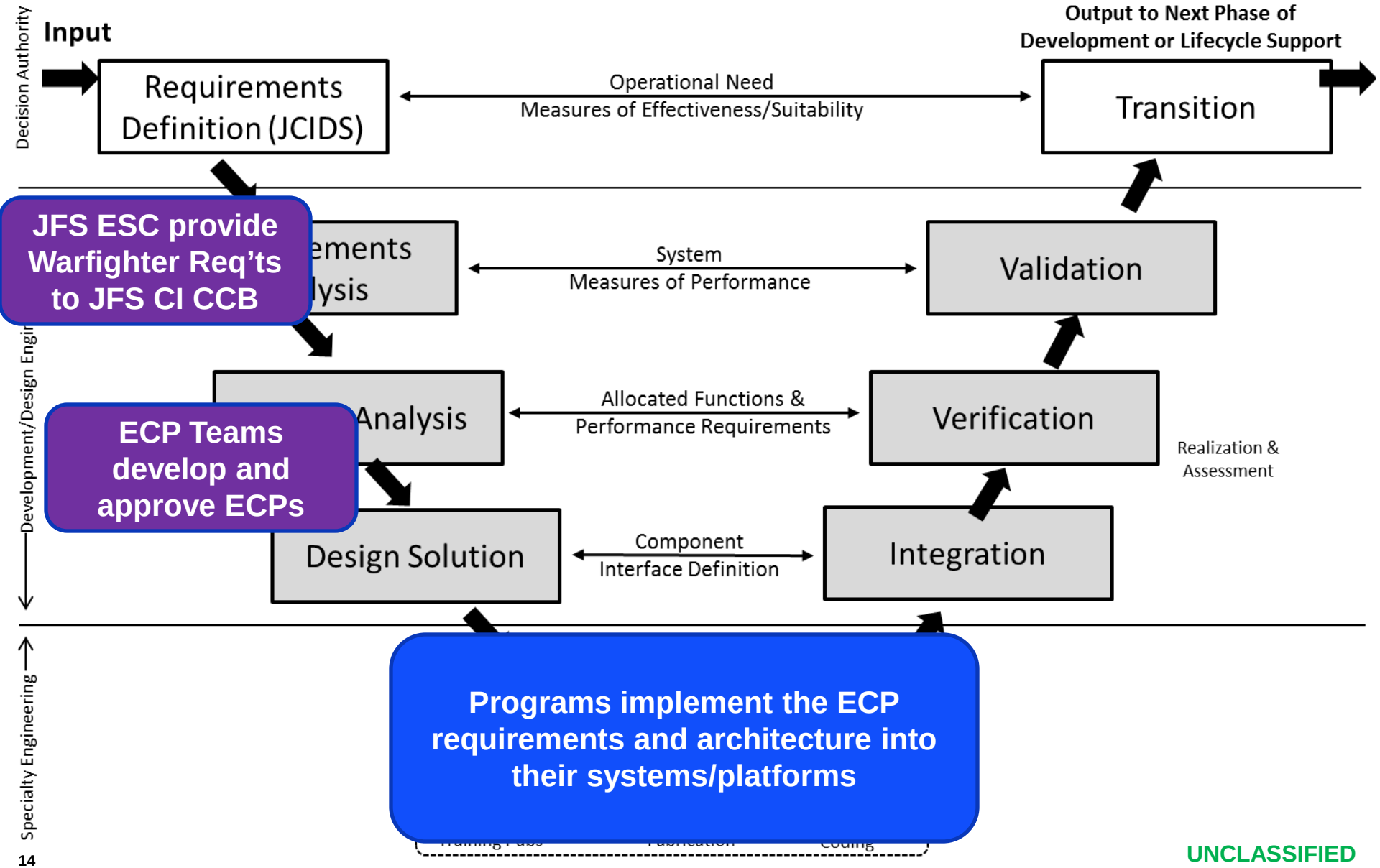
CI and the Systems Engineering V (U)



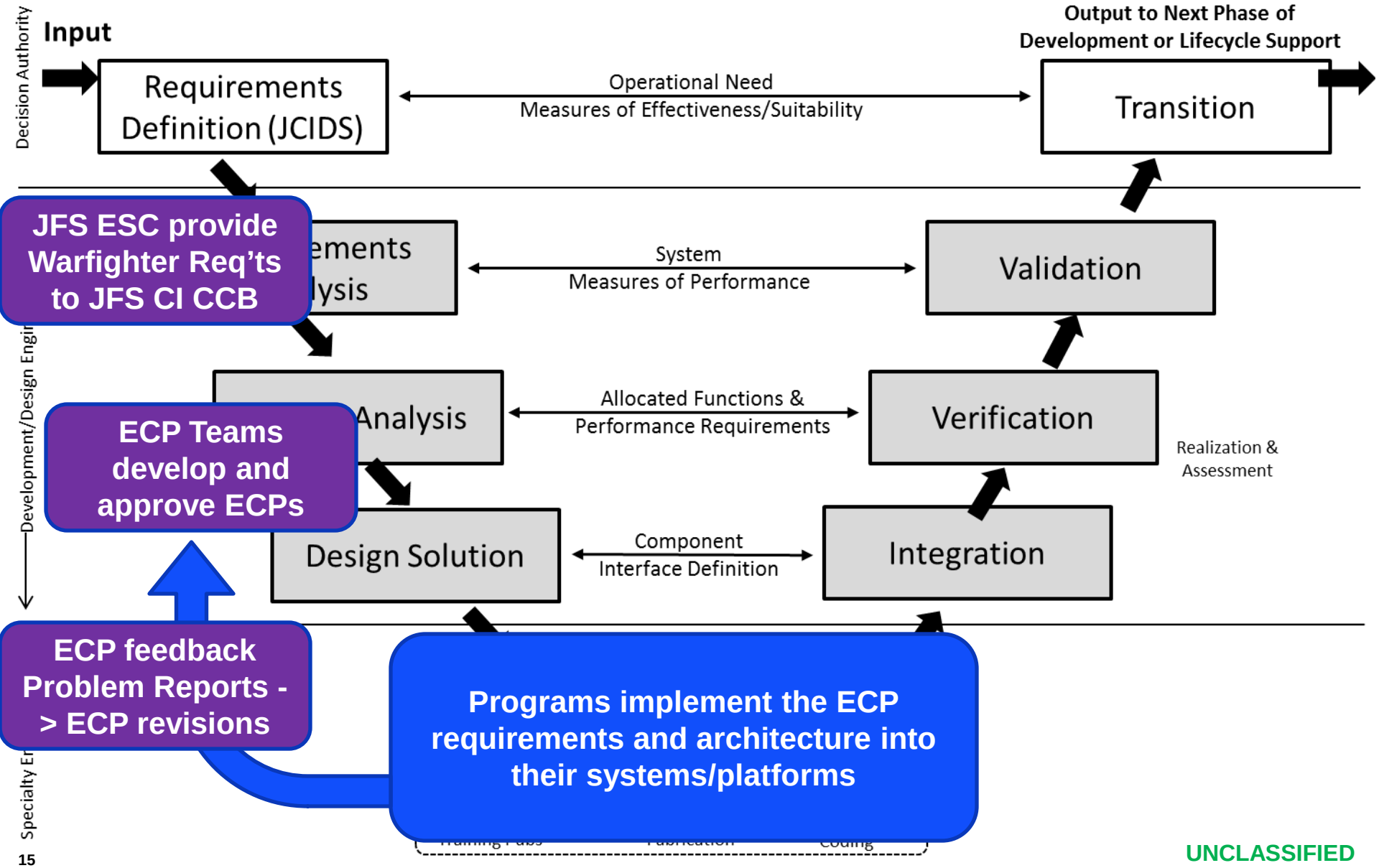
CI and the Systems Engineering V (U)



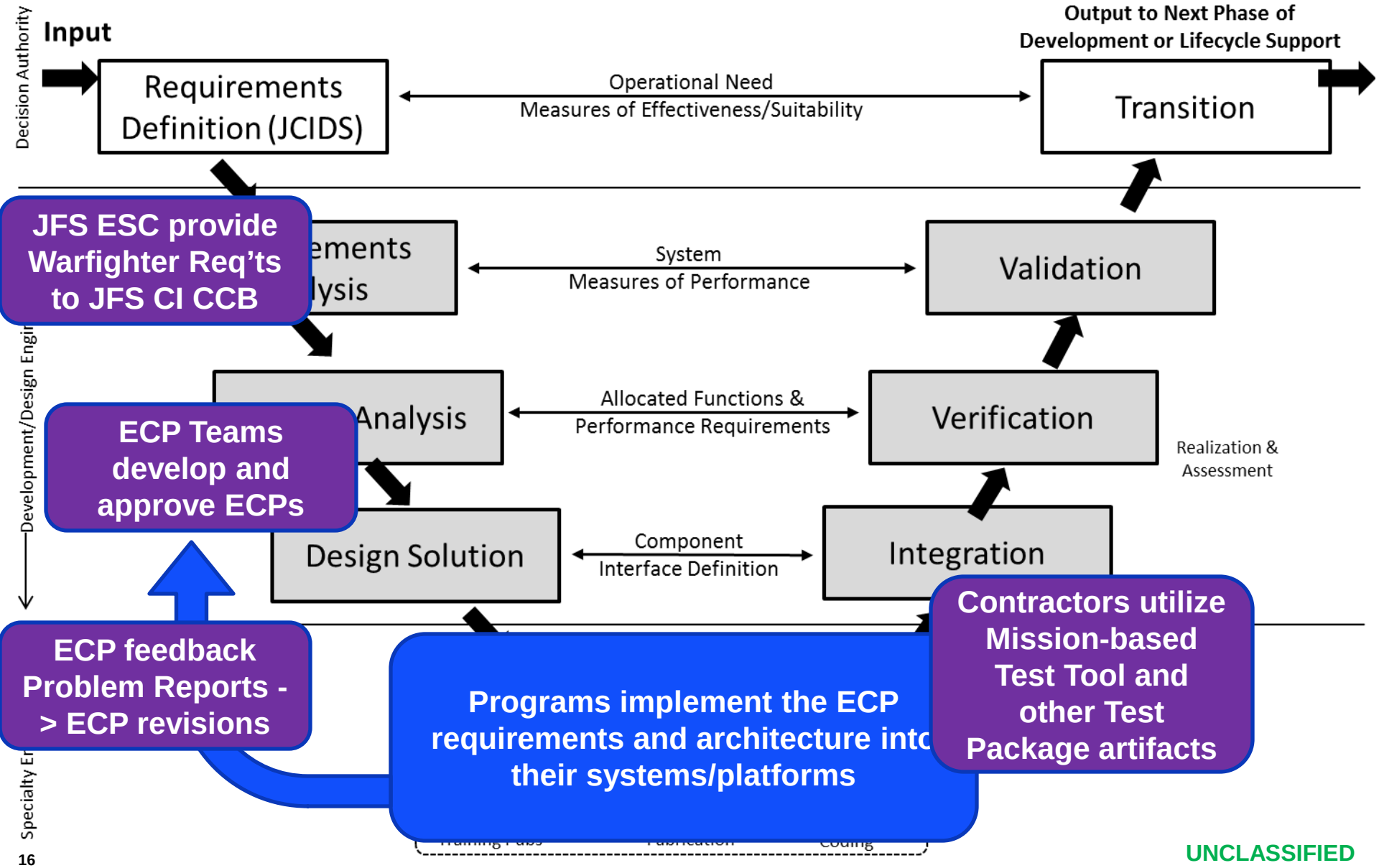
CI and the Systems Engineering V (U)



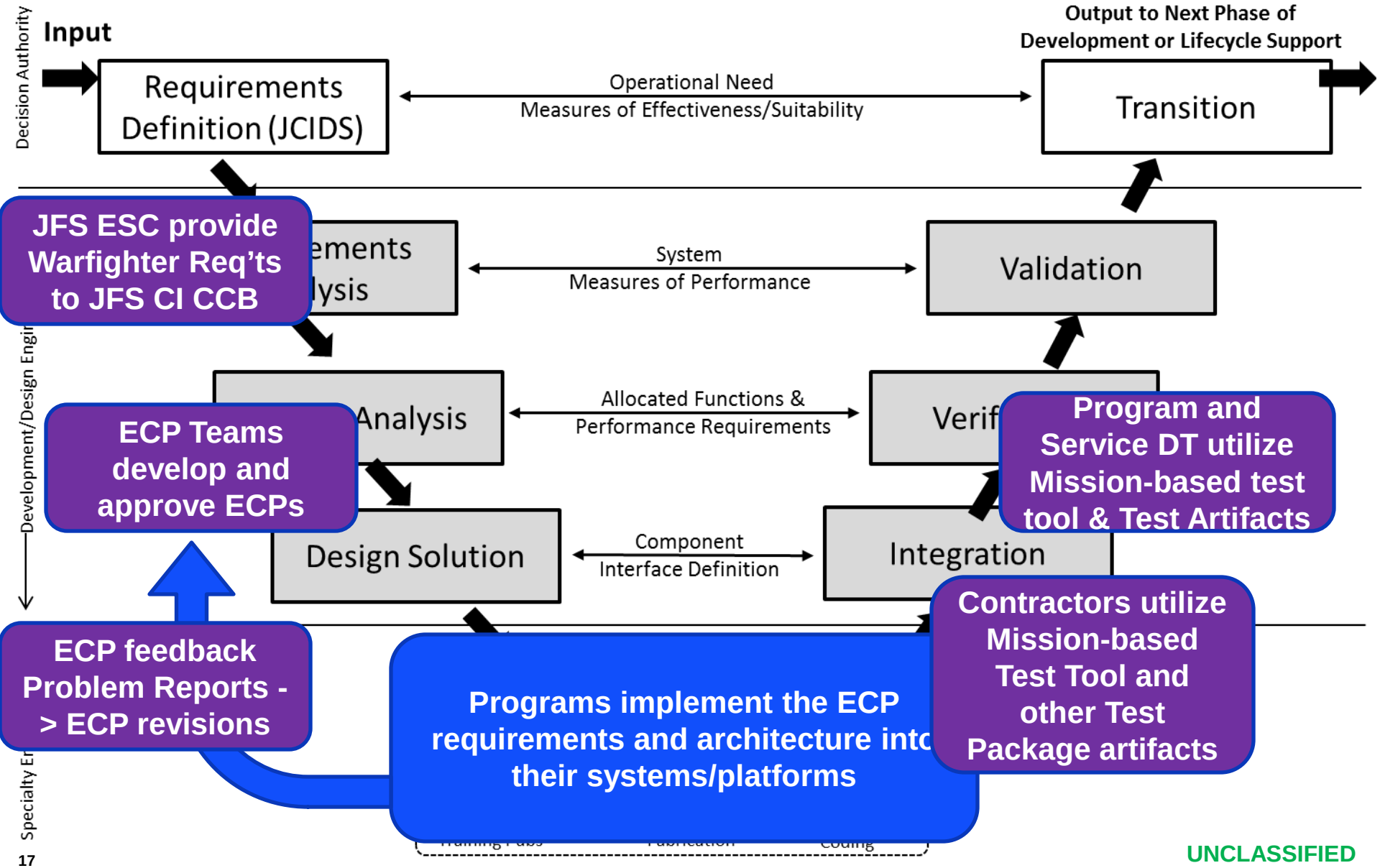
CI and the Systems Engineering V (U)



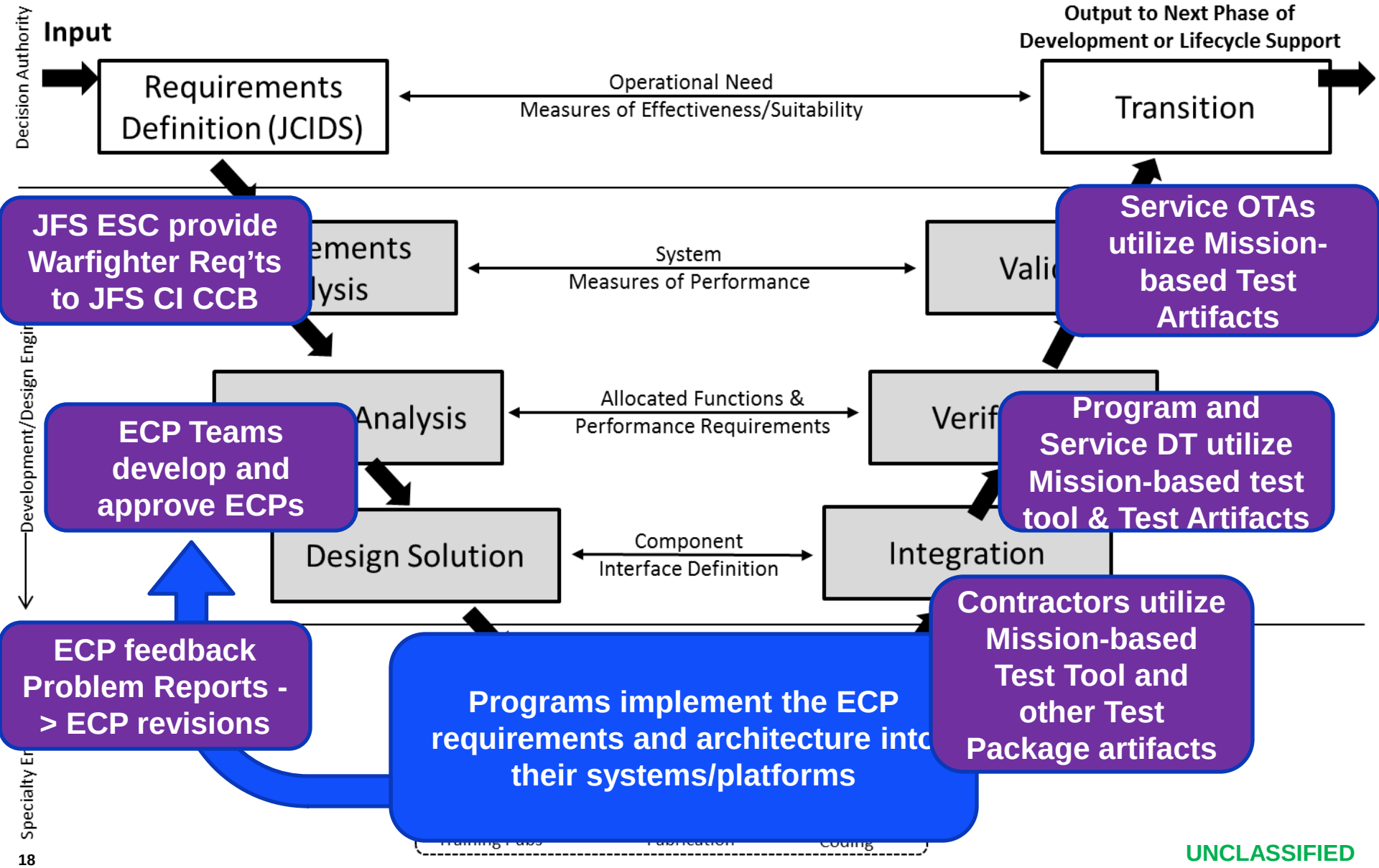
CI and the Systems Engineering V (U)



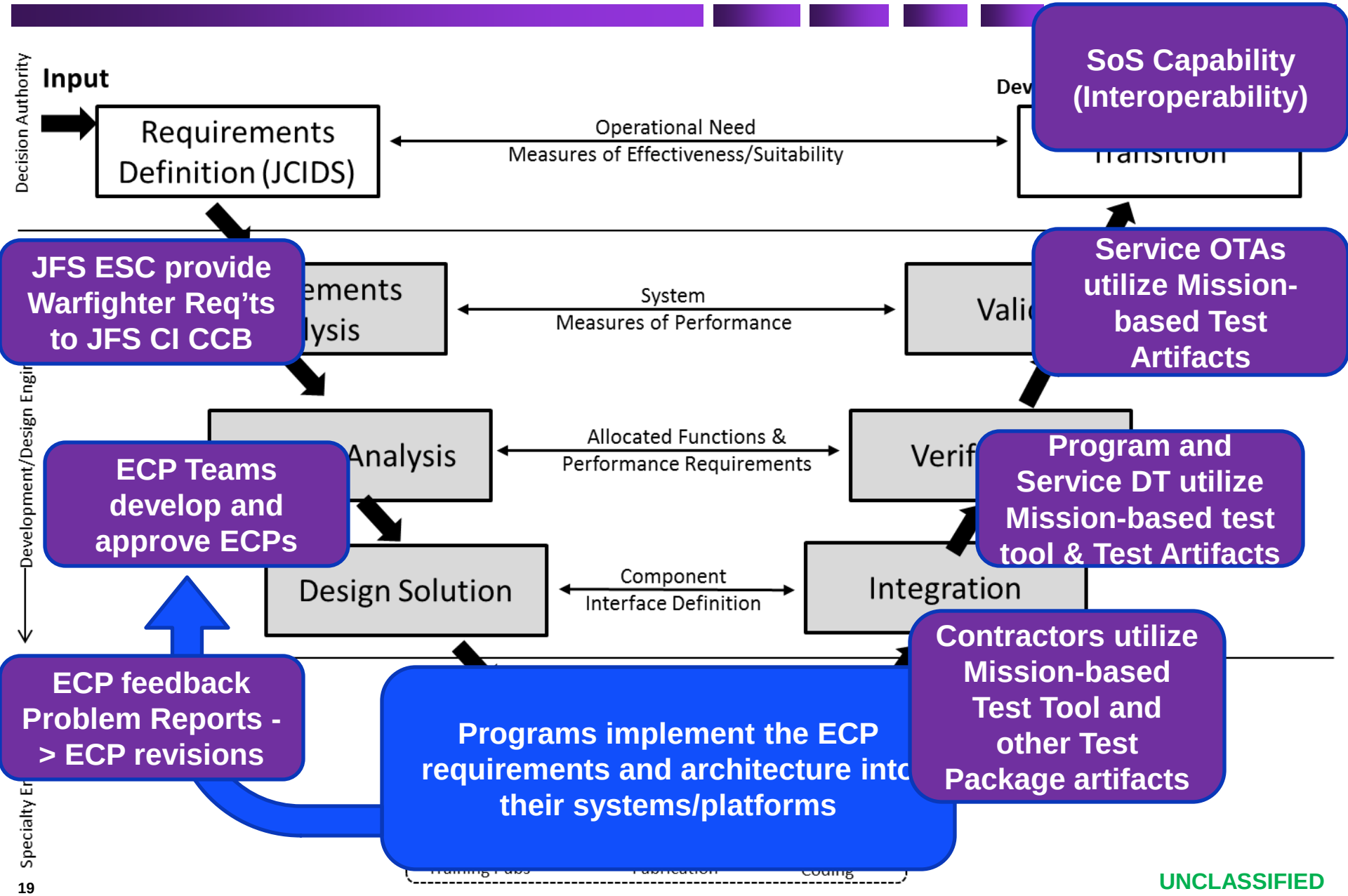
CI and the Systems Engineering V (U)



CI and the Systems Engineering V (U)



CI and the Systems Engineering V (U)



Integration of DACAS by the Program Offices

JS J6 EFFORTS

DACAS REQUIREMENTS

JFS ESC Warfighter Requirements

SoS ECPs

SoS ECPs

SoS ECPs

SoS ECPs

DACAS Block Definition Package (Block 1)

Program Office incorporates the DACAS ECPs/Reqts into Individual system/platform design documentation including requirements documents, contracts, and component procurement

DACAS TEST REQUIREMENTS

Operational (SoS) Measures

Data Collection Plan

Joint Test Threads

Test Tools

DACAS T&A Packages

Program Office adopts the DACAS T&A artifacts, leverages DACAS tests tools, and conducts the demos, tests and assessments with DACAS CI support

Program Office EFFORTS

Program Office System Requirements

System Requirements

Contractor Reqt/ Task

Component Reqt/ Task

Program Office Test Requirements

System TEMP and DT/OT Test Plans

Contractor/ Engineer Test Plans

Component and Integration Test Plans

Closing (U)

- **Achieving interoperability within a mission area provides operators with:**
  - **Increased decision-making speed and effectiveness**
  - **Increased information exchange accuracy**
  - **Reduced language barrier in Coalition environment**
- **Programs and Nations realize:**
  - **Reduction in overall interoperability engineering costs**
  - **Increase in interoperability assessment opportunities**
  - **Decreased cost to correct interoperability issues**
    - **By identifying early in the lifecycle vice after fielding**

Ultimately, interoperability isn't the responsibility of any one organization or community.
It is however a responsibility we all owe to our warfighters!!!

Questions