System of Systems Analysis of Future Combat Systems Sustainment Requirements

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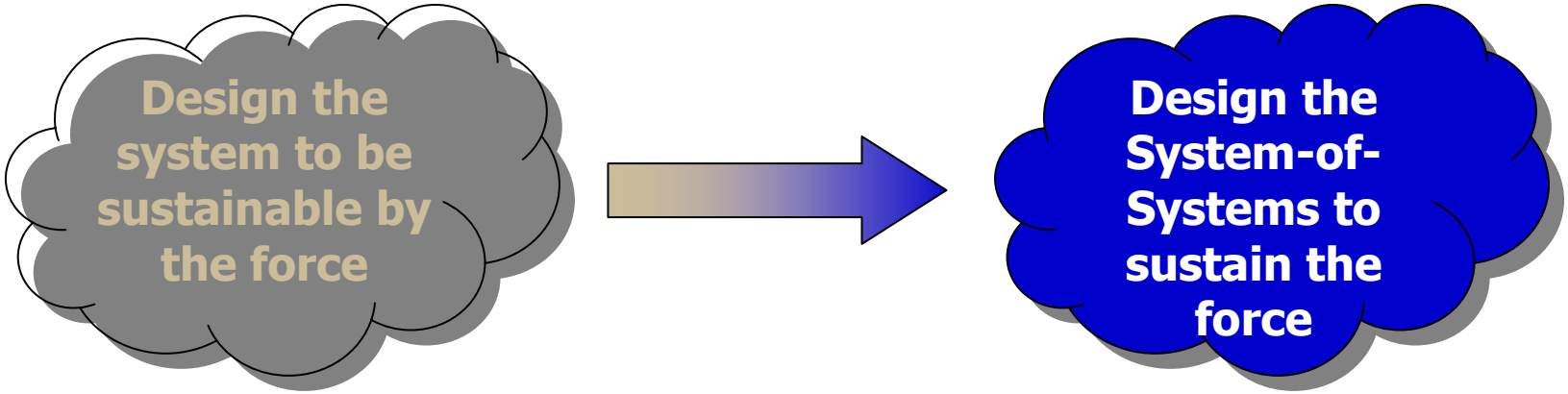
FCS Sustainment



Development of an individual system
Current Army force structure

→

Development of a System-of-Systems
Future Force – Unit of Action

Agenda

FUTURE COMBAT SYSTEMS
FCS
One Team-The Army/Defense/Industry

- **FCS and Army Transformation**
- **Supportability Performance**
- **Analysis Process and Examples**
- **Process Enablers**
- **Lessons Learned**
- **Questions**

Leading Transformation

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- **The US Army "At War and Transforming"**
  - 781,000 to 480,000 active duty since 1990
  - Forces currently deployed in 120 countries
  - Army's transformation effort announced in Oct 1999
  - Leading implementation of network-centric operations
  - Driving Joint interdependency and standards

General Peter J. Schoomaker
Chief of Staff, U.S. Army

- **FCS: Transformation in Multiple Dimensions**
  - Warfighting, logistics, technology, business

FCS is a Complex System of Systems in a Transformational Warfighting Context

Reaffirming the Government's Key Program Tenets

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- Create opportunity for **Best of Industry** to participate
- Leverage government **Technology** base to maximum extent
- **Associate** on-going enabling efforts with LSI-Led activity
- **Collaborative Environment** from design through life cycle
- As a minimum, **Commonality** at subsystem/component level
- Design/plan for **Technology Integration and Insertion**
- Maintain and shape the **Industrial Base** for the future
- Retain **Competition** throughout future force acquisition
- Appropriate **Government Involvement** in procurement processes
- Consistent and continuous **Definition of Requirements**
- Maintain and shape government acquisition community
- Program **Affordability - Balance** performance and sustainment
- One team operating with **Partnership and Teamwork**

The tenets remain constant: Applying them to the Current and Future Force

Future Combat Systems

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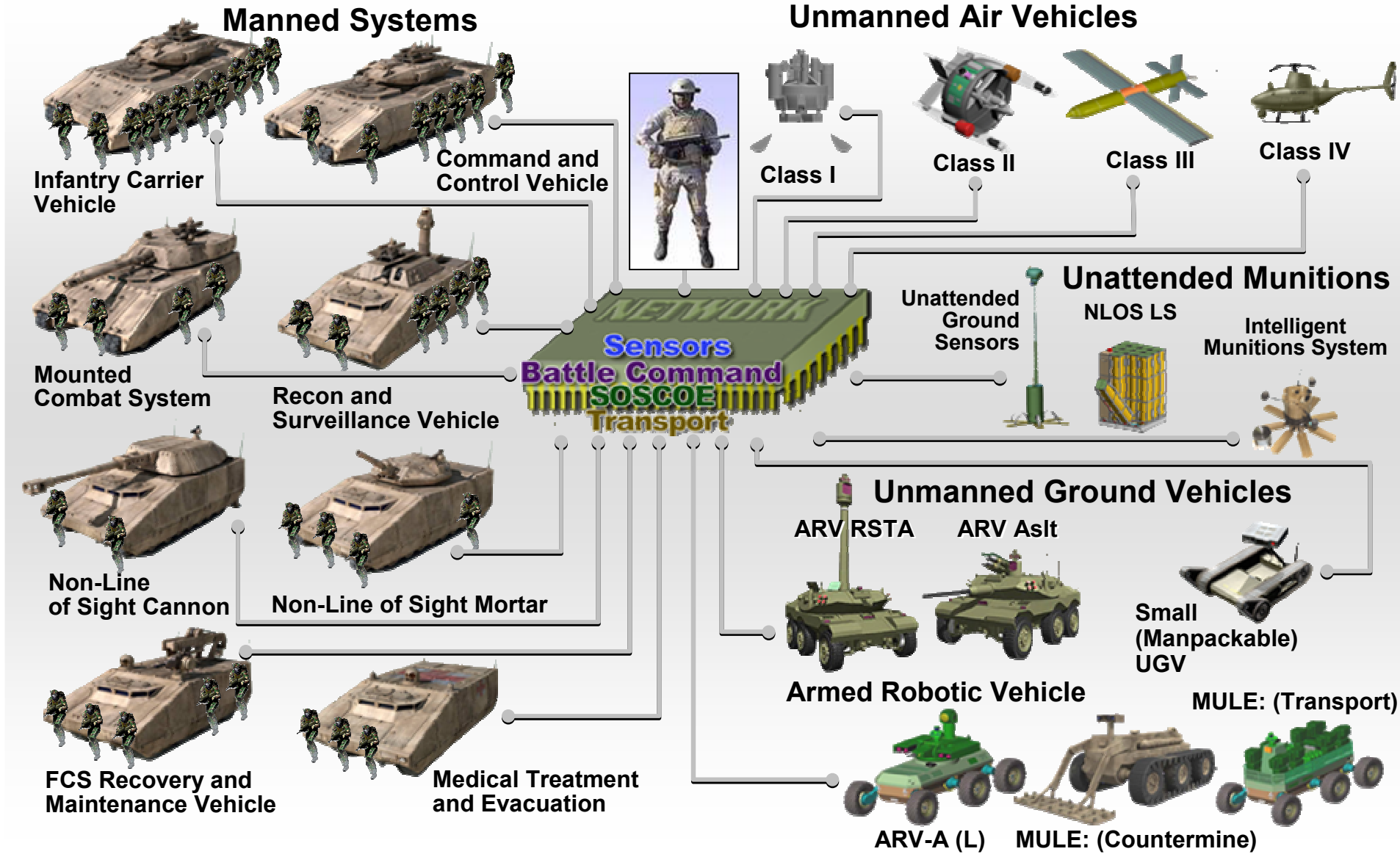

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Supportability Performance

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- **Supportability Performance Objectives**
  - Reduced Logistics Footprint
  - Reduced Demand for Maintenance
  - Reduced Demand for Supply

- **Enabled by**
  - Personnel Efficiencies
  - Improved Reliability/Availability
  - Lower Maintenance Ratio
  - Increase in Crew-performed Maintenance
  - Lower Consumption Rates
  - Part and supply Commonality
  - Self-Sustainment
  - Networked Sustainment

The Integrated - Interoperable UA
Network-Centric Warfighting - Supportability

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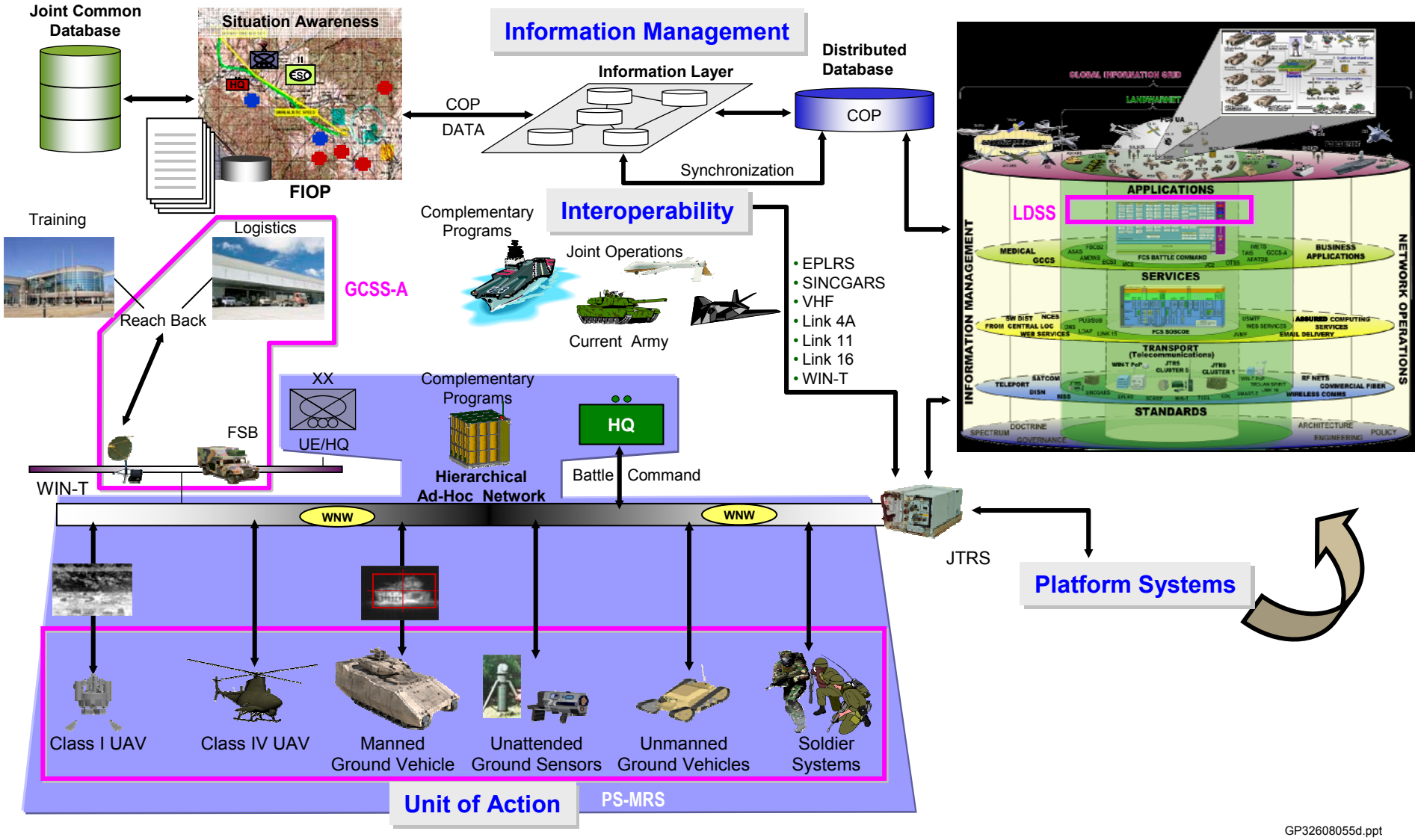

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Supportability as a Quality of Firsts

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- **See First**
  - The Networked Sustainment system "sees" supportability concerns before the warfighter
- **Understand First**
  - Networked Sustainment system understands the impact/influence of supportability concerns on the force
- **Act First**
  - Networked Sustainment system automatically presents Courses of Action (COAs) to the User to resolve supportability concerns
  - Automated initiation of COAs
- **Finish Decisively**
  - Networked Sustainment enables resolution of supportability concerns with minimal impact to force operation
- **Sustainment Concerns = need for and status of:**
  - Resupply
  - Maintenance
  - Combat Health Support
  - Human Resource Support

Sustainment Performance Analysis

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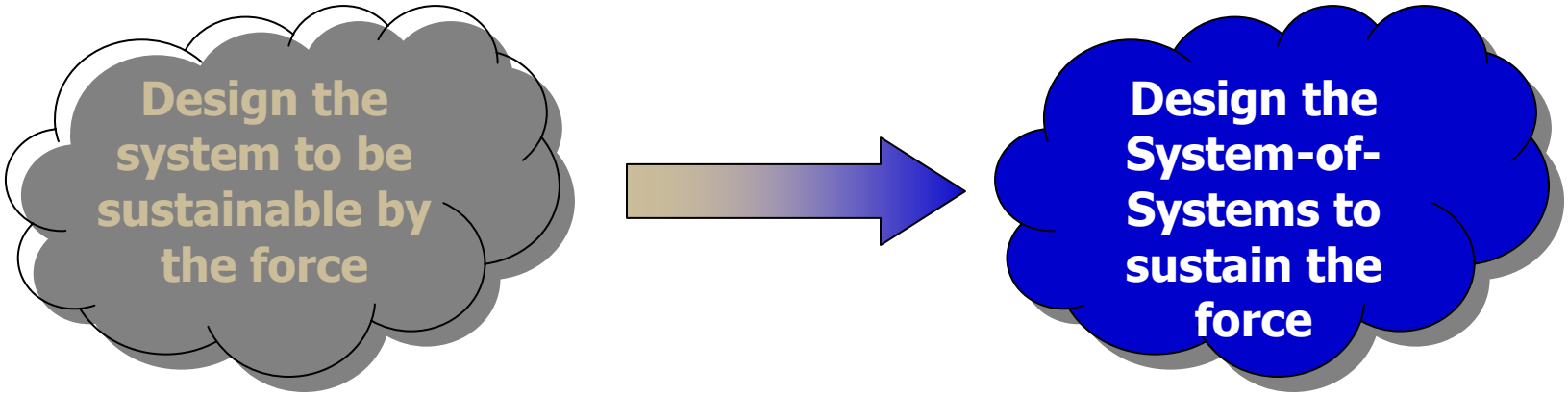
- **Integrate Army doctrine for supportability functionality into the FCS requirements baseline**
- **Apply FCS Networked Sustainment concept to the accomplishment of supportability functions in the UA**



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Requirements Tree

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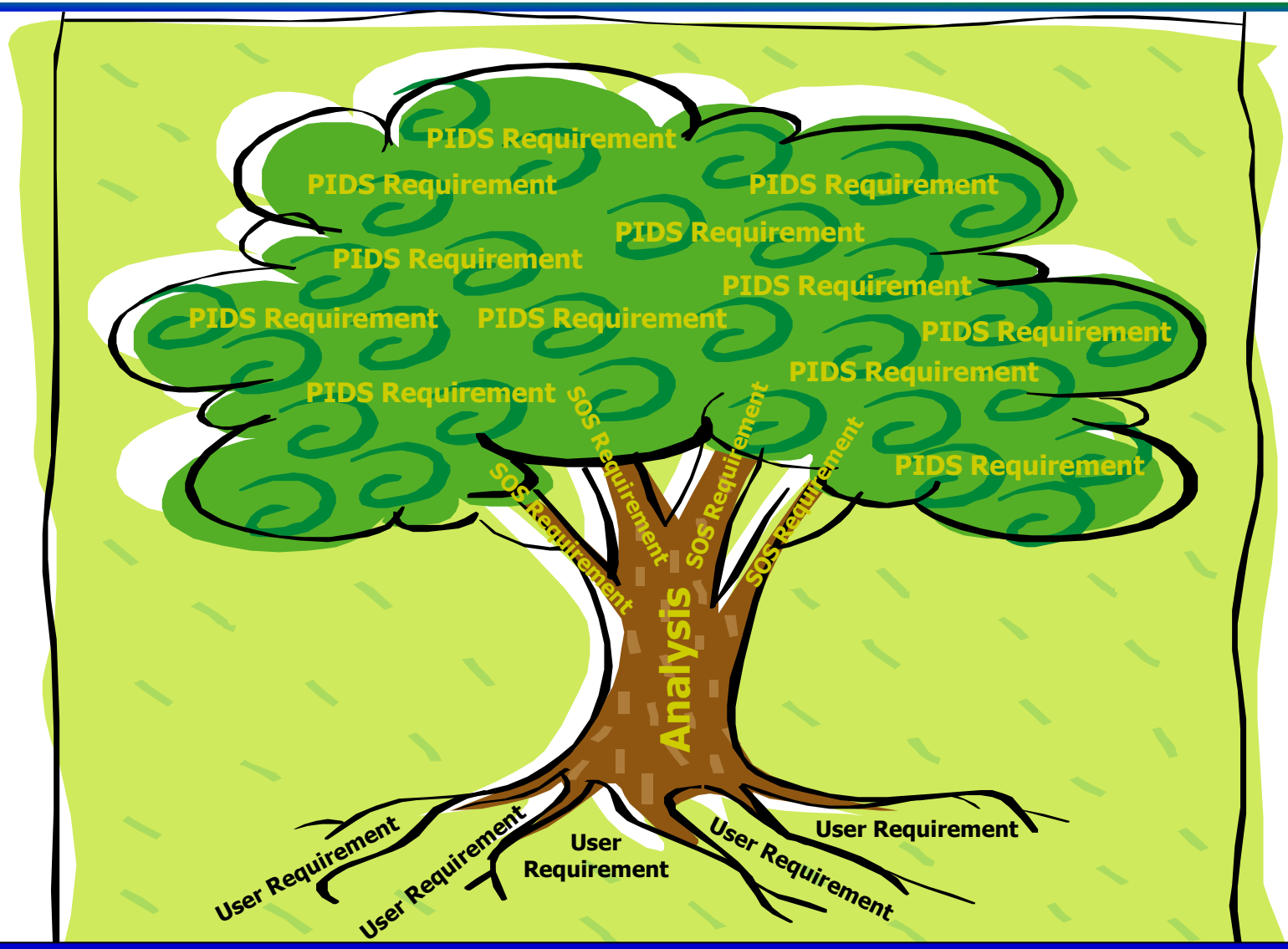

Analysis establishes a strong foundation to support requirements development

Analysis Focus

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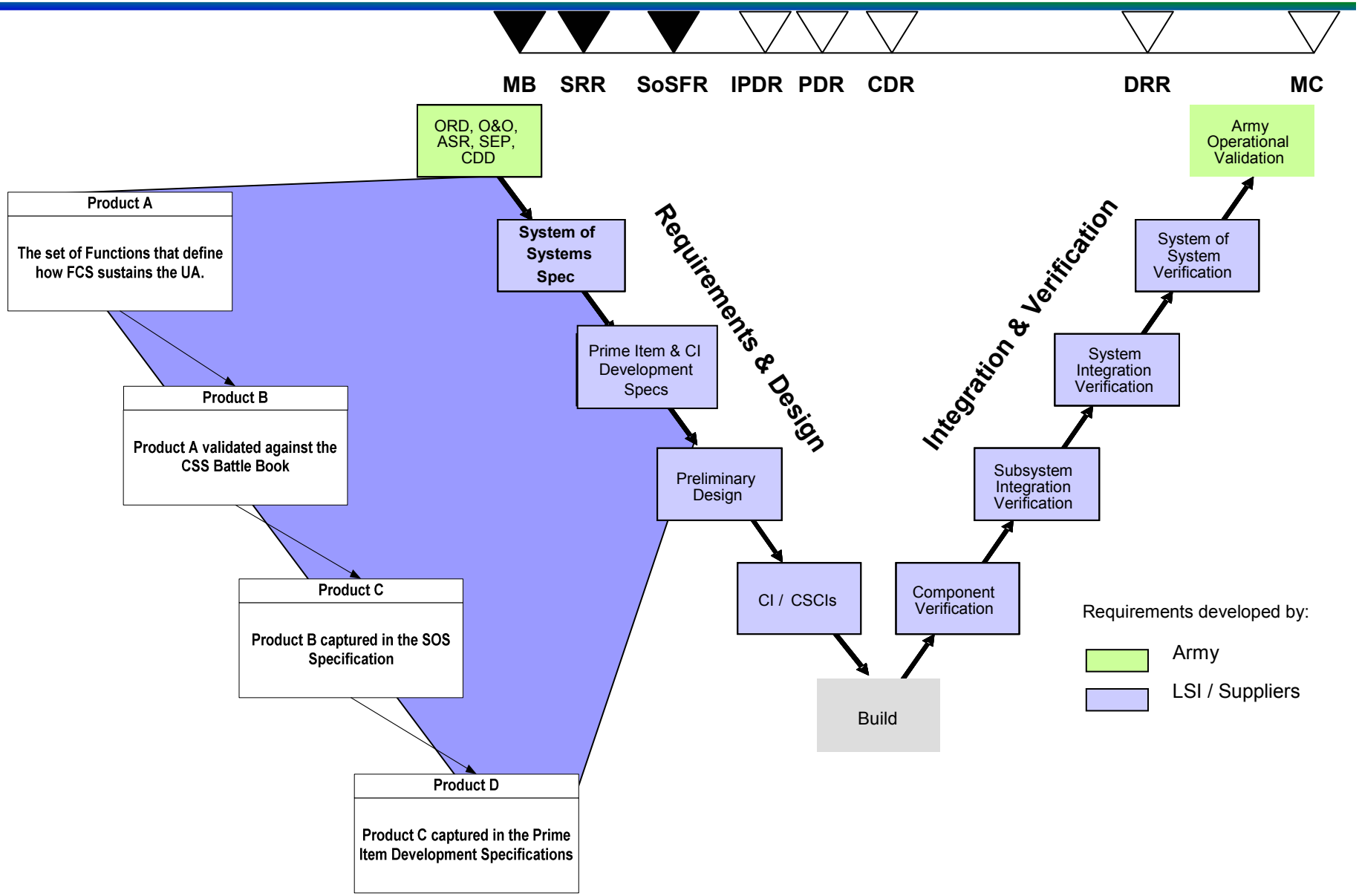

Requirement Decomposition Process

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Existing FCS Operational Analyses
- **Architecture**
- **Integrated Processes**

Army Doctrine
- **Combat Service Support (CSS)**
  - **Army FM 4-0**
- **Army Universal Task List (AUTL)**
  - **Army FM 7-15**

ANALYSIS

F(1) + F(2) + F(3) + F(4) + F(n)

- Outputs*:
- System Functional Requirements
- System Performance Requirements
- System Interface Requirements
- System Design Constraints

ANALYSIS

SOS Specification Requirement

PIDS Rqrmnt | PIDS Rqrmnt | PIDS Rqrmnt | PIDS Rqrmnt | PIDS Rqrmnt

Example – Human Resources Support

Combat Services Support	Army Universal Task List
Human Resources Support	Provide Human Resources Support
Manning the Force	Man the Force
Personnel Readiness Management	Conduct Personnel Readiness Management
Replacement Operations Management	Conduct Replacement Operations
Personnel Accounting	
	Provide Career Management
Personnel Information Management.....	Provide Personnel Information Management
	Manage DOD/DA Civilian Personnel
Personnel Services	
Personnel Support	

Distribute soldiers to subordinate commands based on documented manpower authorizations and the commander's priorities. ART 6.6.1.1 involves the critical manning tasks of predict, resource, monitor, assess, and adjust.

- Upon prediction of a critical personnel manning vacancy based upon …. the FCS Networked System shall identify the vacancy to the Commander.
- Upon notification of a vacancy … the FCS Networked System shall recommend assignments to fill critical personnel manning requirements.
- The FCS Networked System shall prioritize critical personnel manning data for the Commander's assessment.
- The FCS Networked System shall collect critical personnel manning data in accordance with AR 220-1.
- The FCS Networked System shall recommend adjustment of critical personnel to distribute soldiers to subordinate UA commands.

Example – Dental Support

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Combat Services Support	Army Universal Task List
Health Service Support	Provide Force Health Protection
Functional Areas	Provide Combat Casualty Care
Medical Evacuation & Regulation	Provide Medical Treatment
Hospitalization	Provide Hospitalization
Health Service Logistics	
Dental Services	Provide Dental Services
Operational Care	Operational Dental Care
Emergency Dental Care	Emergency Dental Care
Essential Dental Care	Essential Dental Care
Comprehensive Care	Comprehensive Dental Care
Veterinary Support	
Preventive Medicine	
	Provide Clinical Laboratory Services
	Provide Mental Health Treatment
	Provide Medical Evacuation
	Provide Medical Logistics
	Provide Casualty Prevention
	…
	…
	…
	Provide Preventive Dentistry Support

Out of Scope For Unit of Action

Example – Dental Support (page 2)

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Combat Services Support	Army Universal Task List
Dental Services	Provide Dental Services
Operational Care	Operational Dental Care
Emergency Dental Care	Emergency Dental Care
Essential Dental Care	Essential Dental Care
Comprehensive Care	Comprehensive Dental Care

Prevent and treat dental disease and injury. ART 6.5.1.3 includes providing operational dental care, which consists of emergency dental care and essential dental care, and comprehensive care which is normally only performed in fixed facilities in CONUS or in at least a Level III facility.

- Provide Emergency Dental Treatment
  - Collect Emergency Dental data
  - Communicate Emergency Dental Data to MC4
- Provide Preventive Dental Support
  - Collect preventive Dental data
  - Communicate preventive Dental Data to MC4

Out of Scope For Unit of Action

Analysis Summary and Results

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- **Original Sustainment requirements analysis based only on the ORD resulted in approximately 1100 requirements**
- **Incorporation of CSS and AUTL field manuals into the analysis process**
- **CSS/AUTL analysis clarified functionality not obvious in original ORD analysis**
  - Human Resources
  - Information Management
    - Medical Support
    - Resupply
    - Maintenance
  - Planning functions
    - Resupply
    - Maintenance
- **CSS/AUTL analysis derived an additional 950 SoS requirements**
  - Represents 1/3 of the Sustainment Requirements in the specification

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Key Factors to a Successful Analysis

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- **The right mix of people … and personalities**
  - Systems Engineers
  - System Designers
  - Logisticians
  - Soldiers
  - Facilitators
- **Leadership commitment to a common set of goals**
- **Adequate planning and schedule**
- **Participants want to do the job and appreciate the value**
- **Maintain tangible results in-sight**

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Lessons Learned

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- **It pays off when the time is taken to do the job right**
- **Indications the job was done right**
  - Endures the “test of time”
- **Sustainment analysis at the front end of the program as a major influence**
  - Historically unusual for this level of Sustainment requirements analysis this early in a program
  - Sustainment requirements constitutes ~30% of System-of-System requirements on FCS
- **Culture change within the Sustainment community … bigger culture change outside the Sustainment community**

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