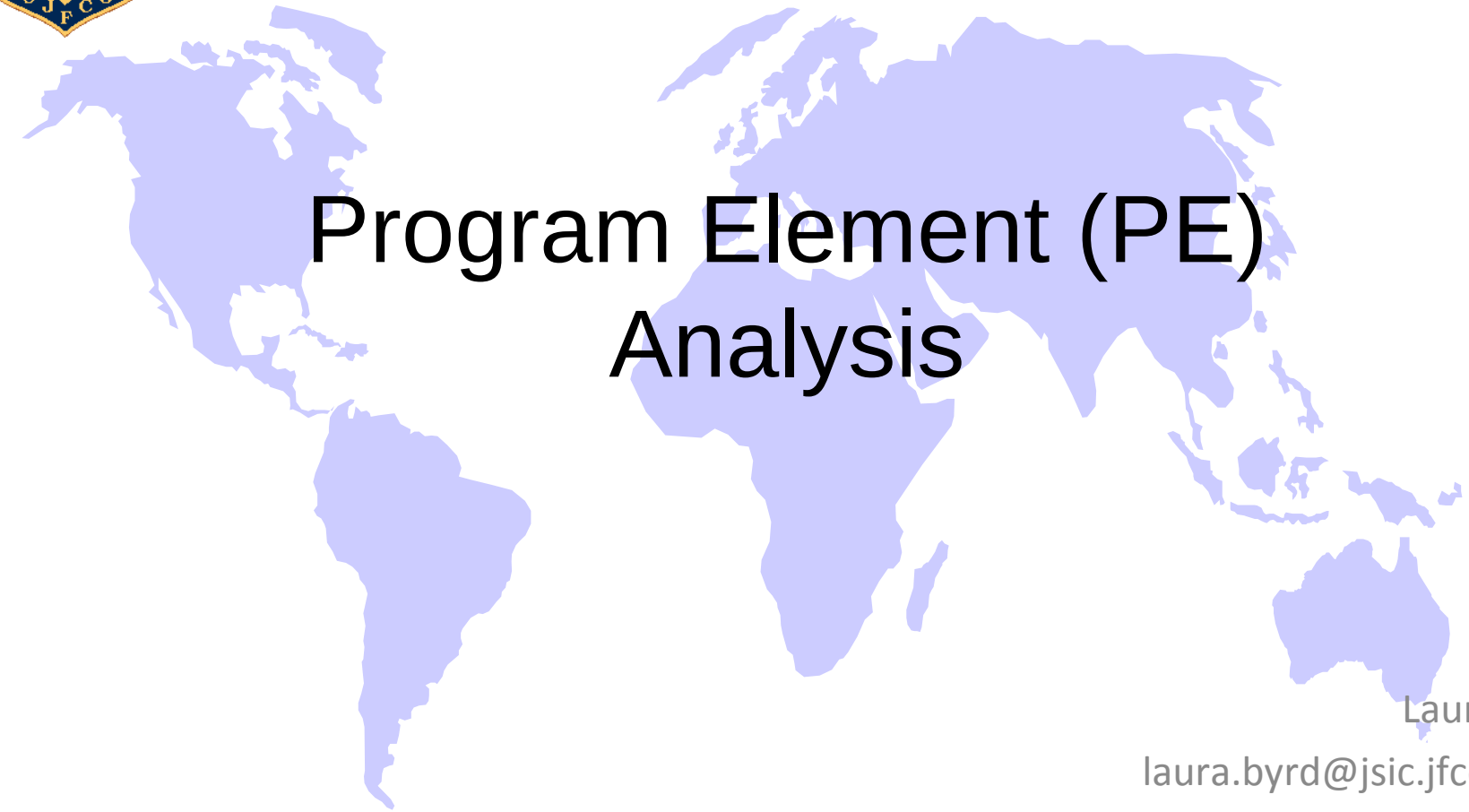
United States Joint Forces Command



Program Element (PE) Analysis

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22 June 10

Agenda

- ***Joint Systems Integration Center (JSIC) Background***
- ***Capability Portfolio Manager Background***
- ***Program Element (PE) Analysis Background***
- ***PE Analysis Methodology***
- ***Applications and Results***
- ***Limitations***
- ***Conclusions***
- ***Way Ahead***

Joint Systems Integration Center Background

- ***Mission Statement:***

> "Improve the joint warfighter's ability to plan and execute operations by driving resolution of C2 interoperability problems and providing unbiased evaluations of existing and emerging C2 capabilities."

- ***Vision Statement:***

> "JSIC will be DoD's preeminent center for innovation and interoperability."

- ***JSIC Provides:***

  - Interoperability Demonstrations and Assessments
  - Capability Assessments
  - Capability Integration
  - Support to the C2 Capability Portfolio Manager

Capability Portfolio Managers

- ***DoD Directive 7045.20:***

  "Establishes policy and assigns responsibilities for the use of capability portfolio management in order to advise senior leadership on capability investment pursuant to the authority vested in the Secretary of Defense by section 113 of title 10, United States Code…."

Note: CPM areas align to the Nine Tier 1 Joint Capability Areas (JCAs)

CAPABILITY PORTFOLIO AND TIER 1 JCA	CPM CIVILIAN LEAD	CPM MILITARY LEAD	SWarF LEAD	CPM JS OPR	FUNCTIONAL CAPABILITY BOARDS
COMMAND AND CONTROL	ASD(NII)	USJFCOM	USJFCOM	J-3	USJFCOM
BATTLESPACE AWARENESS	USD(I)	USSTRATCOM	USSTRATCOM	J-2	J-2
NET CENTRIC	ASD(NII)	USSTRATCOM	USSTRATCOM	J-6	J-6
LOGISTICS	USD(AT&L)	USTRANSCOM	USTRANSCOM	J-4	J-4

PE Analysis Background

- ***Program Elements are the basic building blocks of the Future Years Defense Plan (FYDP)***
  - **Each line in the budget is associated with a PE**
  - **Three broad categories: RDT&E, Procurement, and O&M**
  - **Over 6000 complex and somewhat unique documents**
- ***JSIC assessments, which integrate programmatic data, focus on the analysis of Program Elements and provide:***
  - **Support to Capability Portfolio Manager Functional Integration Teams (FITs)**
  - **System specific programmatic data to FITs which support PR/POM recommendations designed to mitigate functional overlap and capability gaps**
  - **Support to other DoD organizations seeking perspective on PE alignment to systems, Capability Portfolio Management (CPM) areas, and Joint Capability Areas (JCAs)**
  - **Cost Assessment and Program Evaluation (CAPE) assigns PEs to Capability Portfolio Management (CPM) areas**

Bottom Line……PE Analysis is another perspective on the alignment of PEs to CPM areas

PE Analysis Background

- ***Mapping Program Elements to C2 CPM Focus Areas***
  - ➢ **"Refined" PE decomposition and mapping**
  - ➢ **Identification of relevant PEs as defined by Focus Areas**
  - ➢ **Measure or "weight" of PE relevance utilizing PE budget lines**
- ***C2 On-the-Move (C2OTM) Focus Area Test Case***
  - ➢ **Focus Area well defined by C2OTM related systems**
  - ➢ **Existing JSIC participation with C2OTM FIT on draft CONOPS and ICD**
  - ➢ **Test case to validate and refine PE Analysis methodology**

Methodology

- ***PE Analysis addresses three needs:***
  - Identification of PEs that are relevant to a particular CPM focus area
  - Identification of specific CPM focus area related funding within PEs
  - Alignment of CPM focus area related PEs across CPM areas and JCAs

- ***C2 On-the-Move (C2OTM) Focus Area Test Case:***
  - Focus Area well defined by C2OTM related systems
  - Existing JSIC participation with C2OTM FIT on draft CONOPS and ICD
  - Test case to validate and refine PE Analysis methodology

Methodology

Three Step Process:

STEP 1: ***Search across large PE database for systems, terminology and comparative text that relate to a CPM focus area***

- Utilizing search engines such as Comparative Document Navigator (CDN)
- Results ("Hits") are verified by human-in-the-loop
- Produces an initial manageable list of PEs relevant to the given CPM focus area

STEP 2: ***Quantify findings from step one in terms of actual funding***

- Total value of funding within PE projects is documented and compared to the total funding value of the PE
- Due to funding complexity, a relevance score is assigned by the analyst
- Details and quantifies CPM focus area related funding within each PE

STEP 3: ***Align CPM focus area PEs to CPM areas and JCAs***

- Search for JCA related systems and JCA related terminology
- In some cases, existing JSIC system mapping can be utilized
- Alignment to CPM areas and JCAs supports cross-portfolio implications

Applications and Results

- ***C2OTM FIT Support:***
  - **Collaboration with FIT to establish C2OTM system list**
  - **Draft CONOPS and ICD utilized for additional contextual data**
  - **Focus on approximately 800 RDT&E type PEs contained in the Research and Development Description Summaries (RDDS) database**
    - ***Results identified 12 PEs closely related to the C2OTM focus area***
    - ***High confidence based on direct correlation to C2OTM systems***
  - **Subset of C2OTM related PEs examined further for alignment to CPM areas and JCAs**
    - ***Alignment determined by utilizing JSIC's JCA-UJTL-JCSFL-System mappings***
    - ***Heavy alignment to Net Centric portfolio***

Notional Spreadsheet Results

PE XXXX782A - System X								
Total Program Element (PE) Funding		$1,750,000,000						
Total All Focus Area (FA) Funding		$1,347,500,000						
Total % of FA Funding in this PE		77.00%						
C2 CPM Focus Areas	**System / Terminology Hit Description (Associated Project Title)**	**Identified Funding**	**Rel Factor**	**Rel Value**	**Funding Value**			
C2 OTM	System X Increment 2 - Initial Networking-on-the move (367)	$110,000,000	1	1	$110,000,000			
C2 OTM	System X Increment 3 - Full Networking-on-the-move (372)	$1,237,500,000	1	1	$1,237,500,000			
PE:		**FY 2007**	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**
TOTAL FY DOLLARS		**$0.00**	**$0.00**	**$410,300,000.00**	**$350,300,000.00**	**$325,250,000.00**	**$250,500,000.00**	**$11,150,000.00**
C2OTM	System X Increment 2 - Initial Networking-on-the move (367)	$0.00	$0.00	$75,500,000.00	$15,300,000.00	$10,500,000.00	$0.00	$0.00
C2OTM	System X Increment 3 - Full Networking-on-the-move (372)	$0.00	$0.00	$334,800,000.00	$335,000,000.00	$314,750,000.00	$250,500,000.00	$11,150,000.00

- PE XXXX782A is closely related to the C2OTM focus area based on large amounts of direct funding for system X
- Funding for system X comprises over 77% of the total funding contained within PE XXXX782A

NOTE: Funding amounts are notional and merely representative of typical magnitudes of actual analysis results.

Spreadsheet Results

PE XXXX782A – System X

Total Program Element (PE) Funding **$1,750,000,000**

Total All Portfolio (CPM) Funding **$1,750,000,000**

Total C2 CPM Funding **$280,000,000**

Total % of CPM Funding in this PE **100.00%**

C2 CPM Portfolios	C2 System / JCA Terminology Hit Description (Associated Project Title)	Identified Funding	Relative Factor	Funding Value	Total Funding per CPM	% Total CPM Funding per CPM
Force Support	System X - Dem/Val	$402,500,000	0.04	$16,100,000	$70,000,000	4.00%
	System X Increment 2 - Initial Networking - on-the-move	$110,000,000	0.04	$4,400,000		
	System X Increment 3 - Full Networking - On-the-move	$1,237,500,000	0.04	$49,500,000		
Battlespace Awareness	System X - Dem/Val	$402,500,000	0.08	$32,200,000	$140,000,000	8.00%
	System X Increment 2 - Initial Networking - on-the-move	$110,000,000	0.08	$8,800,000		
	System X Increment 3 - Full Networking - On-the-move	$1,237,500,000	0.08	$99,000,000		
Force Application	System X - Dem/Val	$402,500,000	0.02	$8,050,000	$35,000,000	2.00%
	System X Increment 2 - Initial Networking - on-the-move	$110,000,000	0.02	$2,200,000		
	System X Increment 3 - Full Networking - On-the-move	$1,237,500,000	0.02	$24,750,000		
Logistics	System X - Dem/Val	$402,500,000	0.04	$16,100,000	$70,000,000	4.00%
	System X Increment 2 - Initial Networking - on-the-move	$110,000,000	0.04	$4,400,000		
	System X Increment 3 - Full Networking - On-the-move	$1,237,500,000	0.04	$49,500,000		
Command & Control	System X - Dem/Val	$402,500,000	0.16	$64,400,000	$280,000,000	16.00%
	System X Increment 2 - Initial Networking - on-the-move	$110,000,000	0.16	$17,600,000		
	System X Increment 3 - Full Networking - On-the-move	$1,237,500,000	0.16	$198,000,000		
Net-Centric	System X - Dem/Val	$402,500,000	0.66	$265,650,000	$1,155,000,000	66.00%
	System X Increment 2 - Initial Networking - on-the-move	$110,000,000	0.66	$72,600,000		
	System X Increment 3 - Full					

NOTE: Funding amounts are notional and merely representative of typical magnitudes of actual analysis results.

Applications and Results

Follow-on C2OTM work:

- **PE analysis applied to broader, publicly accessible, PE database**
- **Focus on 27 core C2OTM systems**
- **Results tailored to C2OTM FIT request to support potential PR/POM recommendations**
  - **System Descriptions**
  - **Percentage alignment to JCAs and CPM areas**
  - **Associated PE funding documents**
  - **Funding type (RDT&E, Procurement, O&M)**
  - **Clarifying comments**
  - **Specific funding amounts**
- **Results provided “starting points” and initial data which proved useful in the overall development of PR/POM recommendations**

System	System Description	JCA/CPM Function Mapping	Funding Document	Funding Type	Document Date	Comments	Direct Funding Amount
ctical ystem	JTRS is a Defense Department-wide initiative to develop a family of software-programmable tactical radios that will provide the warfighter with voice, data and video communications, as well as interoperability across the joint battlespace. JTRS is an all service radio and a new wideband networked waveform with the ability to provide mobile networked-connectivity across the battlespace while providing compatibility with the current waveforms in use by the DoD today.	**NC – 43.4% overall** 40.5% Primary 1.3% Secondary 1.6% Tertiary C2 **– 21.7% overall** 0.8% Primary 12.7% Secondary 8.2% Tertiary BA **– 21.8% overall** 9.4% Primary 6.0% Secondary 6.4% Tertiary	**PE - XXXX280N** Joint Tactical Radio Systems (JTRS)	RDT&E	2010	PE XXXX280N represents the total JTRS RDT&E Budget (includes Multifunctional Information Distribution System (MIDS) JTRS, Airborne and Maritime/Fixed Station (AMF) JTRS, Ground Mobile Radio (GMR) JTRS, Handheld/Manpack/Small Form Fit (HMS) JTRS, and JTRS Network Enterprise Domain (JNED)).	FY09 - $XX M FY10 - $XX M
			PE - XXXX790A NATO Research and Development **Project 691**	RDT&E	2010	This PE implements the provisions of Title 10 U.S. Code, Section 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. One of the systems covered in project 691 within this PE is JTRS	FY09 - $XX K FY10 - $XX K
			Army, **Other Procurement,** **Comm & Elec Equipment,** **Line 35** Joint Tactical Radio System	Procurement	2010	P-1 Item B90000 is a summary of B90100 (Joint Tactical Radio System, Ground Mobile Radio) and B90210 (Joint Tactical Radio System, Handheld, Manpack and Small Form Fit).	N/A
ble nd And Vehicle	DCCV provides mobile communication anytime a catastrophe hits. The DCCV contains an integrated communications system designed to interface with the DoD, Federal agencies, and first responders. Mission areas include command and control and communications.	**NC – 38.7% overall** 38% Primary 0.7% Tertiary **C2 – 24.3% overall** 6% Primary 9.9% Secondary 8.4% Tertiary **BA – 18.4% overall** 6% Primary 4.5% Secondary 7.9% Tertiary	**PE - XXXX237N** Deployable Joint Command & Control **Project 9999: Congressional Adds/ Deployable Command & Control Vehicle**	RDT&E	2010	PE 0603237N funds a Deployable Joint Command & Control; a priority DoD transformation imitative. Project 9999 within PE XXXX237N funds the Deployable Command & Control Vehicle.	$XXM
M: d Battle nd on e	MBCOTM provides an integrated suite of C3I capabilities to ground Commanders, enabling Network Centric Warfare, while OTM in a Light Tactical Vehicles (LTVs) including the High Mobility Multipurpose Wheeled Vehicle (HMMWV), Stryker, and Bradley vehicles. MBCOTM integrates available Battle Command Software Applications including FBCB2, ASAS, AFATDS, MCS, C2PC, Tactical Voice Radios, Wideband Data Communications Systems and computing devices while OTM.	**C2 – 33.5% overall** 23% Primary 9.8% Secondary 0.7% Tertiary **BA – 25.3% overall** 11.6% Primary 9.3% Secondary 4.4% Tertiary **FA – 17% overall** 0.7% Primary 10.4% Secondary 5.9% Tertiary	**PE - XXXX818A** Army Tactical Command & Control Hardware & Software (ATCCS)	RDT&E	2009	PE XXXX818A is the overall RDT&E funding document for ATCSS. Project C15, within PE XXXX818A, details funding for MBCOTM. Funding includes System Development/Tech Upgrades, Prototype Build, Program Spt and Test/Evaluation. Note: MBCOTM Project C15 does not appear in 2010 version of PE - XXXX818A	FY09 - $XX M FY10 - $XX K
			Army, **Other Procurement,** **Elect Equip - Tactical C2 Systems,** **Line 117** Mounted Battle Command on the Move (MBCOTM), BZ9970	Procurement	2010		FY09 - $XX M FY10 - $XXK

Applications and Results

USJFCOM C2 Portfolio Baseline:

- **Methodology applied to USJFCOM Joint Architectures and Capability Engineering Division (J89) C2 baseline spreadsheets**
- **Populate "Relevant PE" fields in spreadsheets**
  - **C2 systems**
  - **C2 support systems**
  - **C2 systems of interest**

Limitations

Database access

- Publicly accessible databases may not offer entire range of programmatic data
- Comprehensive DoD sites require additional training, authorization, and non-disclosure agreements.
- Public sources are sufficient for most purposes

Complexity and diversity of programmatic documents

- Lack of consistency among service documents
- Analysts can overcome complexity by isolating funding lines and relating searches to the overall context of the PE

Subjective interpretation

- Some amount of subjective interpretation is unavoidable
- Recognize and limit effects through designed analyst consensus

Labor intensive nature of search validation

- Involves reading and understanding PEs to verify accuracy and context
- Analysts can be provided with programmatic training to assist validation efforts

Search engine capability

- “Comparative Text” query accuracy
- Ontology-based approaches may allow for more sophisticated semantic searches in the future

Conclusions

JSIC's PE Analysis is a repeatable and effective process for identifying PEs relevant to a specific area of interest

Provides a measure of alignment across CPM areas and JCAs to identify potential cross-portfolio issues

Provides an alternate and complimentary view of funding data

Proven beneficial and integral to the overall programmatic efforts of the C2OTM FIT by providing analytical data required to develop POM issue papers

FITs and other CPM groups can utilize PE analysis to quickly narrow their programmatic focus

Way Ahead

pand and refine PE Analysis

- Exercise the methodology

ach out to other CPM areas

- Future Battlespace Awareness (BA) CPM efforts

pand collaborate efforts to additional CPM FITs

- Develop accurate and meaningful system lists, terminology, and descriptive text to define the boundaries of specific focus areas

arch Engines

- Utilize all available resources to optimize the methodology

tabases

- Expand to Cost Assessment and Program Evaluation (CAPE) DoD Resources data Warehouse (DRDW)

ogrammatic training

- Take advantage of any available programmatic training

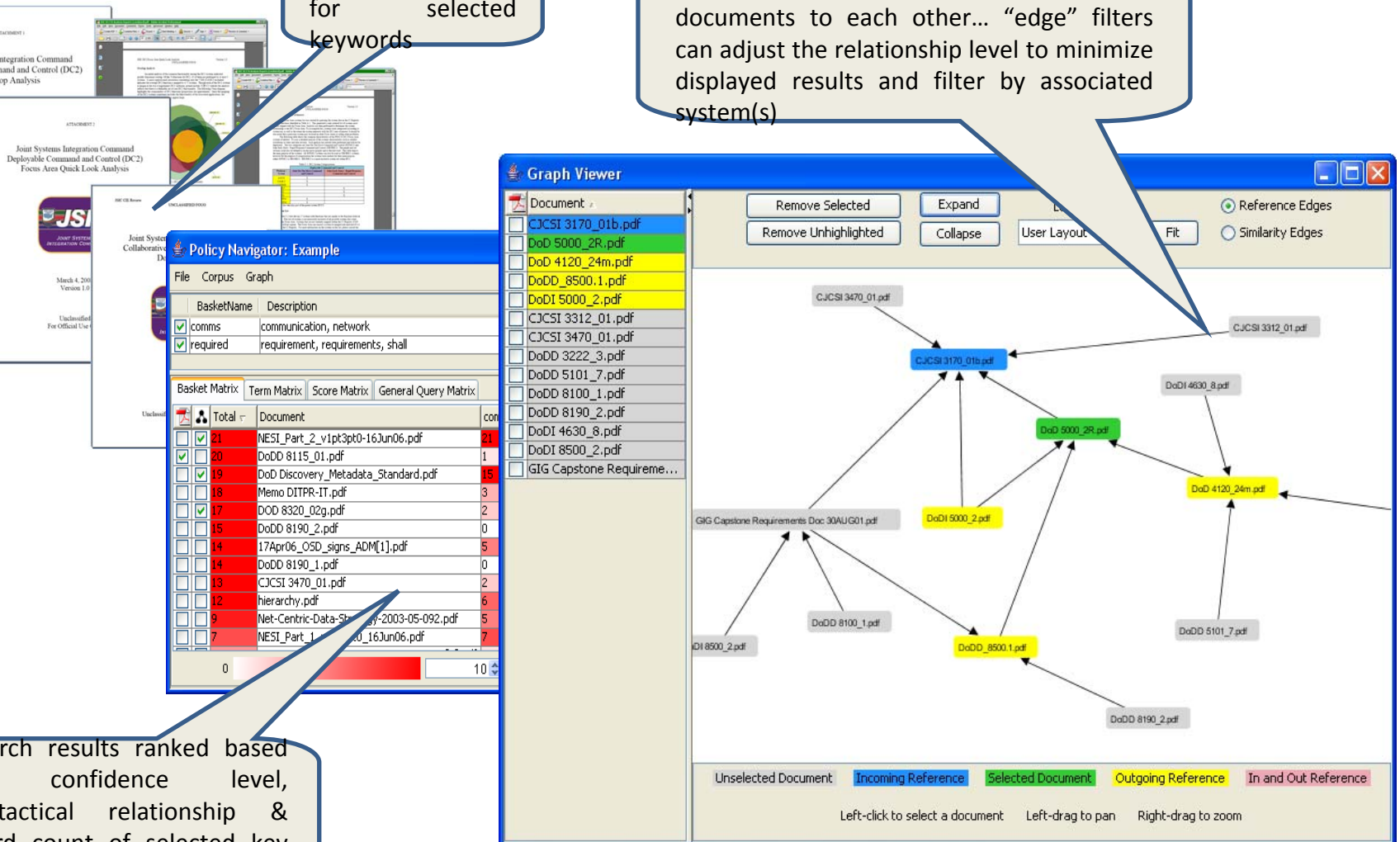
Questions?

BACKUP SLIDES

Comparative Document Navigator (CDN)

Searches document library for selected keywords

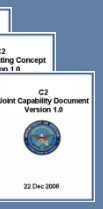
Displays syntactical relationship of documents to each other… "edge" filters can adjust the relationship level to minimize displayed results and filter by associated system(s)

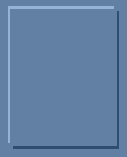


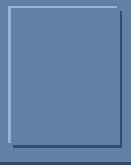
rch results ranked based confidence level, tactical relationship & rd count of selected key

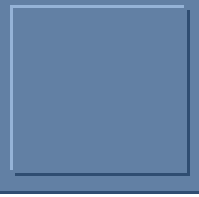
Capability Mapping Framework Structure

Unclassified









Purpose of the Capability Mapping Framework

Supports analysis and assessment

- Provides a means to assess systems within the context of capabilities
- Helps identify potential gaps and redundancies within the portfolio

Bounds the Command And Control (C2) portfolio

Shows cross-portfolio implications of systems

- Systems support capabilities found in multiple portfolios

CMF Based Analysis Products

System Analysis

- Individual System Functionality Profile
- % Contribution to JCAs or UJTLS
- Area-Specific Systems Analysis Report

Redundancies

- Functional Overlap of Systems
- Functional Overlap within JCA
- Functions supporting Multiple JCAs
- Most Common Functions in Portfolio

Gap Analysis

- Under-supported JCAs
- Under-funded JCAs (need programmatic data)
- How “New” Systems Fill Gaps in Functionality
- % JCAs satisfied over time

• Cross Portfolio

- Critical Functions (shared between portfolios)
- System “Best” Fit to Portfolio

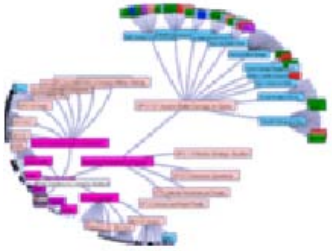
• Trade-Off

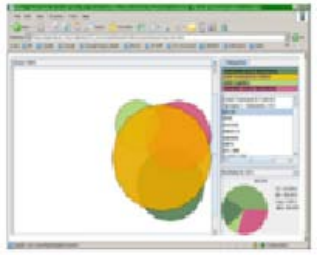
- Implications of System Divestiture
- Implications of Added Systems
- Robustness of Priority Functions

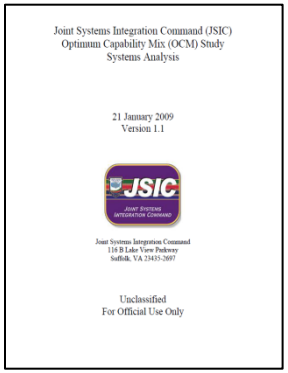
CMF Based Analysis and Observations

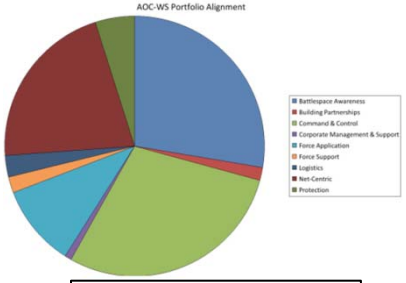
Unclassified

- ployable C2 Quick Look
- ogram Element Analysis for POM 12
- Portfolio Baseline
- On the Move ICD Support
- oss-Portfolio System Analysis
- timum Capability Mix Study
- Registry
  - Hypertree
  - C2 Pedia
  - C2 Metrics (Tree Map)

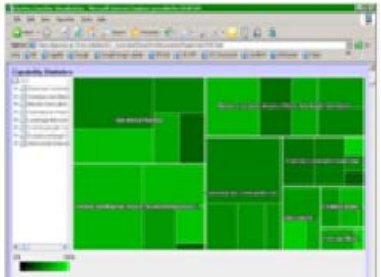








C2Pedia – knowledge base
https://c2.jsic.ifcom.mil



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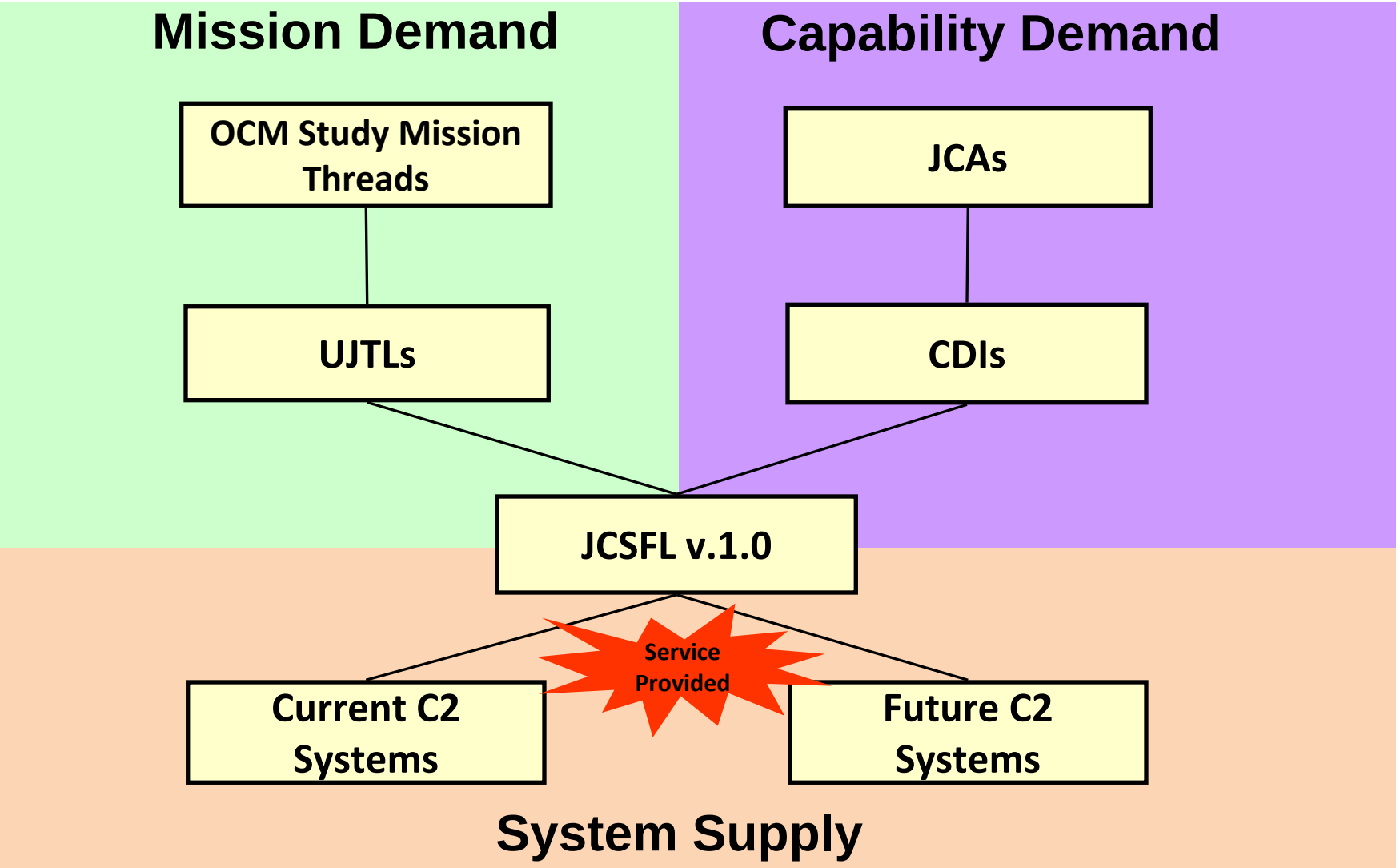
JSIC OCM Study Framework drawn as a supply and demand model



C2 OCM Study Functional Analysis

Analytical methods utilized to balance the supply-and-demand relationship using optimization techniques to select the best mix of systems which cover the highest priority system functions for all Mission Threads and CDIs.

Anchor Systems Analysis:

- To Identify systems which provide unique or pervasive role
- Analyzed along 2 dimensions
  - Functionally – How well did the system meet the prioritized functional requirements of the threads and CDIs
  - Operationally – How well did the system meet the defined attributes for C2 (Accuracy, Agility, Relevance, Simplicity, Timeliness, etc.)

Functional Modeling

- Generated scoring metrics and used optimization techniques to improve the functional coverage beyond that of the anchor systems
- Established metrics for baseline capability and mission accomplishment levels

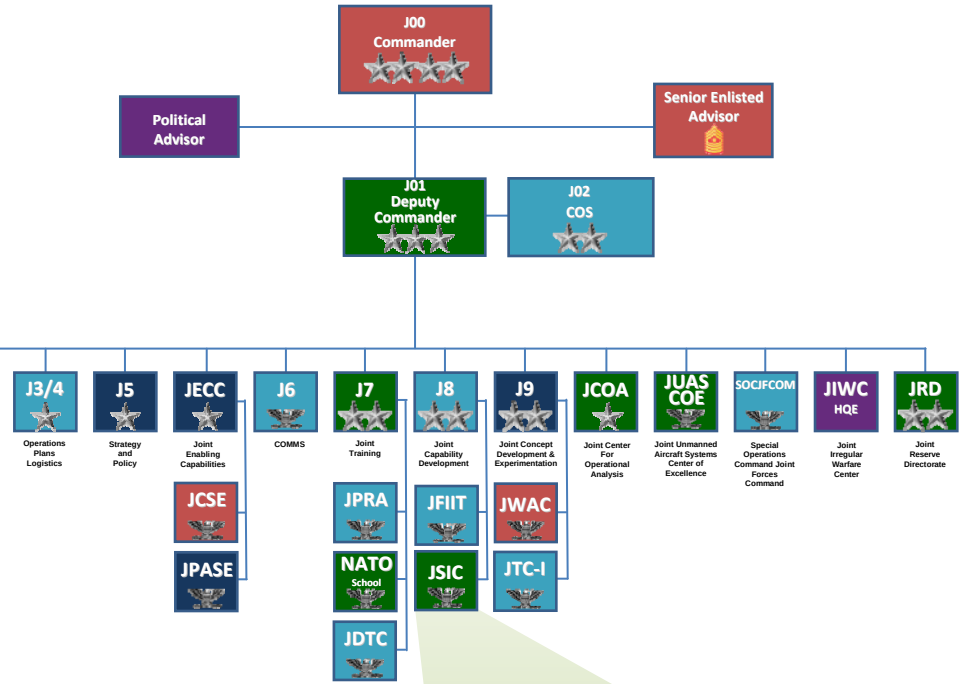
United States Joint Forces Command
Joint Systems Integration Center

Unclassified

Unclassified

USJFCOM, J8

Joint Capability Development Directorate



JSIC provides the

Joint Capability Developer

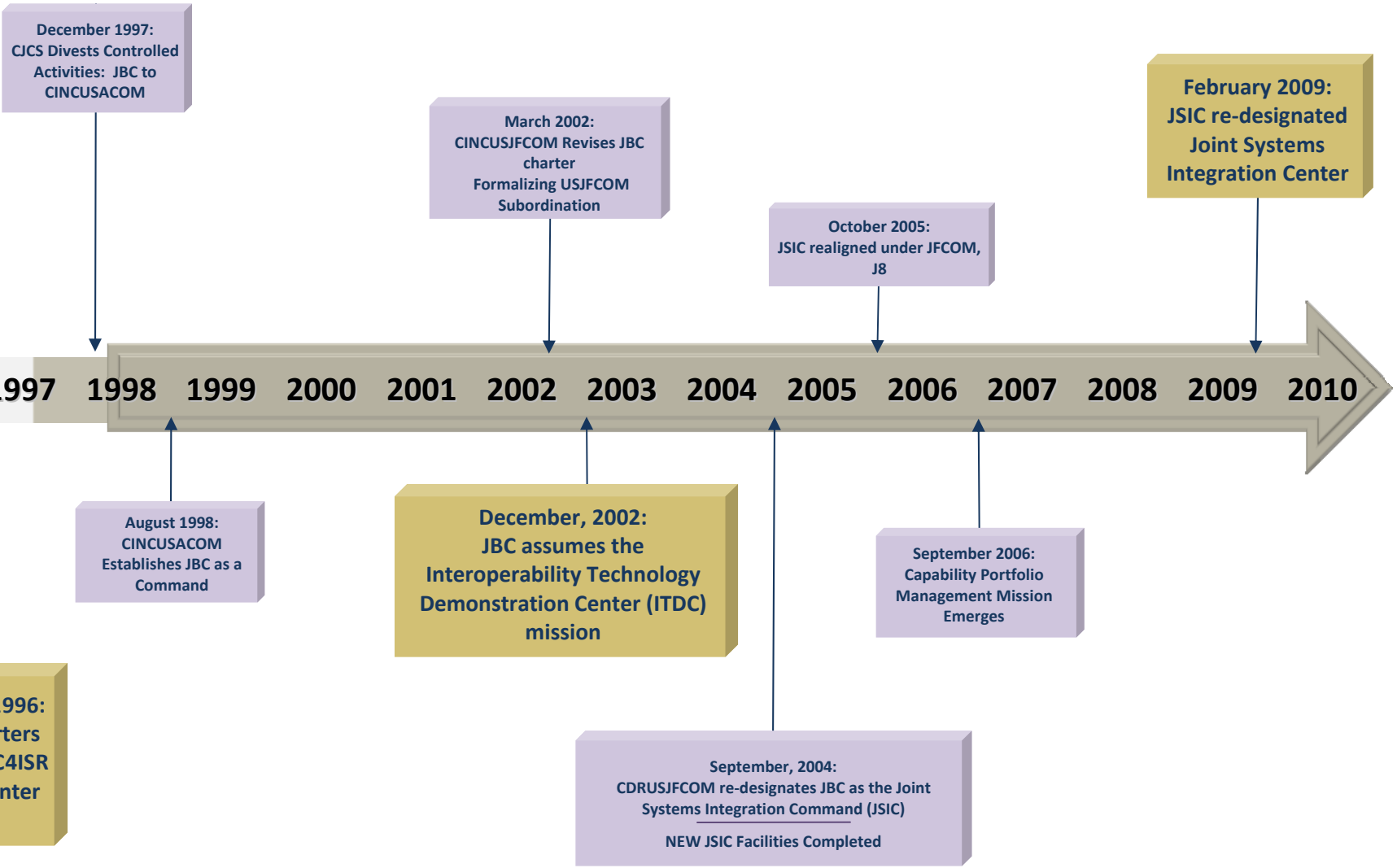
- Joint Capability Requirements
- Joint Architectures
- Data Strategy
- Joint Integrated Fires
- Rapid Capability Transition

C2 Capability Portfolio Management

- Improve interoperability and maximize effectiveness
- Minimize capability redundancies & gaps
- Harmonize DoD's Decision Support Processes for Requirements,
- Acquisition and Programming of C2 capability solutions

Unclassified

JSIC Legacy



Joint Systems Integration Center

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Mission

Improve the joint warfighter's ability to plan and execute operations by driving resolution of C2 interoperability problems and providing unbiased evaluations of existing and emerging C2 capabilities.

IC Priorities

Conducting Quality Interoperability and Warfighter Utility Assessments of Joint C2/C4 Systems
Maintaining a Persistent C2 Test and Evaluation Environment
Continuing Technology Integration

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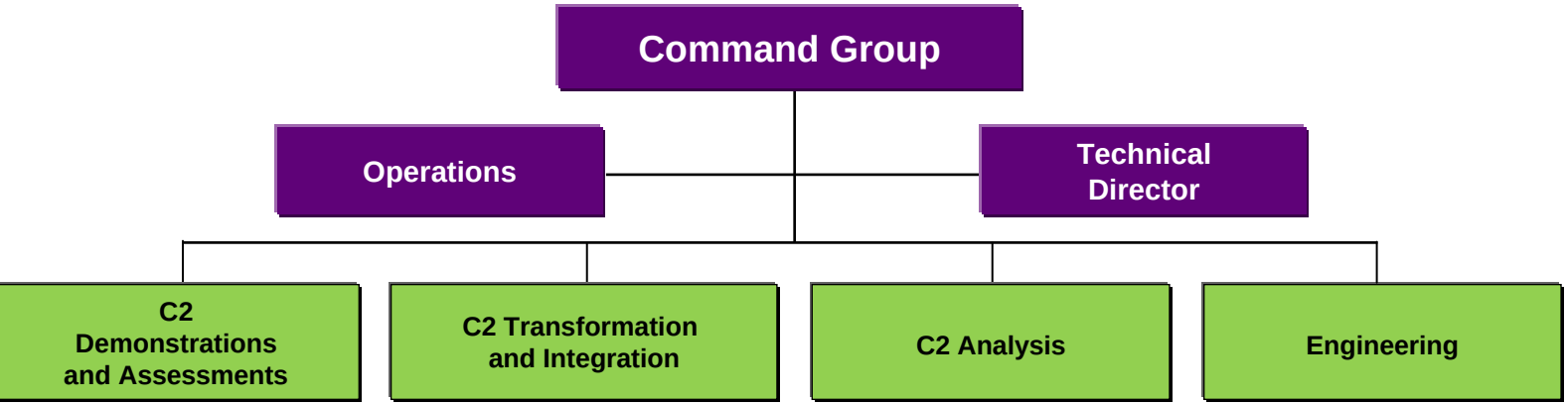
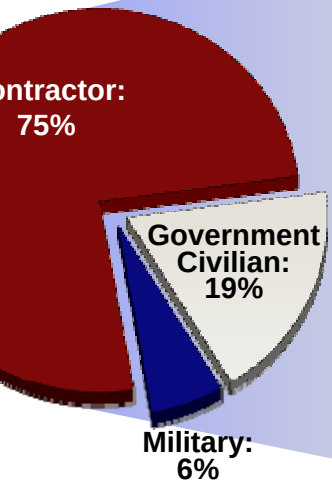
JSIC Organization



Personnel



185 JSIC FTE total

Skilled workforce features:

- **Recent operational experience**
- **Extensive technical expertise in**
  - **Intelligence**
  - **Computer Science**
  - **Ops Research**
  - **Engineering**
  - **Signal/Telecommunications**

Onsite Partners:

Agencies

DoD/Other

TRADOC

Academia

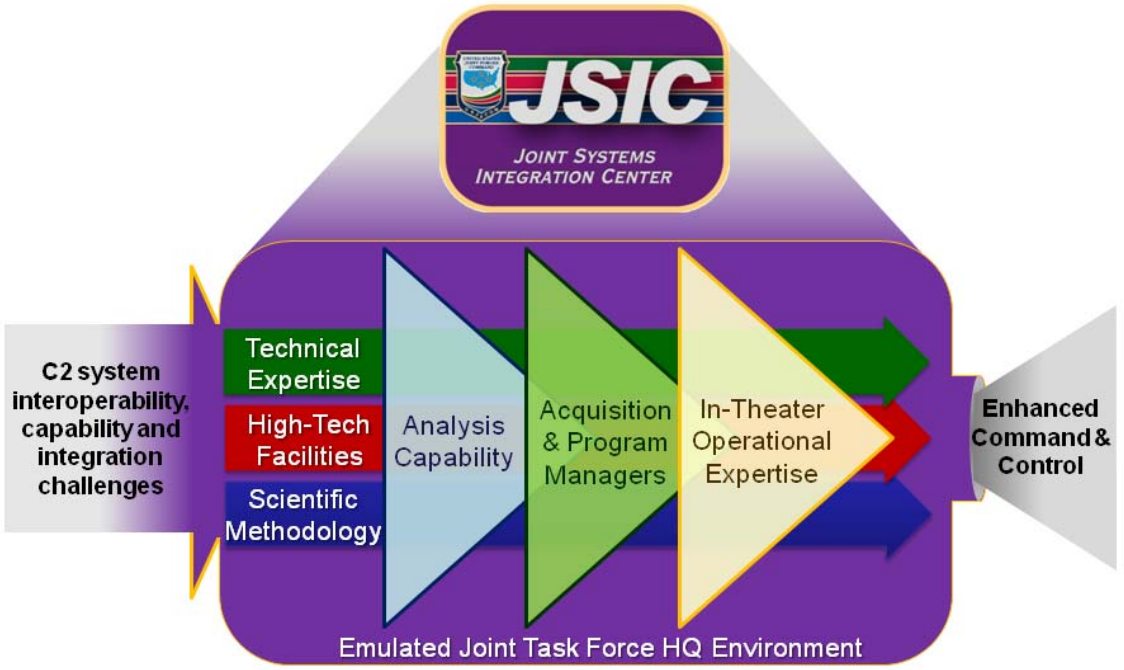
Georgia Tech Research Institute

nique environment that brings together

Operational experience,
echnical expertise and
cquisition program
anagers

echnology and state-of-
ne-art facilities

Defendable & repeatable
cientific methodology



nhance joint C2 capabilities and ***solve joint eroperability problems***

What JSIC Does

Focused at the ***JTF HQ*** level

– Joint, Coalition & Combined

Assess ***operational interoperability*** of selected C2 programs and systems

Conduct warfighter utility assessments

Capability integration using government and

ing the toughest Joint, Coalition & Combined C2
ration and systems interoperability challenges

- Venue for DoD to assess capability and interoperability of current and future warfighting systems
- Provides unbiased evaluations

que, emulated Joint Command and Control
onment

- Features joint, coalition, and combined "System of Systems" assessment and engineering services
- Joint Mission Thread / Operational Context focused

amic technology assessment and integration

- Emerging capability analysis
- Accelerated integration of new technology

DoD's Premier C2 Interoperability Solution Laboratory

Interoperability Demonstrations

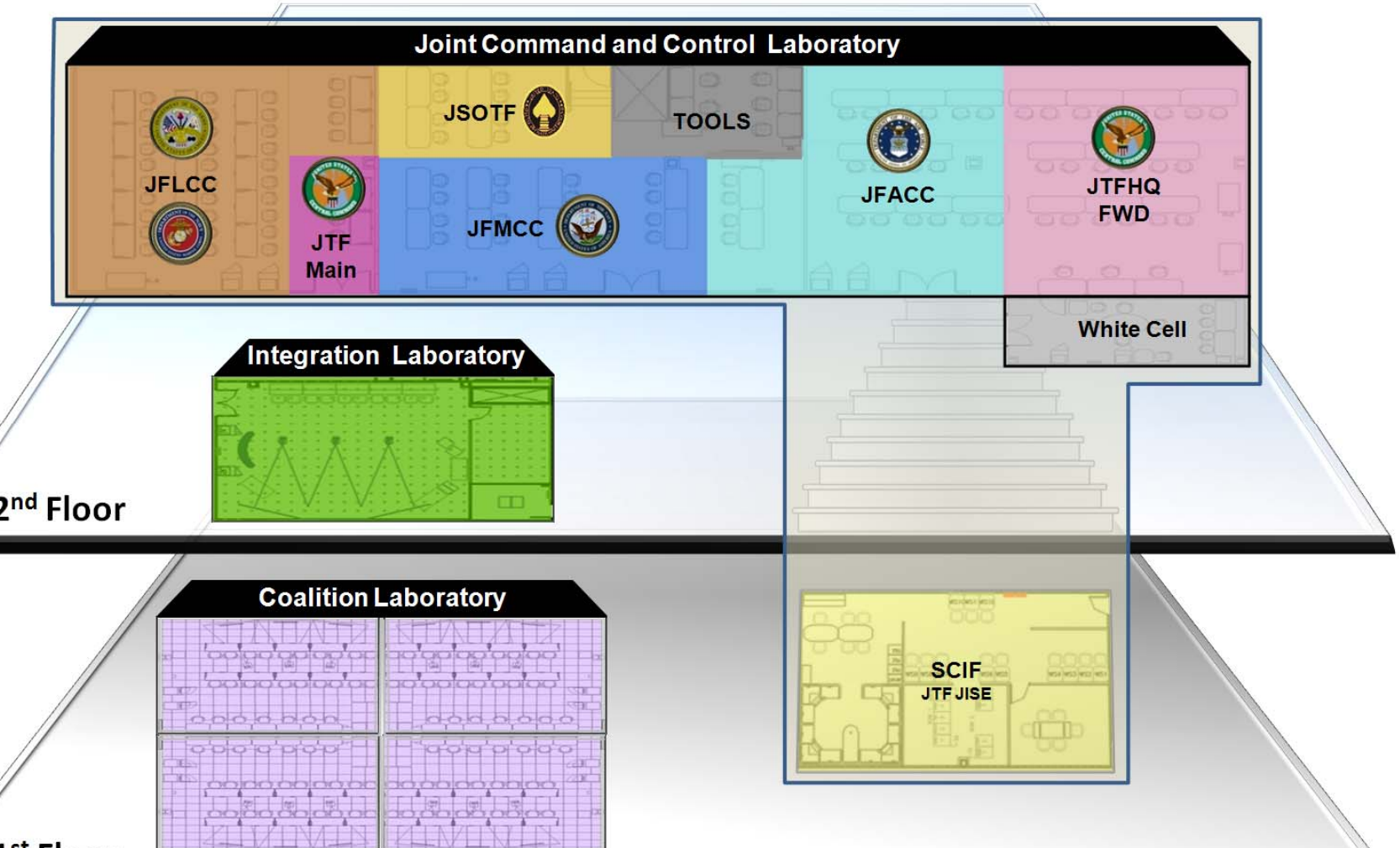
Joint C2 System Analysis and Assessment

Warfighter Utility Assessments

Technology Assessment and Integration

JSIC
JOINT SYSTEMS INTEGRATION CENTER

Three primary laboratories, ten separate enclaves

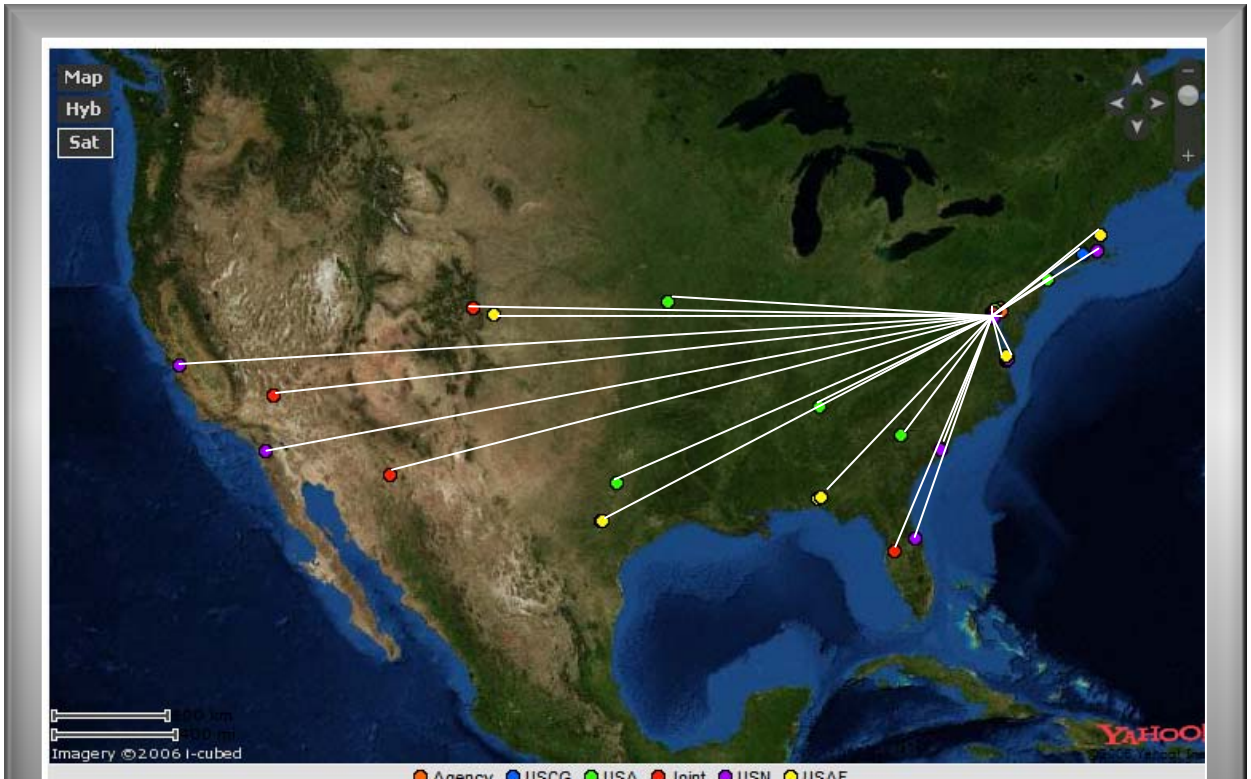


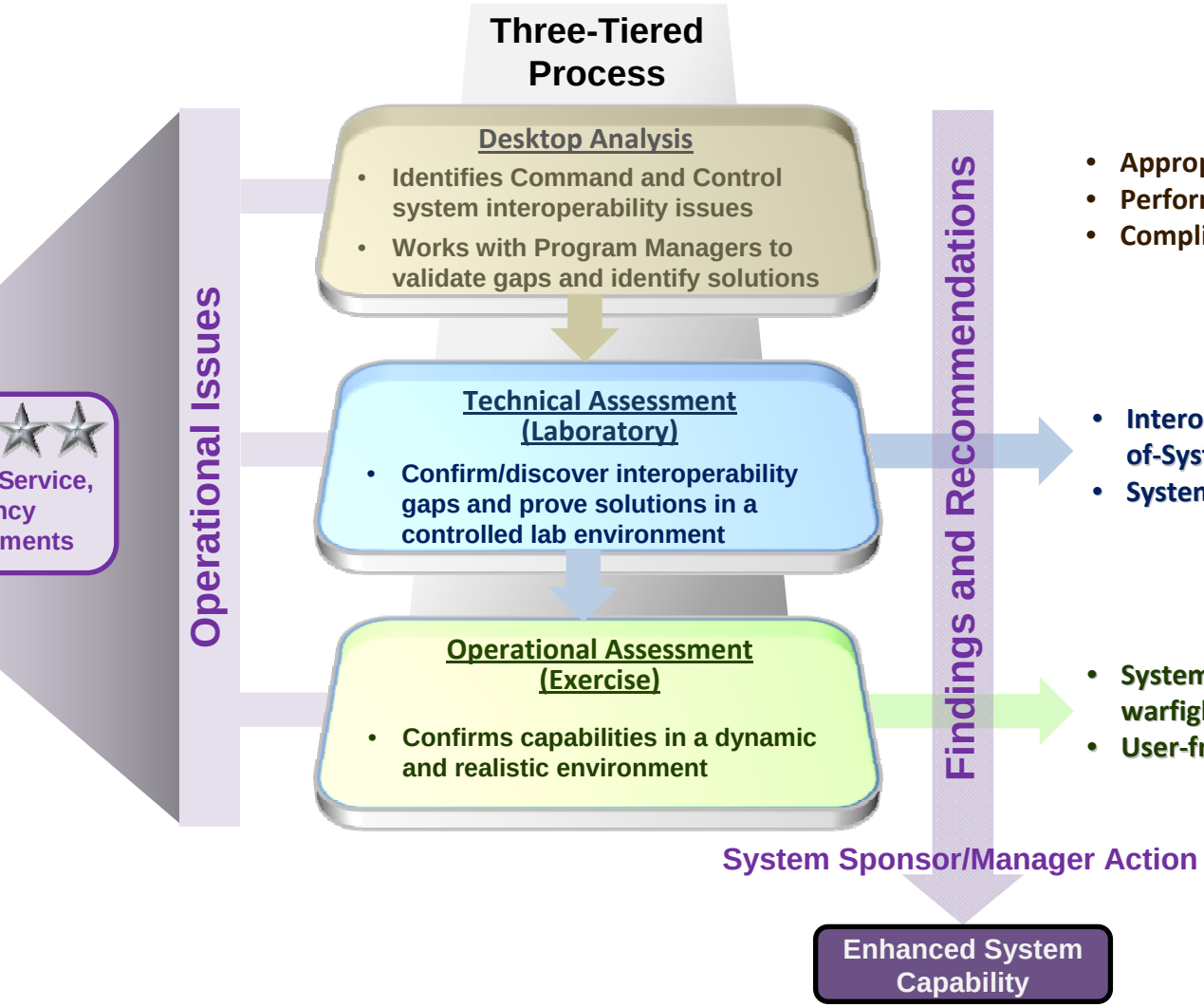
JSIC's Environment

connected,

- ercial Internet, NIPRNET, SIPRNET, JWICS
- Leading Edge Services (DISN-LES)
- se Research & Engineering Network (DREN)
- se Video Services-Global (DVSG)
- Global Broadcast System (GBS)
- Access to the DISN Core
- Combined Enterprise Regional Information Exchange System
- Combined Federated Battle Laboratories Network (CFBLNet)

... and scalable through distributed reach.





Metrics

Technical Maturity

- Appropriate programmatic support
- Performance of required capabilities
- Compliance and documentation

Joint Interoperability

- Interoperability in a controlled, System-of-System environment
- System capacity to complete tasks

Warfighter Utility

- System effectiveness in completing warfighter tasks
- User-friendliness and timeliness

A rigorous, repeatable, and tailorable process

Back