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DEFENSE INFORMATION SYSTEMS AGENCY
The IT Combat Support Agency

JITC Requirements Analysis Framework for Test

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Agenda

- **Problem**
- **Challenges**
- **JITC Goals**
- **RAFT**

Problem Statement

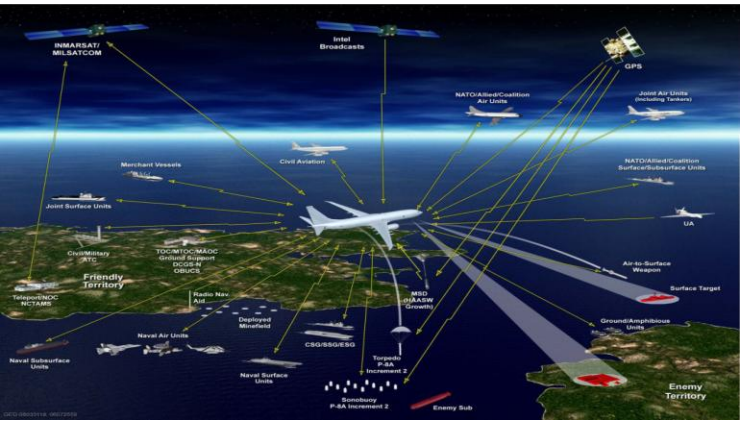
- **The Net Ready-Key Performance Parameter table does not adequately describe the scope of the system under test. This table does not express the totality of the system's information exchange capabilities but does provide a context of what is considered critical from an operational point of view.**

- **The solutions architecture does describe the scope of the system under test, but does not provide a context of what mission tasks are truly critical for the user.**

- **It is the compilation of the NR-KPP and the solutions architecture that provides the scope and context in sufficient detail to adequately evaluate the system under test. The RAFT process allows us to reduce the risk of under-testing or over-testing the system.**

RAFT leads to the right amount of testing.

Challenges for JITC



Complex Systems of Systems (SoS) consisting of communications and weapons capabilities, integrated into a Weapons/C2 System platform (Air/Land/Sea) exchanging information to achieve operational success

Conduct efficient Interoperability certification for weapons/C2 systems

- Traceability of interoperability requirements through products is difficult
- Need to improve Speed, Rigor, Quality
- SoS evalutation requires methodologies to be comprehensive
- Report/Cert Memo articulates the interoperability of the system under test

JITC T&E Goals

- **Maintain a high level of engineering discipline in the interoperability test planning process.**
  - **Document the end-to-end traceability of interoperability requirements.**
  - **Document the end-to-end traceability of interoperability test threads.**
  - **Show the scope of the interoperability test effort.**
  - **Integrate multiple sources of requirements and architectural artifacts into a single analysis.**

- **Generate dialog between system stakeholders: Requirements owners, Program Managers, System Engineers, Testers, and Users.**

RAFT is a fit-for-purpose Test Architecture

Requirements Analysis Process

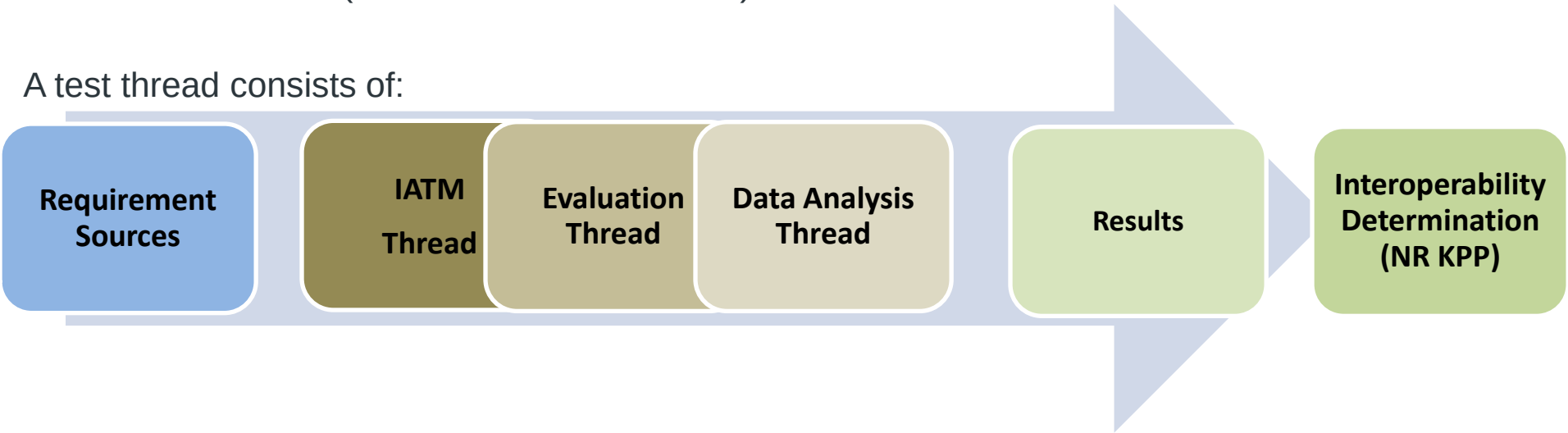
- **Requirements Analysis Framework for Test (RAFT) is composed of three distinct tasks;**
  - **Integrated Architectural Traceability Matrix (IATM)**
  - **Evaluation Framework (EF)**
  - **Data Management and Analysis Plan (DMAP)**

- **This process is scalable from a single system to a system of systems and family of systems using multiple solutions architecture sets and multiple requirements sources.**

Requirements Analysis Framework for Test

JITC uses the RAFT (IATM + Eval Frwk + DAS) to document test threads

A test thread consists of:



JITC documents a test thread for each information exchange, network, and mission performed by the system under test.

Integrated Architecture Traceability Matrix

- **IATM is built from right to left, but read from left to right.**
- **Documents the Parent-Child relationships and contains the information to answer the following questions;**
  - **Why are we doing what we are doing? (OV-5a/b and OV-6 (Activity))**
  - **Who needs the information? (OV-3 (Resource Flow))**
  - **How do we do what we are doing? (SV-4/SV-5 (Function))**
  - **How are we getting the information where it needs to go? (SV-1/SV-2 (Network))**
  - **What are the technical attributes of the IER? (SV-6/SV-7 (Info Exchange & Performance Attribute))**
- **IATM documents *Scope, Context, and Performance attributes* of the system under test.**

This process can uncover any discontinuities in the Requirements documentation

Example Evaluation Thread

Requirement Source	Mission Measure	Network Measure	Information Exchange Measure	Activity	Function	NeedLine	IE performance attributes
CPD ISP	M1: Percent of Troop Deployments initiated upon receipt of Ops Orders. Threshold: 90%	N1: Percent of IEs sent via NIPRNet without drops or outages. Threshold: 95%	IE 1a: Time to send info from Div to Bgd Threshold: ≤ 10 sec IE 1b: Percent of info sent and received without error Threshold: 95%	Order troop deployment	Disseminate Operations Order	Division to Brigade	Timeliness ≤ 10 seconds Accuracy ≥ 95%

Example Data Management & Analysis Plan

Data Management & Analysis Plan								
Data Description	**Operator Location**	**Data Extraction Method**		**Data Format**		**Methodology**	**Test Card**	**Survey Sheet**
		Automated	**Manual**	**Automated**	**Manual**			
Message Time tags Number of messages sent/received Number of messages with errors	02-93-4-C	Recorded on digital hard drive	Direct observation by the JITC data collector	.xls & .doc files	Data collection form and survey sheet	Tester accesses log file from hard drive; records on data collection form	#1	#1

- JITC develops a data and analysis entry for each test thread. Detailed instructions are provided in the test cards and survey sheets.

Data & Analysis Strategy (Data Management)

- **The DAS is used to document the answers to the following questions for each test measure.**
  - **What is the source of the data?**
  - **What types of data do we need collected?**
  - **Where in the system will we extract the data?**
  - **What are the steps required to extract data?**
  - **How frequently will we extract the data?**
  - **Who will extract the data and using what media?**
  - **What analytical tools will we use to array the data?**
  - **What is the methodology used to analyze the data?**

Completed RAFT

- **Provides traceability from the Information Exchange to the Mission Activity**
- **Provides the Evaluation Framework and Data Strategy to collect and evaluate the Information Exchange**
- **Connects the DoDAF architectures to the NR KPP**

- **Disconnects in requirements are readily identified**
- **Enables easier and better reporting**
- **Drives discussions with stakeholders**

Completed RAFT coupled with NR KPP yields Interoperability Determination

Questions?

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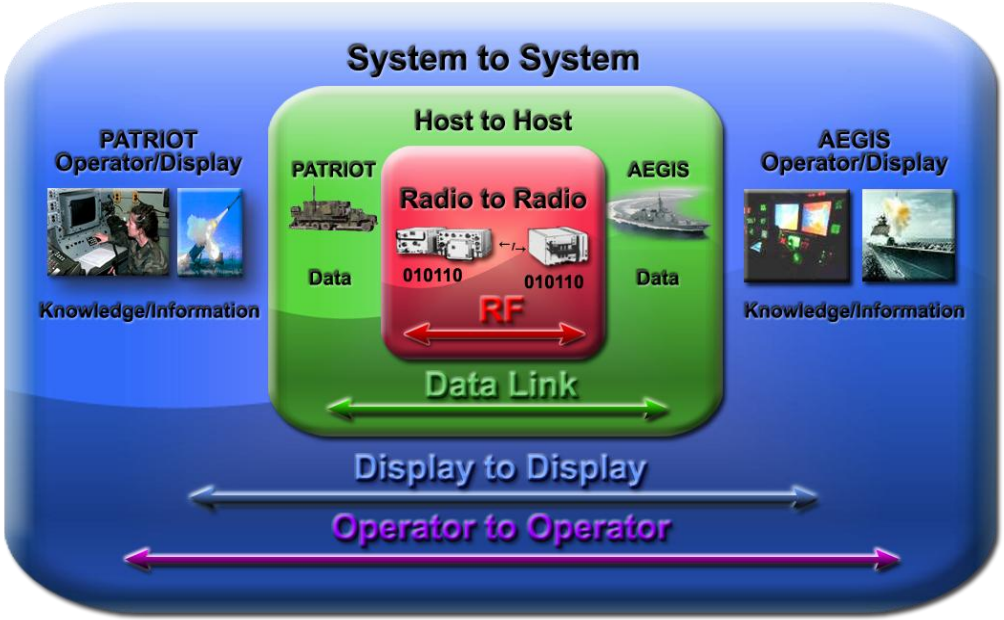
Backups

Interoperability

- The ability of systems/forces to exchange data and information with other systems/forces
- Data and information exchanges permit effective operations together to enable *mission accomplishment*.

- IT interoperability includes:
  - Technical exchange of information, and
  - End-to-end operational effectiveness of that exchange of information.



Challenges – Program Manager

- **From a Weapons System/C2 Platform Perspective – integrated into the Force**
- **Enabling Capabilities:**
  - Tactical Data Links
    - Link 11/ Link 16 / Link 22/ Inter-Flight Data Link/ Multifunction Advanced Data Link / Situation Awareness Data Link / Common Data Link/ Variable Message Format/ Intelligence Broadcast System
    - Hybrids – Gateways/ JRE-Forwarders/ Concurrent Ops/ TRAX
  - Radio/RF - UHF/ VHF /HF/SATCOM
  - Data/RF – SATCOM/ INMARSAT/ IP
- At the platform-level the key is…***Integration***
  - Does the capability work correctly as installed and as intended?
- At the mission level the key is…***interoperability***
  - *Operational – End to End – Mission Effective Information Exchanges*
  - *Accurate, Timely, Complete, Usable*

Test what the system is supposed to do* vs. *Test what it does