Command, Control, Communications Center

Thin Thread Analysis

Ver 1.2

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21 June 2006

MITRE

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JUN 2006		**00-00-2006 to 00-00-2006**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Thin Thread Analysis	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **MITRE Corporation,7515 Colshire Drive,McLean,VA,22102**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**		**28**	

Overview

- NCOE Background
- The Need to Close a Potential Analytical Gap
- Purpose of Thin Thread Analysis
- The Architecture-Based Thin Thread Approach
- Initial Development of the Thin Thread
- Results to Date

Background

- NCOE study - two parallel tasks done in FY05 under accelerated timelines
  - Task 1 – Joint Integrating Concept (JIC) development
  - Task 2a – NCOE Baseline and Roadmap

Background – the NCOE JIC

- Focuses on Joint Task Force (JTF) operations within the context of a Major Combat Operation (MCO)
- Defined three interrelated capability areas
  - Knowledge Management
  - Network Management
  - Information Assurance
- Defined three enabling constructs
  - Information Transport
  - Enterprise Services
  - Applications
- Used illustrative examples to explore ideas

Background - the NCOE Baseline & Roadmap

- Description of the DoD's Net-Centric Vision
- Summary of the principal components that are being developed to enable achievement of the vision
  - Transport (Communications)
  - Network Management
  - Enterprise Services
  - Information Assurance (IA)
- Programmatic and technical interdependencies among the NCOE programs and initiatives
- Descriptions of capabilities expected to be available to selected types of users between FY08 and FY20

The Need to Close a Potential Analytical Gap

Task 1

NCOE JIC

Operational Vignettes

Required Operational Capabilities

Tasks, Conditions, Standards

How do we compare these?

Performance Parameters

Expected Functional Capabilities

Technical Characteristics

Task 2a

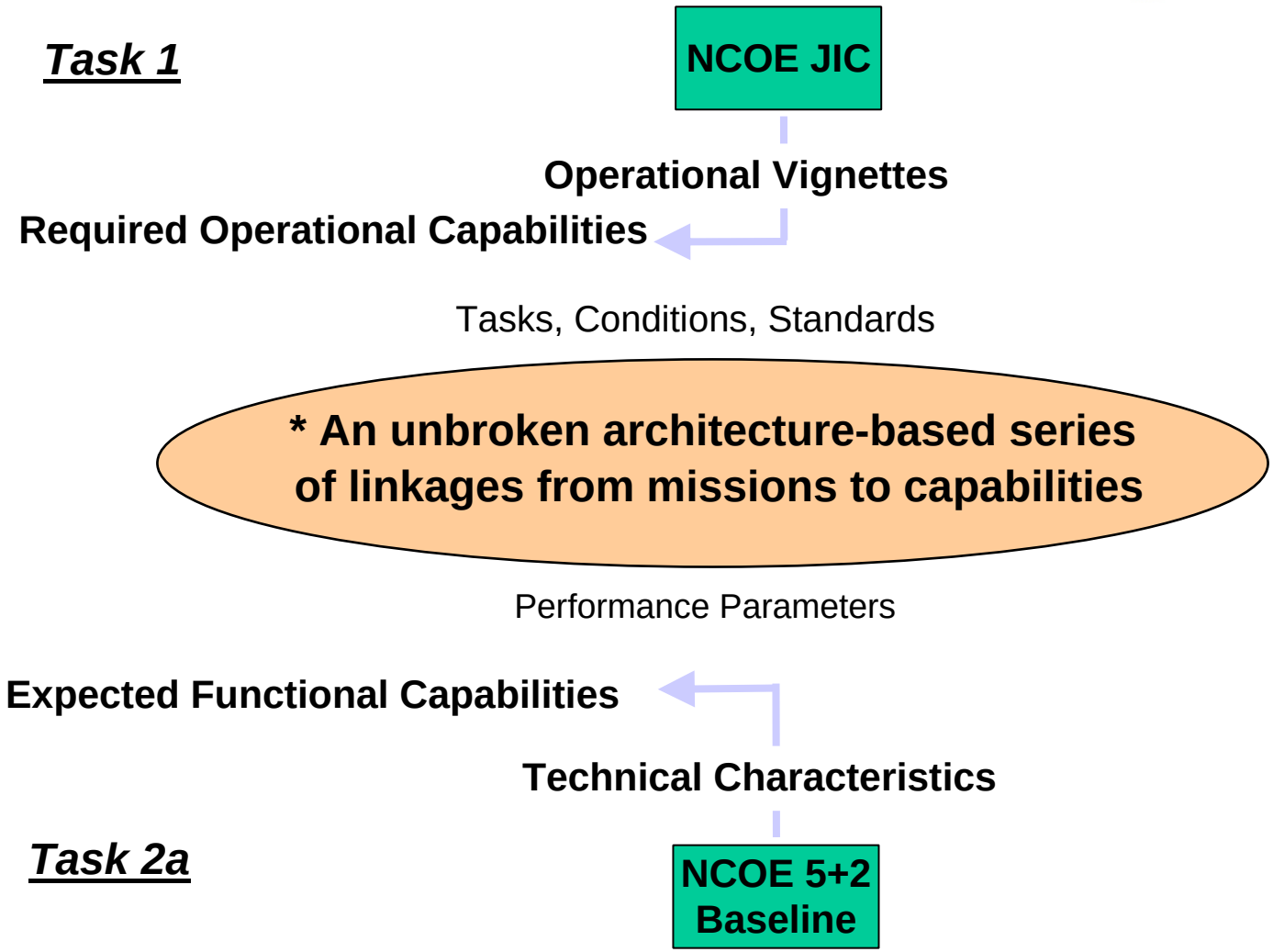
NCOE 5+2 Baseline

Source: MITRE Briefing to ASD (NII) 24 Jan 2005

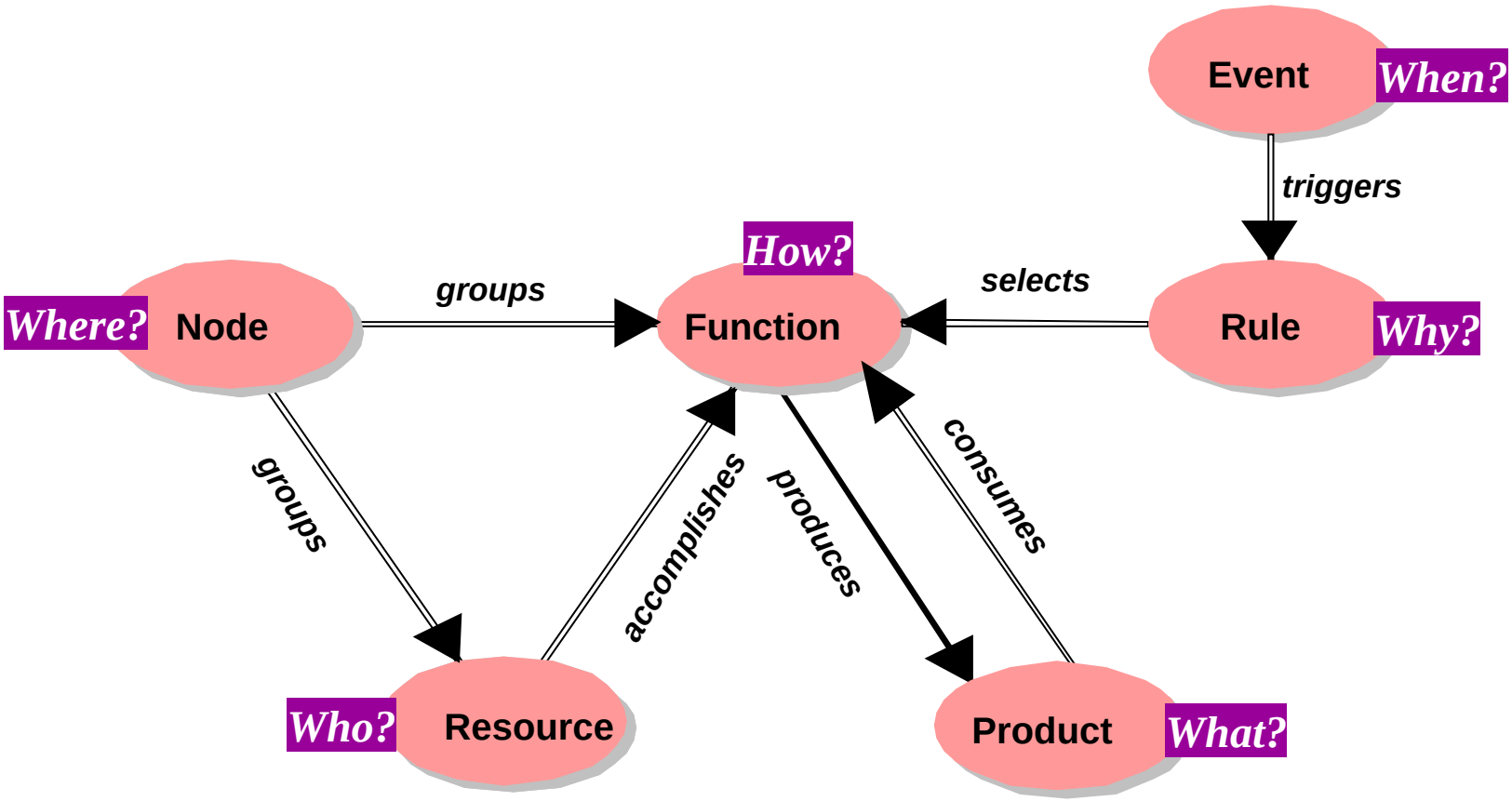
The NCOE Capabilities Based Analysis

- NCOE Capabilities Based Analysis (CBA) planned for FY06
  - Conduct Functional Area Analysis (FAA)
  - Conduct Functional Needs Analysis (FNA)
- MITRE tasked to use existing materials to define a process and demonstrate results
  - Use existing NCOE JIC materials
  - Focus on Time Sensitive Targeting process
  - Augment information with extant materials from Joint Battle Management Command and Control (JBMC2) Roadmap

An Architecture-Based "Thin Thread"*

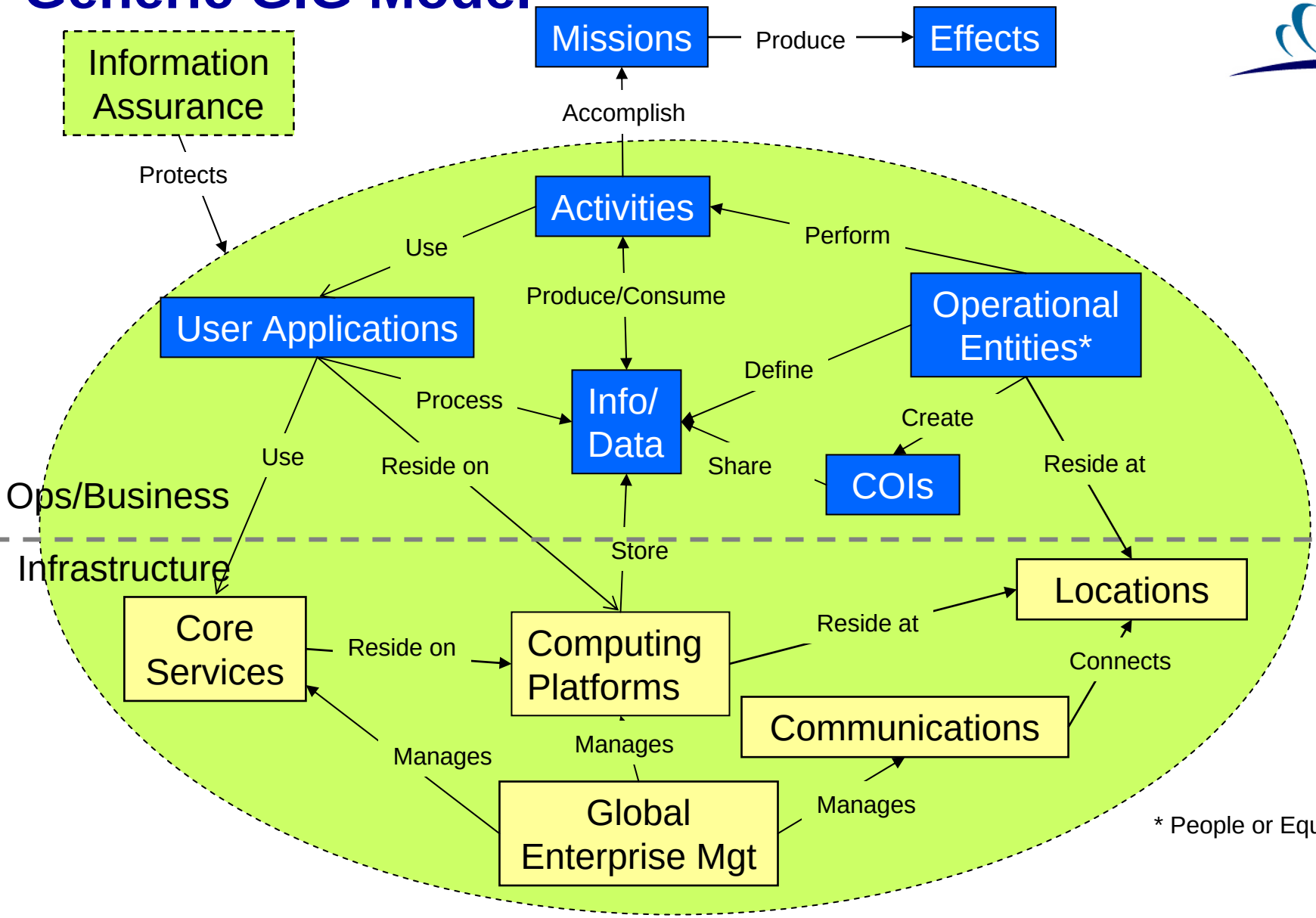


Architecture Specification Model (ASM) Overview*

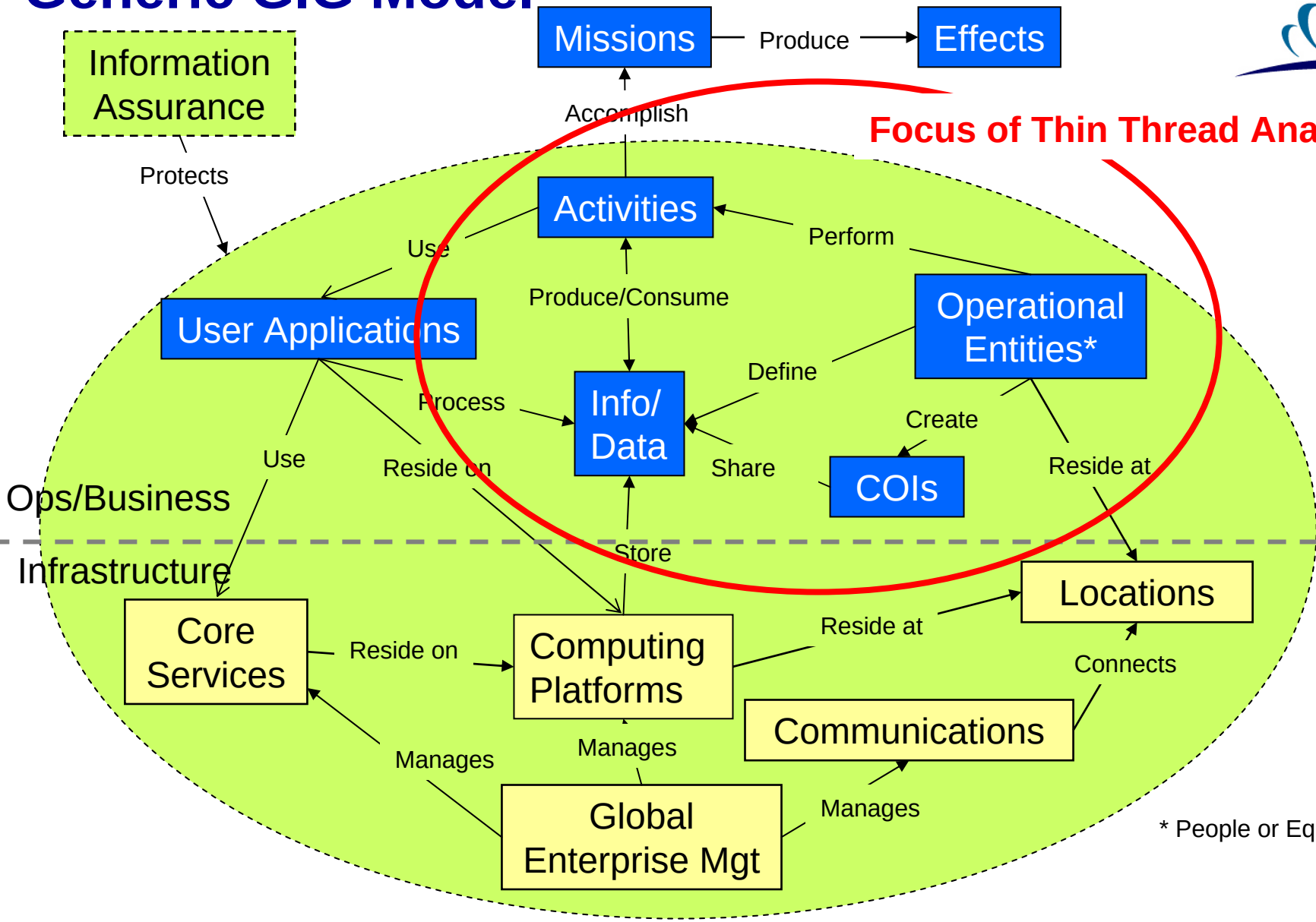


* ASM Developed by MITRE under USAF Sponsorship

Generic GIG Model



Generic GIG Model



Needs are Driven by Operational Characteristics

- **Activity**
  - Operational Role – what activities are performed?
  - Criticality – how important are the activities?
  - Precision – how accurate do the result of the activity need to be?
  - Knowledge – what information is needed to accomplish the activity?
  - Tempo - how often is the activity performed?
  - Timeliness – how fast is the activity performed?
  - Operational Security – how much does it need to be protected?
- **Operational Entity**
  - Organizational affiliation – who are they?
  - Physical Location – where are they located?
  - Environment – what kind of conditions prevail or are possible?
  - Degree of mobility – how much do they move?
- **Community of Interest**
  - Community affiliations – what COIs are involved?
  - Vocabulary – what “language” do they speak?

Needs are Driven by Operational Characteristics

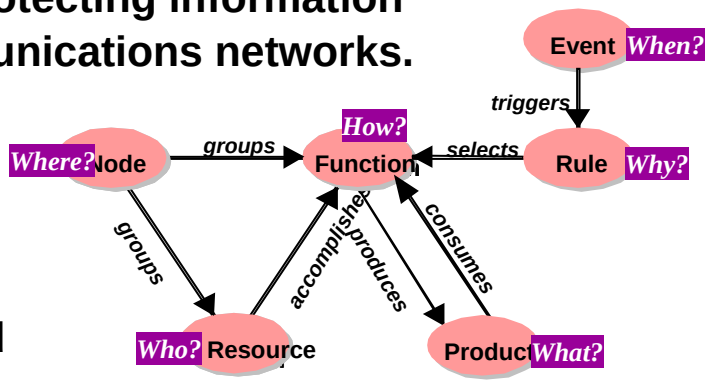
- **Information**
  - Existence - has anyone created the information?
  - Content – what is the substance of the info (intel, ops, weather, logistics, etc.)?
  - Currency – when was it created or last updated?
  - Perishability – what is the "shelf life" of the information?
  - Availability – can it be physically obtained?
  - Format – what form is it in (text, audio, video, imagery, etc.)
  - Discoverable – is it tagged and indexed so it can be readily found?
  - Accessibility – is interaction with it possible and allowed?

Architecture-Based Linkages for TST

F2T2EA **functions** include locating and identifying targets, determining, analyzing and preparing plans of attack, selecting best courses of action, engaging the targets, and evaluating the results; as well as supporting functions such as protecting information and managing communications networks.

In response to an **event**, a need to defend friendly forces from attack, triggers a response.

Predefined **rules** (e.g., in an SOP) are invoked to select the F2T2EA chain of activities.

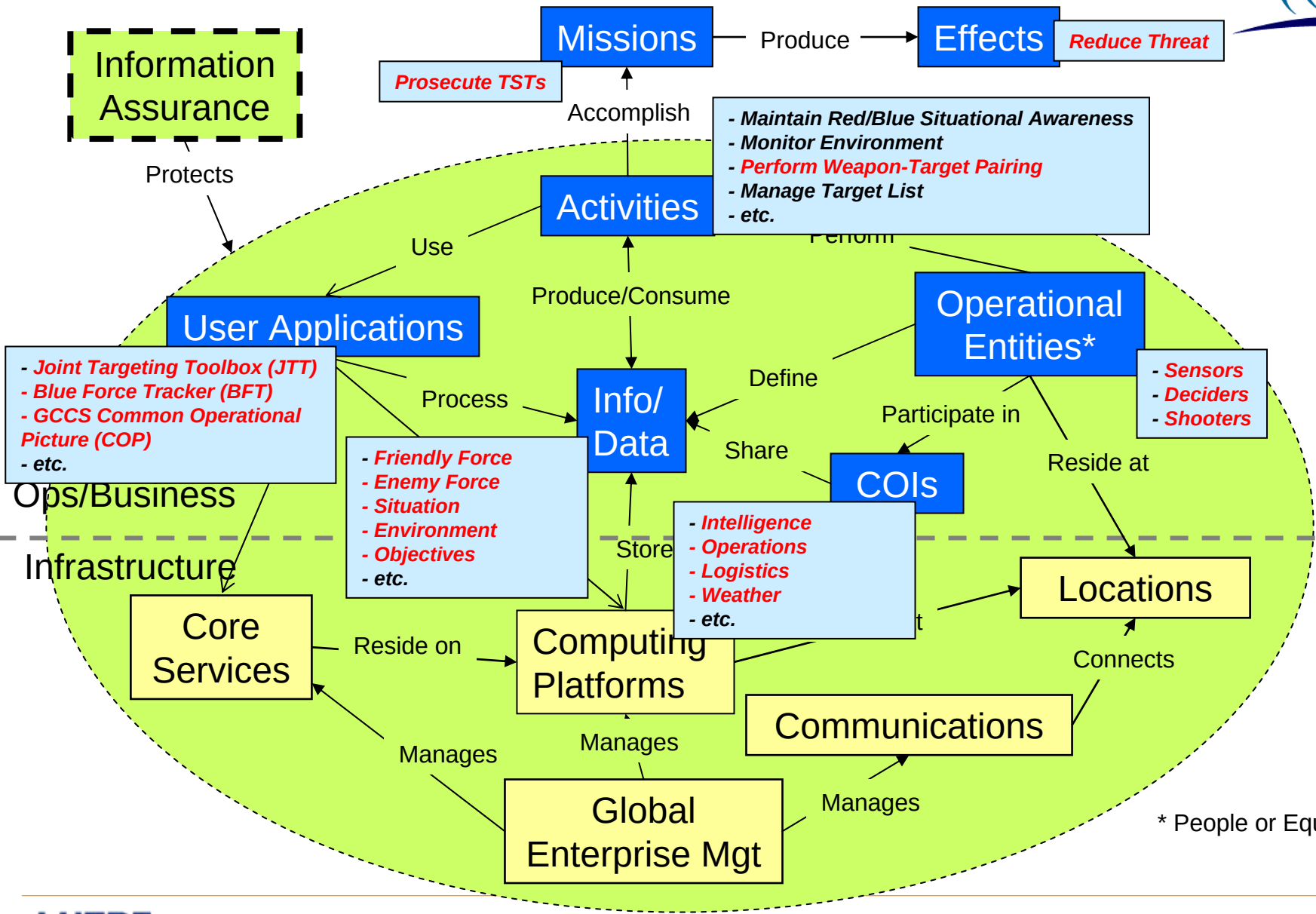


Participating **nodes** include sensors, decision-makers, and shooters; as well as network managers.

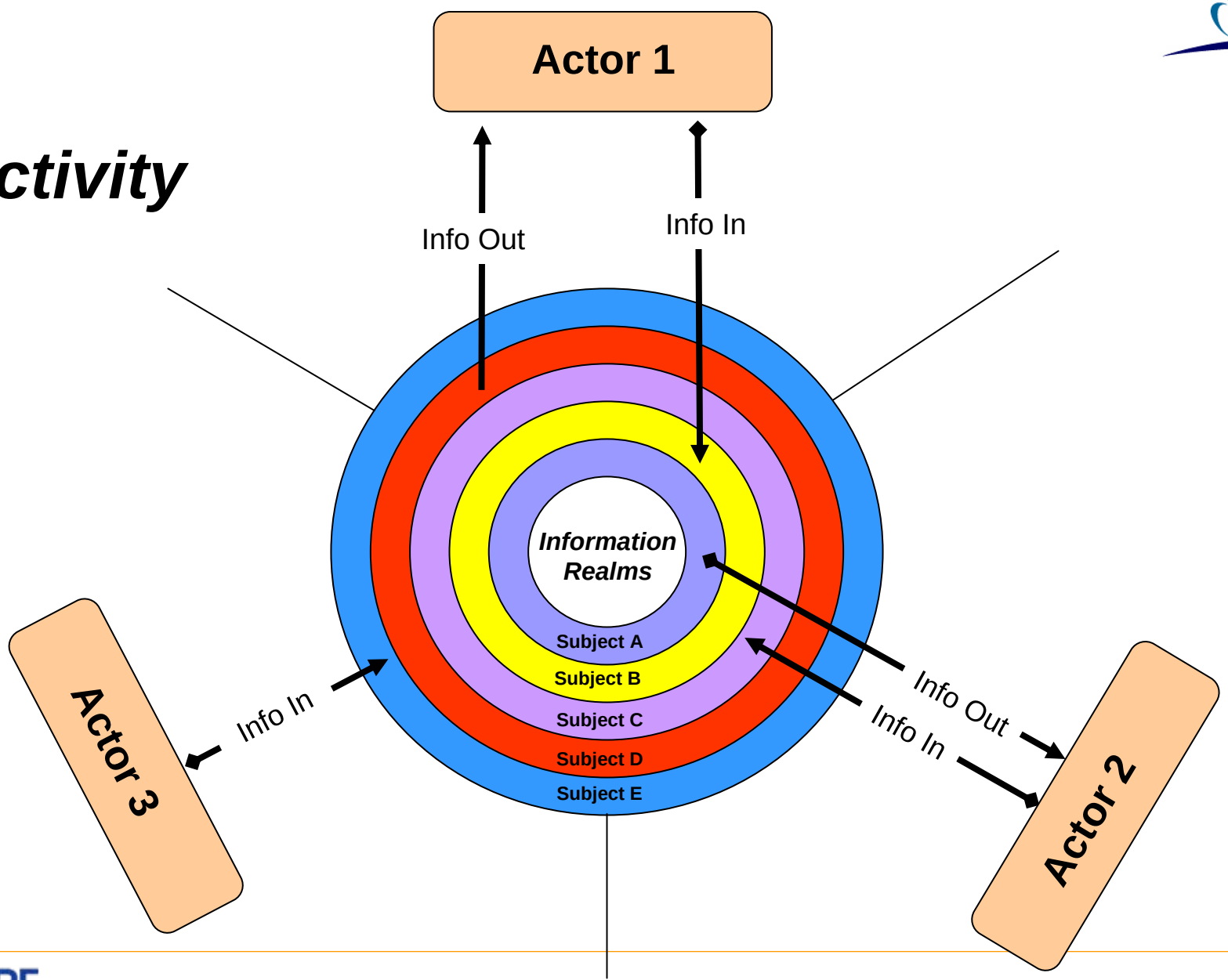
Products include orders of battle, target coordinates, weather reports, terrain descriptions, engagement orders, combat reports, etc.

Resources employed include ISR sensors, C2 platforms, combat vehicles and weapons, and the supporting communications, computing, security, and network management infrastructure.

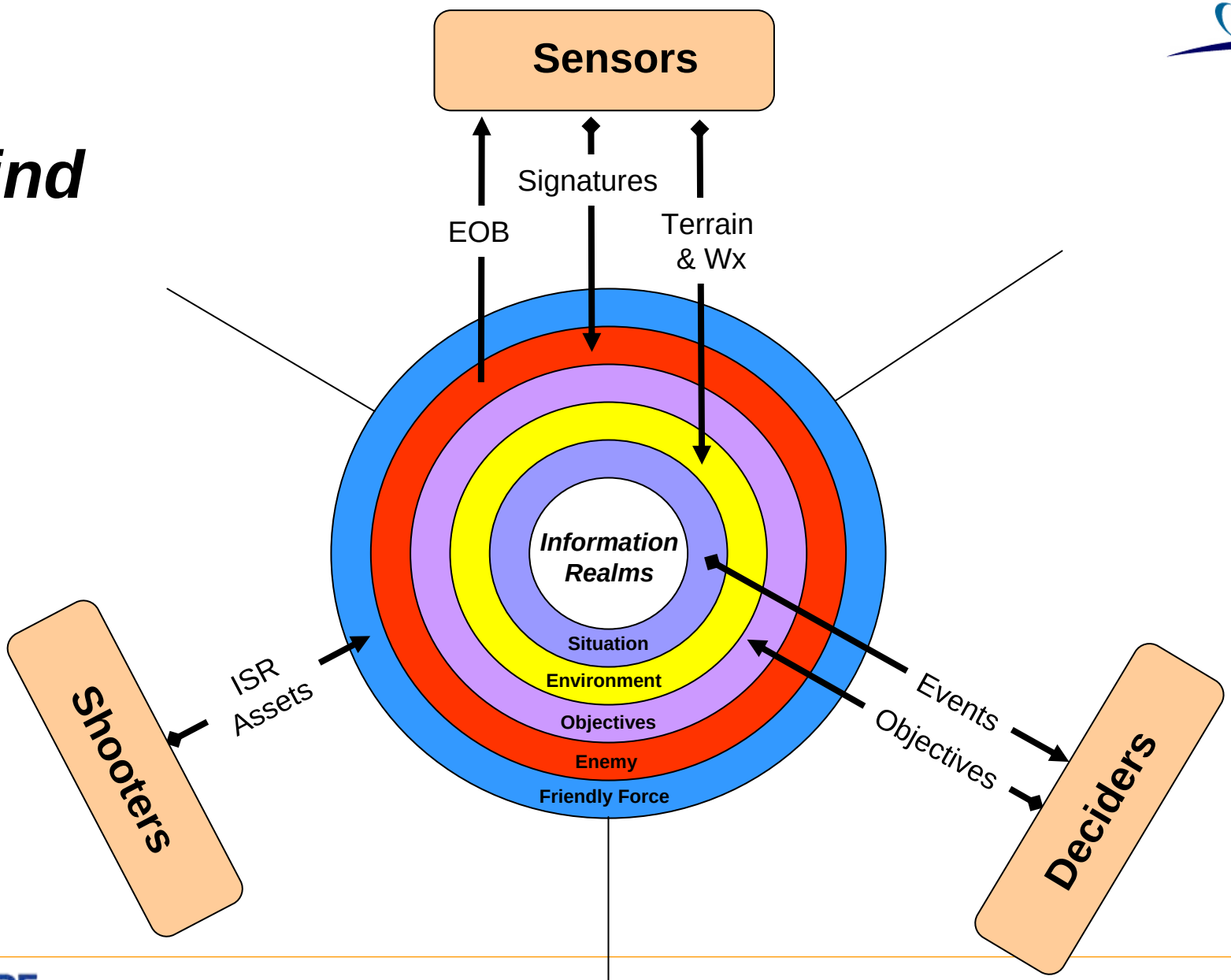
NCOE-Relevant Thin Thread Operational Elements



Activity-Based Net-Centric Diagram (OV-X)



Notional Activity-Based TST OV-X



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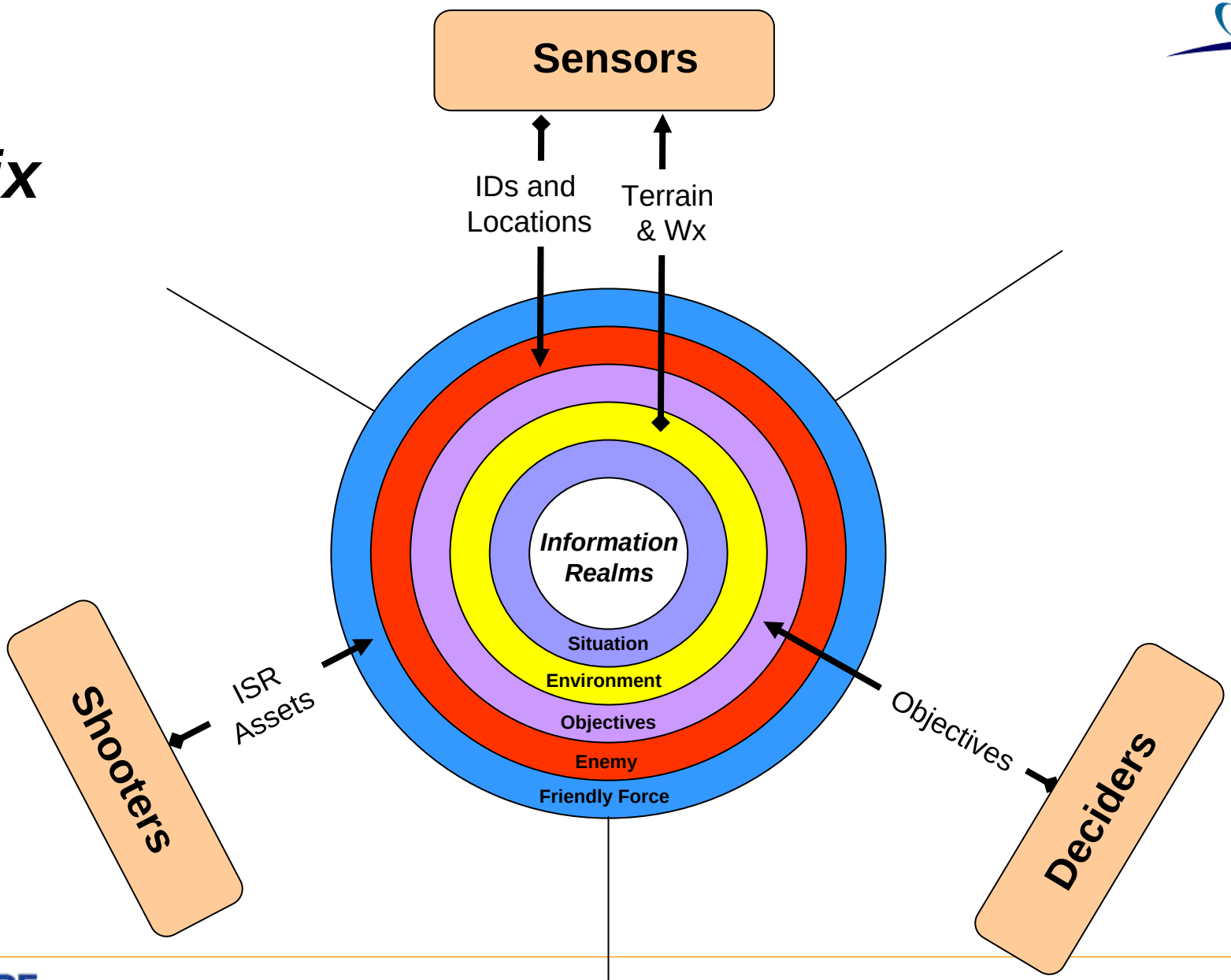

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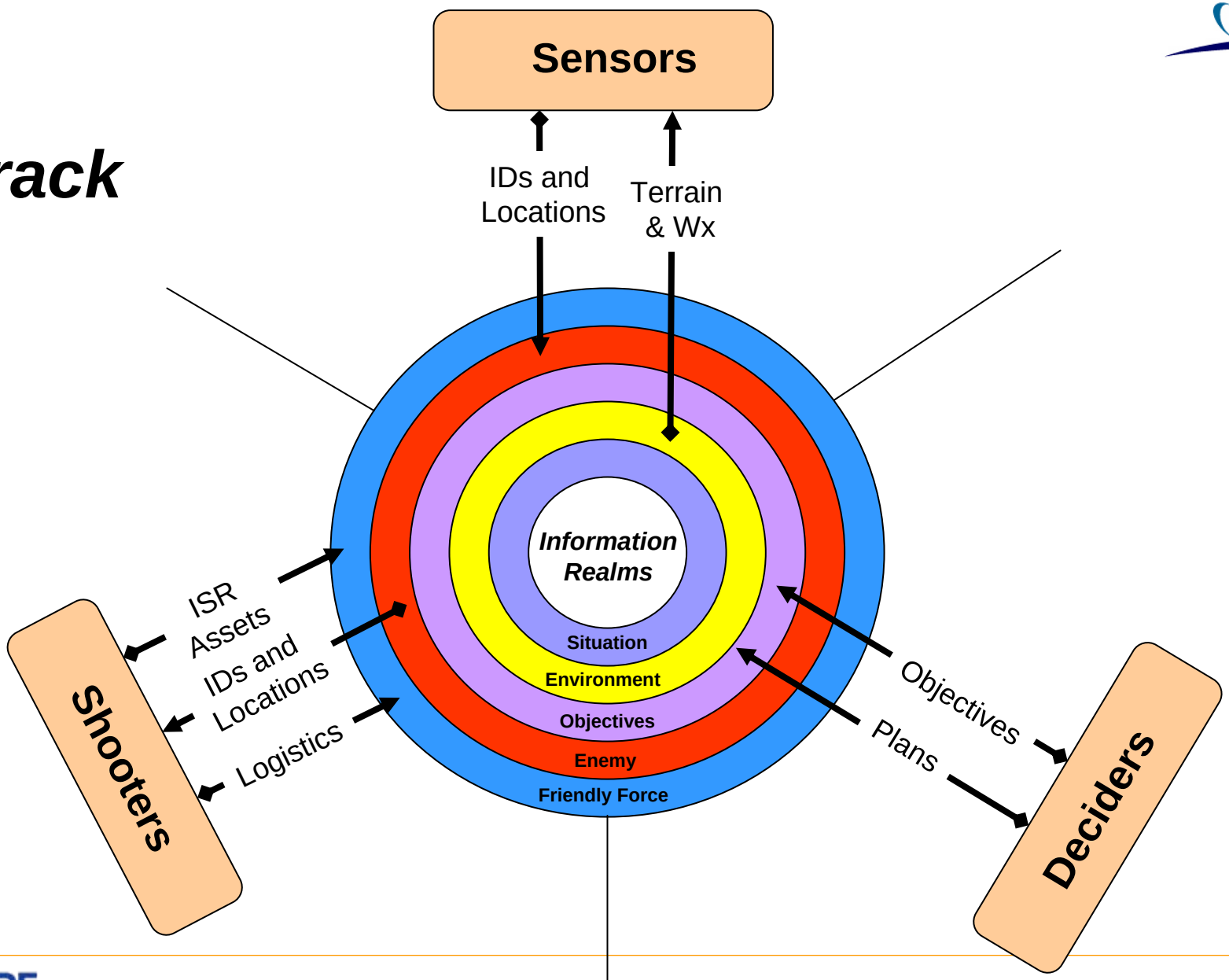

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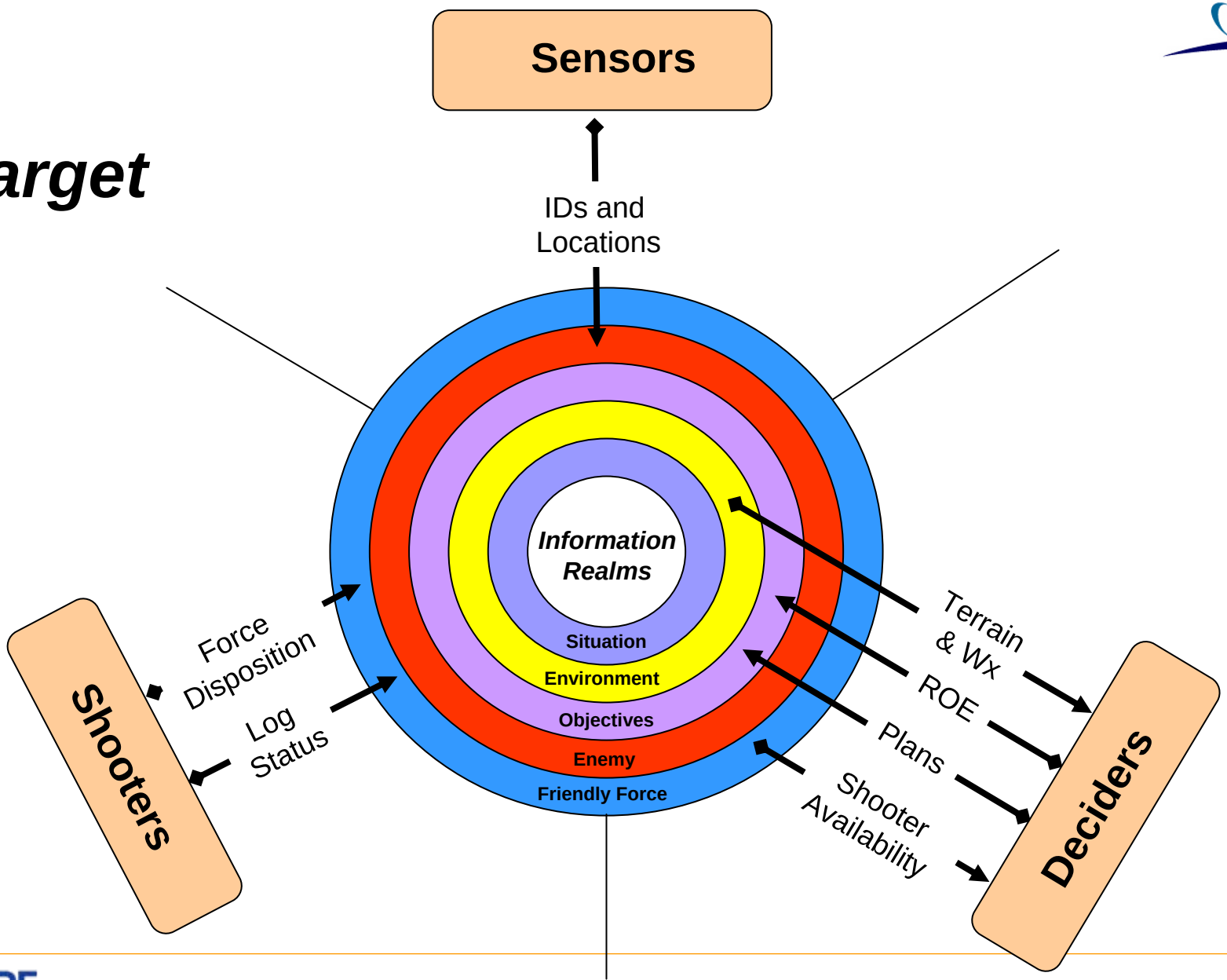

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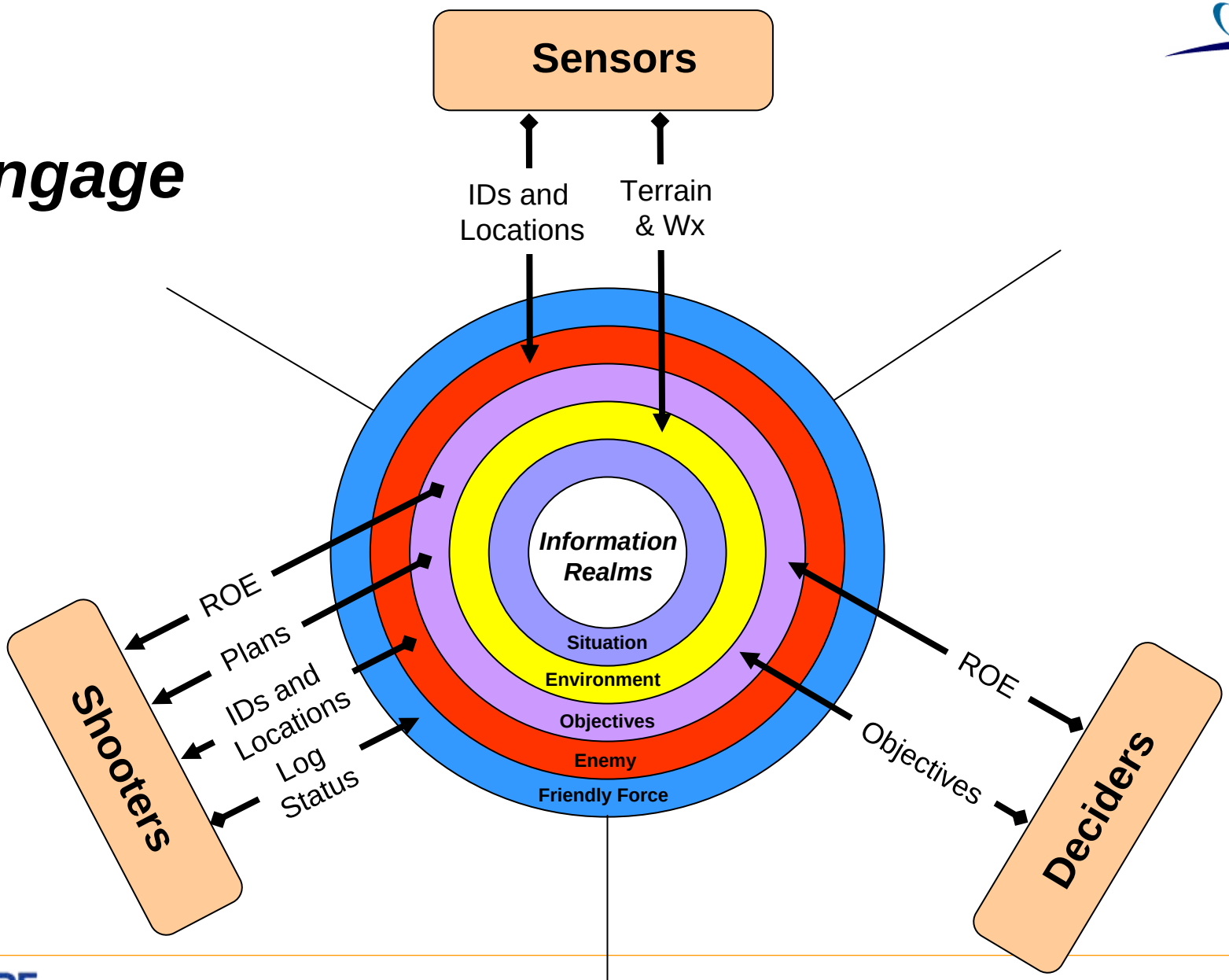

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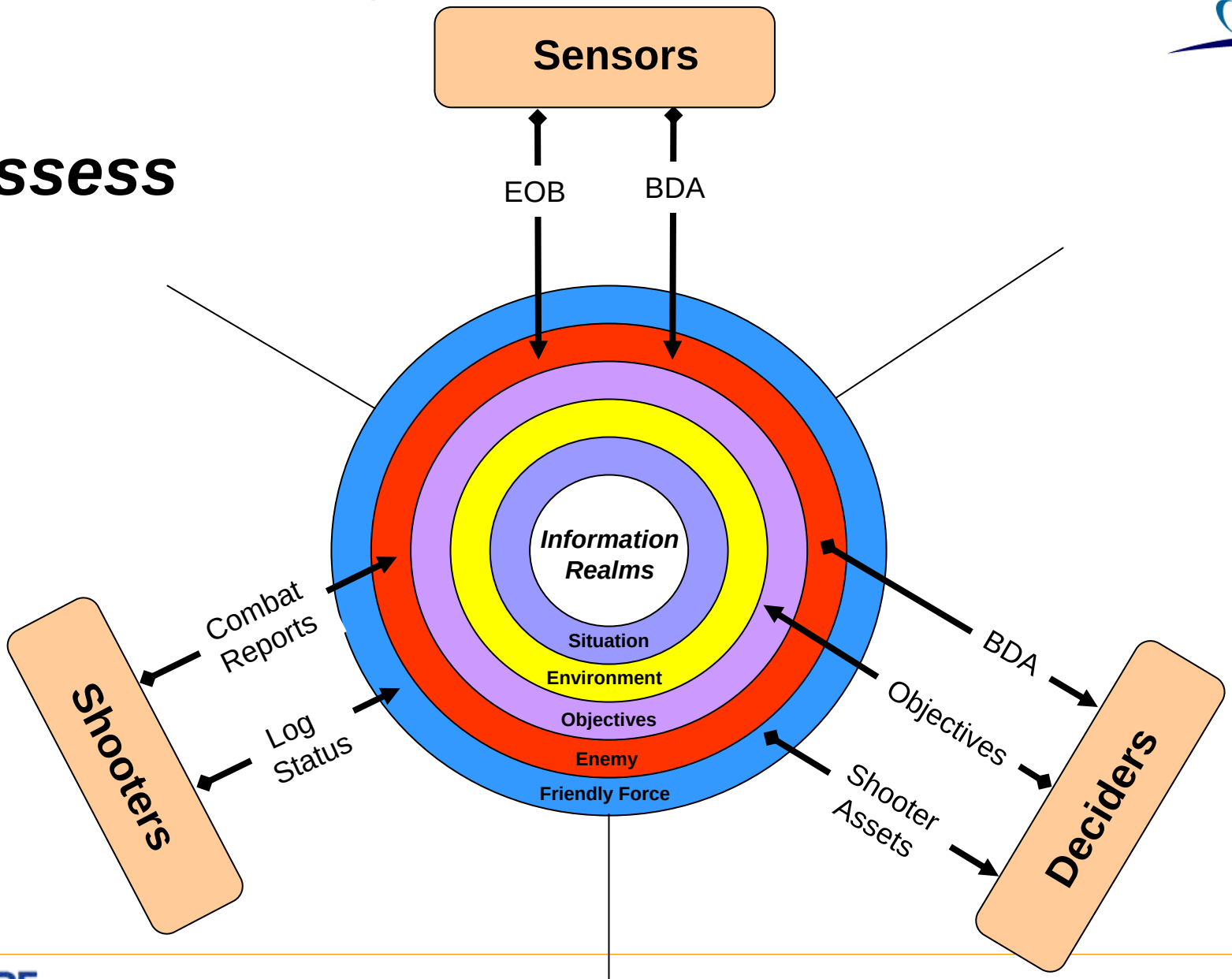
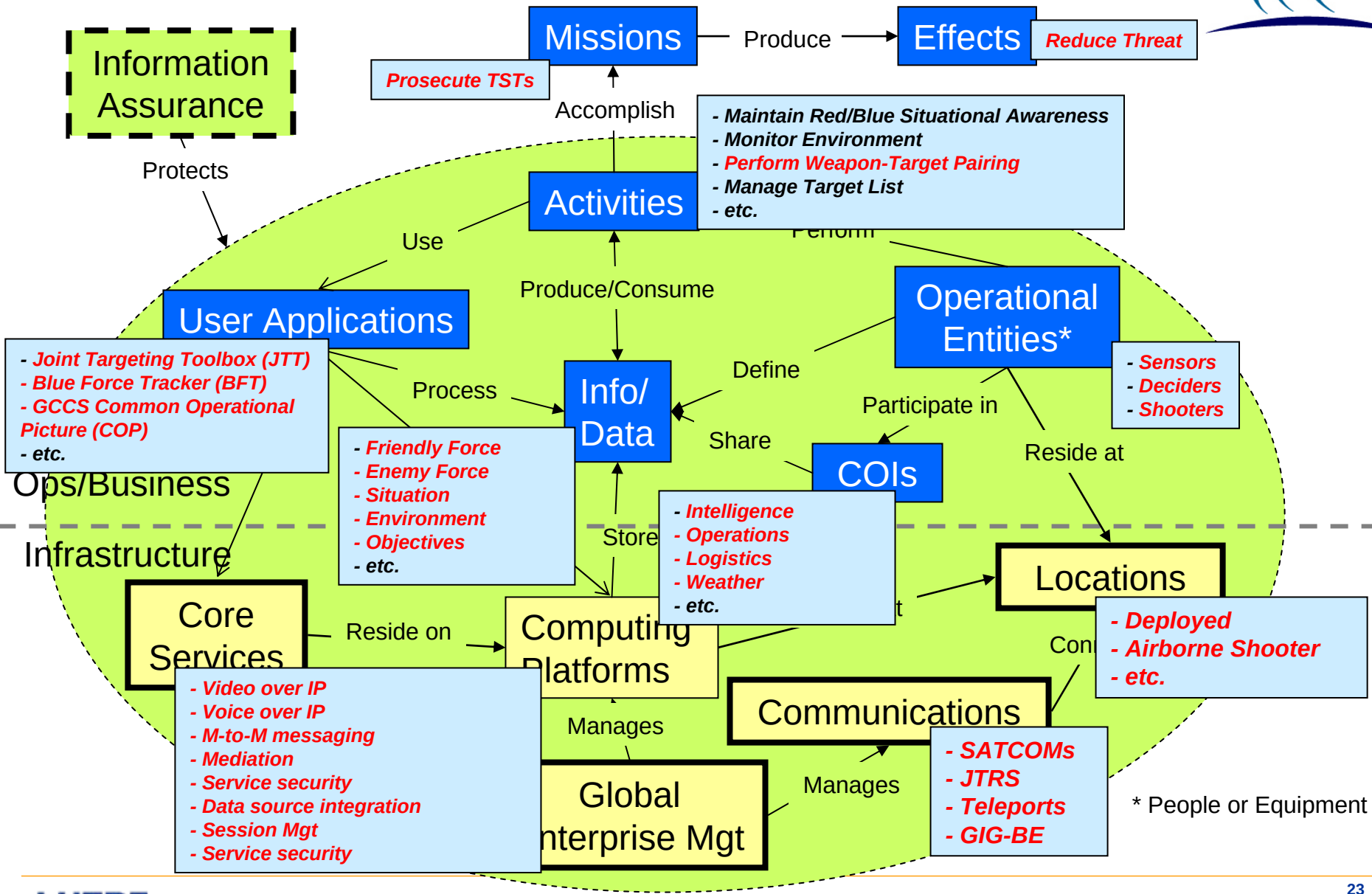
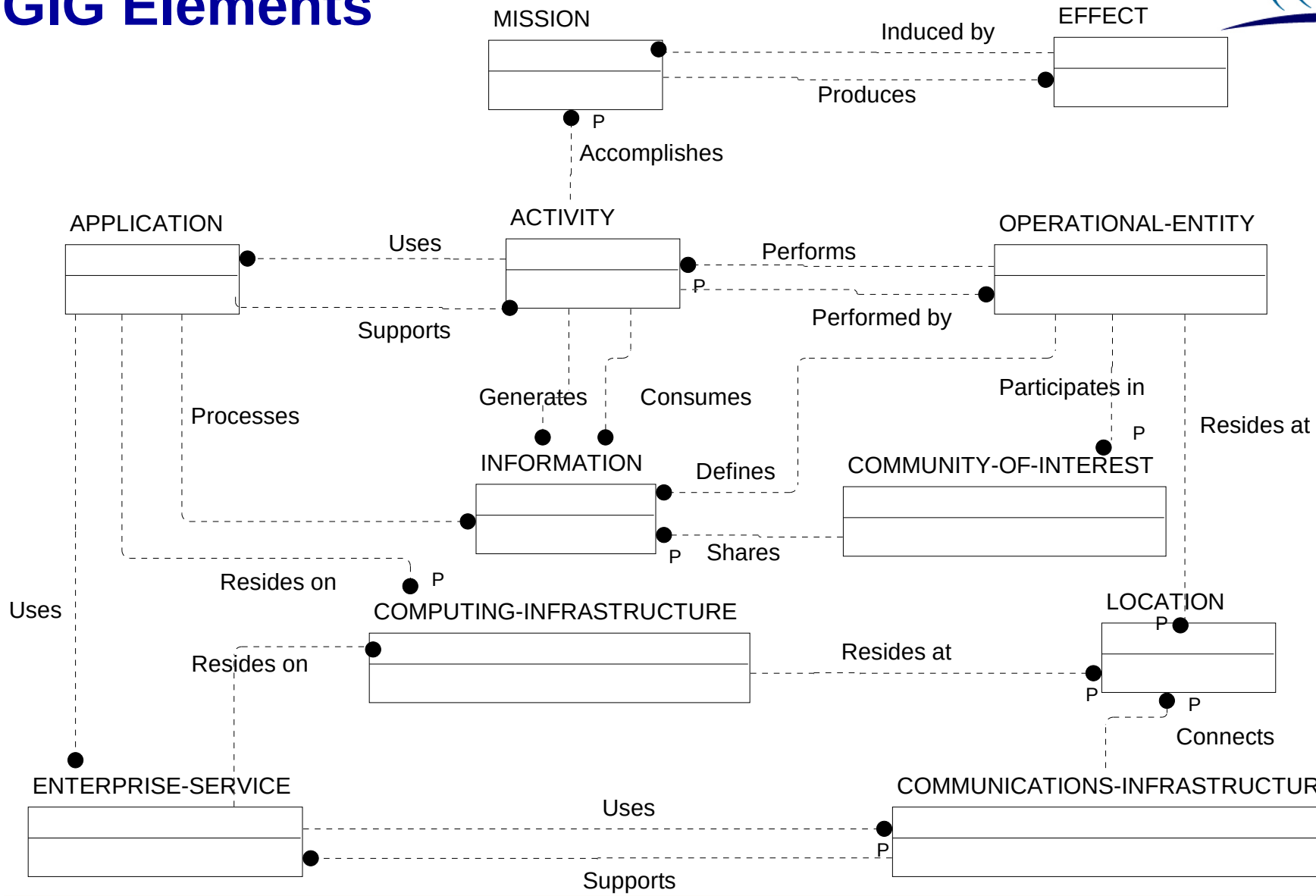


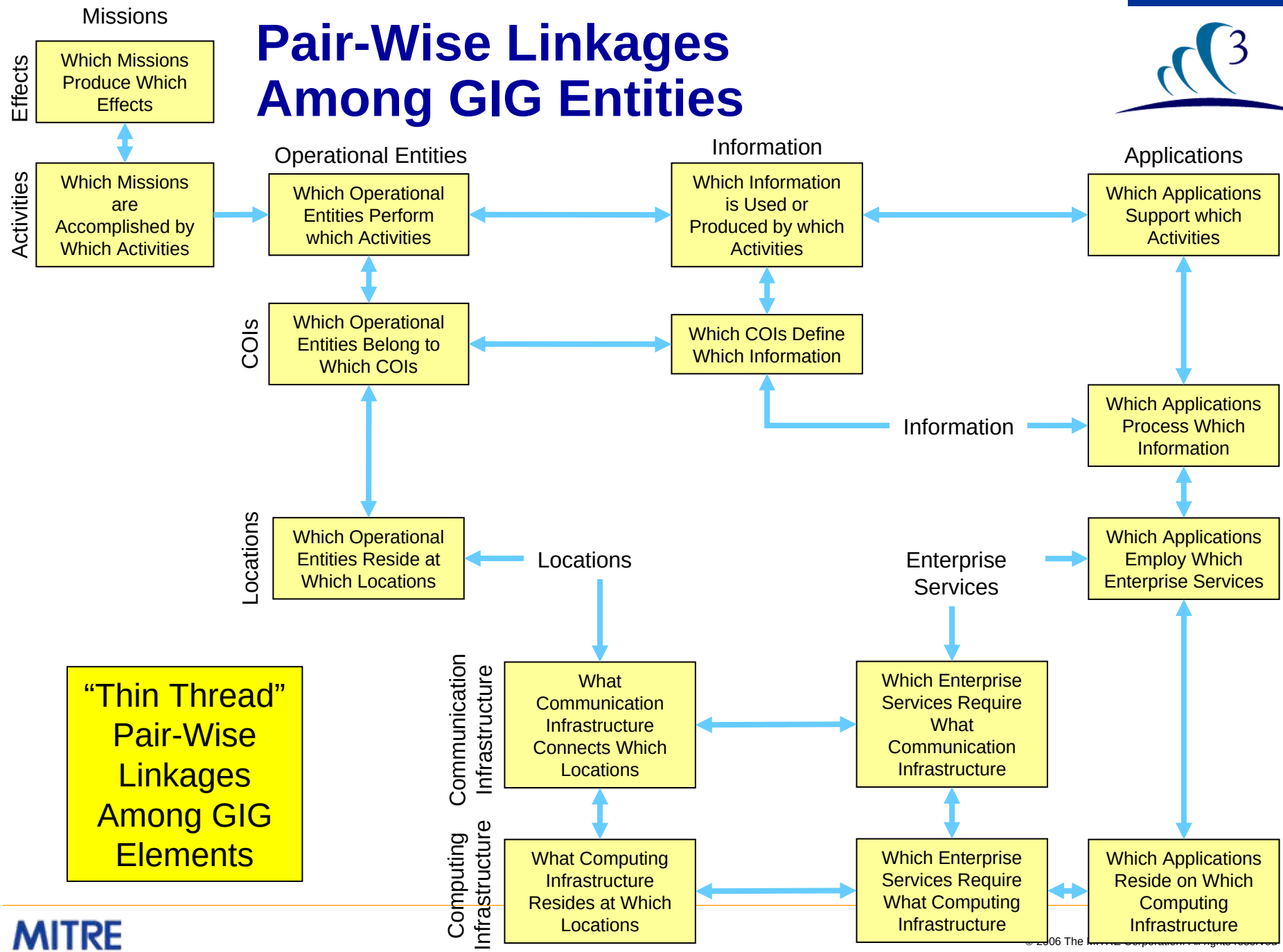
NCOE-Relevant Thin Thread Operational and Infrastructure Elements



Entity Relationship Model of Selected GIG Elements



Pair-Wise Linkages Among GIG Entities



"Thin Thread" Pair-Wise Linkages Among GIG Elements

Sample TST Thin Thread Linkages

Missions

Effects	Which Missions Produce What Effects	Prosecute TST		
	Reduce Threat	X		

Missions

Activities	Which Missions are Accomplished by What Activities	Prosecute TST		
	Find	x		
	Fix	x		
	Track	x		
	Target	x		
	Weapon-Target Pairing	x		
	Determine Desired Effects	x		
	Determine Constraints	x		
	Determine Target Vulnerability	x		
	Select Weapon	x		
	Determine Shooter Availability	x		
	Select Shooter			
	Engage	x		
	Assess	x		

Operational Entities

Activities	Which Operational Entities Perform What Activities	Sensor	Decider	Shooter
	Find			
	Fix			
	Track			
	Target			
	Weapon-Target Pairing			
	Determine Desired Effects		x	
	Determine Constraints		x	
	Determine Target Vulnerability	x		
	Select Weapon		x	
	Determine Shooter Availability		x	x
	Select Shooter		x	
	Engage			
	Assess			

NCOE Thin Thread Results

- Existing TST materials in JIC and in JBMC2 Roadmap provided insufficient level of detail to adequately exercise the concept
- Insufficient time and resources to gather additional information
- Only a Few Characteristics Could be Addressed
  - Activity operational role – what activities are performed?
  - Operational entity organizational affiliation – who are they?
  - Operational entity physical Location – where are they located?
  - Information availability – can it be physically obtained?
- Joint Staff chose to discontinue funding of NCOE Thin Thread effort
  - Considered the architecture-based approach to be too time consuming to pursue

Questions?