

Center for Air Force Command & Control Systems Information Technologies Directorate



Inference Rules for Joint Mission Assessment



MITRE
Technology
Program

Lewis A. Loren
Mike Dinsmore

Introduction



Research Problem

The **disconnect between planning, execution and assessment** impedes Operational Assessment, Situational Awareness, and Mission Effectiveness

Research Question

How can **inferences derived from plans, data links, mission reports** and other sources provide a near-real time **“assessment” capability**?

Research Plan

Develop a **prototype to infer the real-time status of planned operations** and their **impact on Operational Objectives** and **disseminate that data across the AOC**

Research Benefits

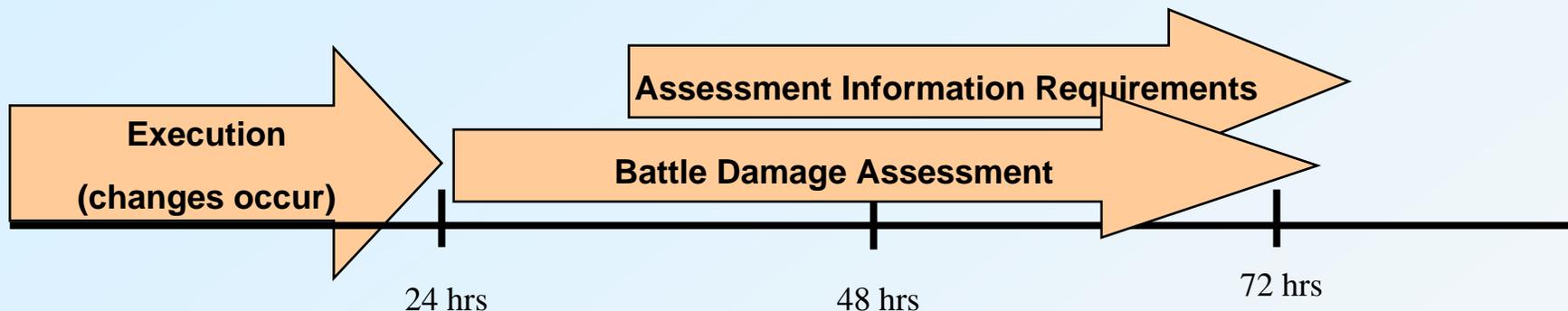
Improve **real-time picture of the battlespace** - support **effects based operations** – Horizontal and Vertical **M2M** – **Responsive ISR** – Improved **Decision Making**

Problem



- 0 **Disconnections between planning and execution impede Operational Assessment, Situational Awareness, and Mission Effectiveness**
 - **Mission status and changes aren't disseminated**
 - = **across Combat Operations cells**
 - = **back to the Operational Assessment Team**
- 0 **This causes disconnects among Combat Ops cells**
 - **ISR assets collecting imagery on targets that were never prosecuted**
- 0 **It impedes response time**
 - **3 days for Operational Assessment Team to learn that a planned target wasn't prosecuted and 3 days to get it in an ATO**
- 0 **It obscures Situational Awareness**
 - **Link between targets and Operational Objectives is lost**

Problem



Operational Assessment requires that we answer two questions:

Did we execute the plan? (Measures of Performance)

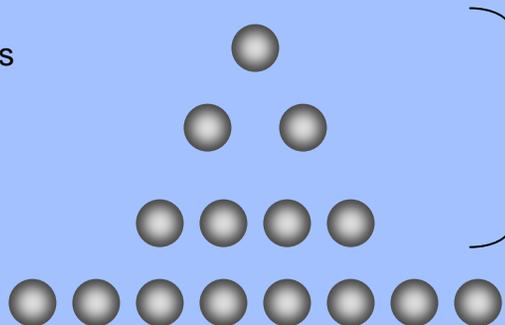
Did it accomplish the objectives? (Measures of Effectiveness)

4 Operational Objectives

16 Tactical Objectives

64 Tactical Tasks

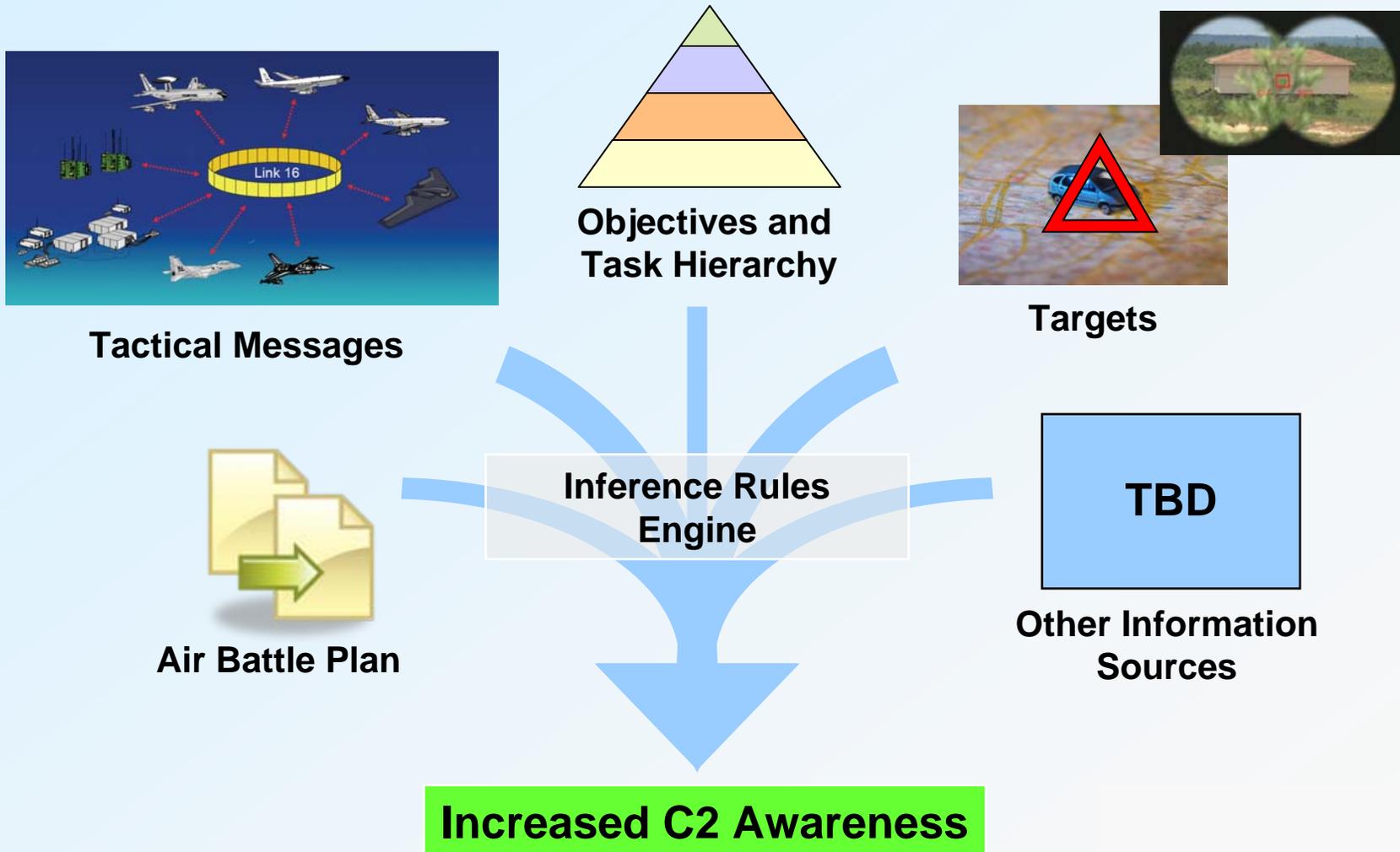
256 = 75% DSE



MOEs do NOT aggregate

MOPs aggregate

Solution



Combine information from tactical messages and data feeds in new ways to infer the impact on the Operational Objectives and schedule

- 0 **“Roll up” execution data to the Operational Objectives and display it graphically in real time**
- 0 **Display the data to anyone who needs it**
 - **Graphic user interface**
 - = **Available via Internet Explorer**
- 0 **Support User Defined Queries**
 - **“Show all planned targets not prosecuted”**
 - **“Show all assets associated with an Operational Objective”**
 - **Disseminate these requests to anyone who needs it**
 - = **Web pages**
 - = **RSS Feeds**

Data Displays



0 Display/Assessment

- Rapid associations to Op and Tac Objectives
- Map displays
= FalconView, Google Earth

First Look UI

Full Tree Target List Map Only

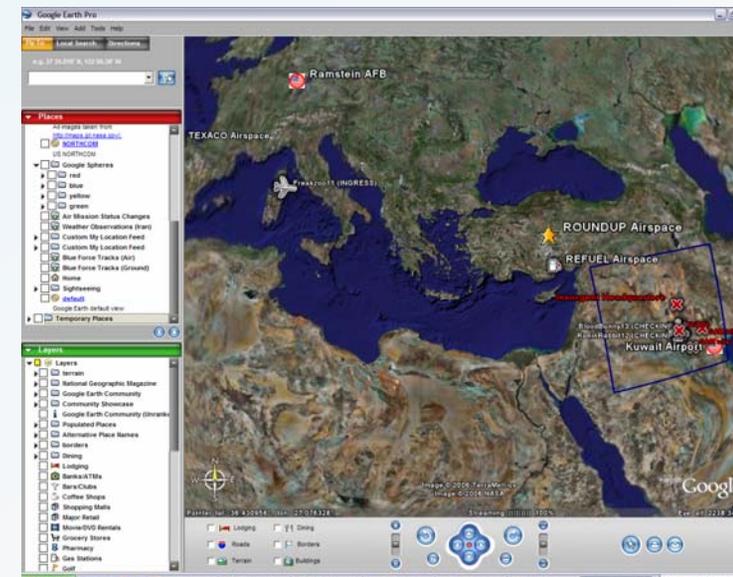
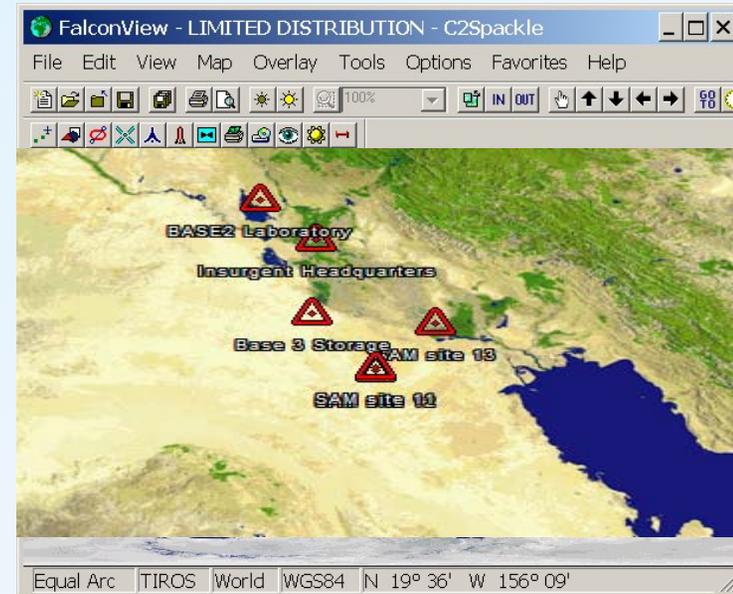
Expand All Collapse All

- Op. Objective 1
 - Tact. Objective A1
 - Tact. Mission A1.1 0% complete
 - Tact. Mission A1.2 0% complete
 - Tact. Objective A2
 - Tact. Mission A2.2 100% complete, successful
 - CA056 100% complete, successful
 - SAM SITE 12

Scheduled	Engaged	MISREP	Effects	Location	Priority
12:00:00	01:00:00	00:00:00	12:00:00	30.01, 45.5	0
 - CA057 100% complete, successful
 - SAM SITE 13

Scheduled	Engaged	MISREP	Effects	Location	Priority
12:00:00	12:00:00	00:00:00	12:00:00	31.2, 46.6	0
- Op. Objective 2
 - Tact. Objective B2 100% complete
 - Tact. Mission B1.1 100% complete
 - CA064 100% complete
 - INSURGENT HEADQ...

Scheduled	Engaged	MISREP	Effects	Location	Priority
12:00:00	00:00:00	00:00:00	12:00:00	33.333786...	0



Data Displays

Expand All Collapse All

		54%			
		Scheduled	Engaged	MISREP	Effects
	AS: Gain and maintain air superiority				
	AS1: Degrade IADS	99%	51%	35%	24%
	AS2: degrade runways and military airports	scheduled 11:25:30	85%	34%	26%
	AS3: Destroy maintenance facilities	scheduled 14:25:30	91%	6%	3%
		73%			
	SS: Sustainment				
	SS1: Destroy rail tracks in remote locations covertly	99%	35%	17%	12%
	▶ Identify most-used tracks				
	▶ Surveil remote locations for protection				
	▶ Destroy rails to degrade transport				
	SS2: Destroy bridges in Northern Califon	96%	21%	16%	8%
	▶ Surveil bridges for protection				
	▶ Identify future alternate routes to secure				
	▶ Destroy bridges				
	SS3: Disrupt fuel pipelines from the north	87%	15%	11%	1%
	▶ Secure areas around key pipelines				
	▶ Limit environmental damage from possible leaks				
	▶ Destroy pipeline				
	Transdirect pipeline				
	Mediterranean pipeline				

Limit Environmental Damage from Possible Leaks

41% complete

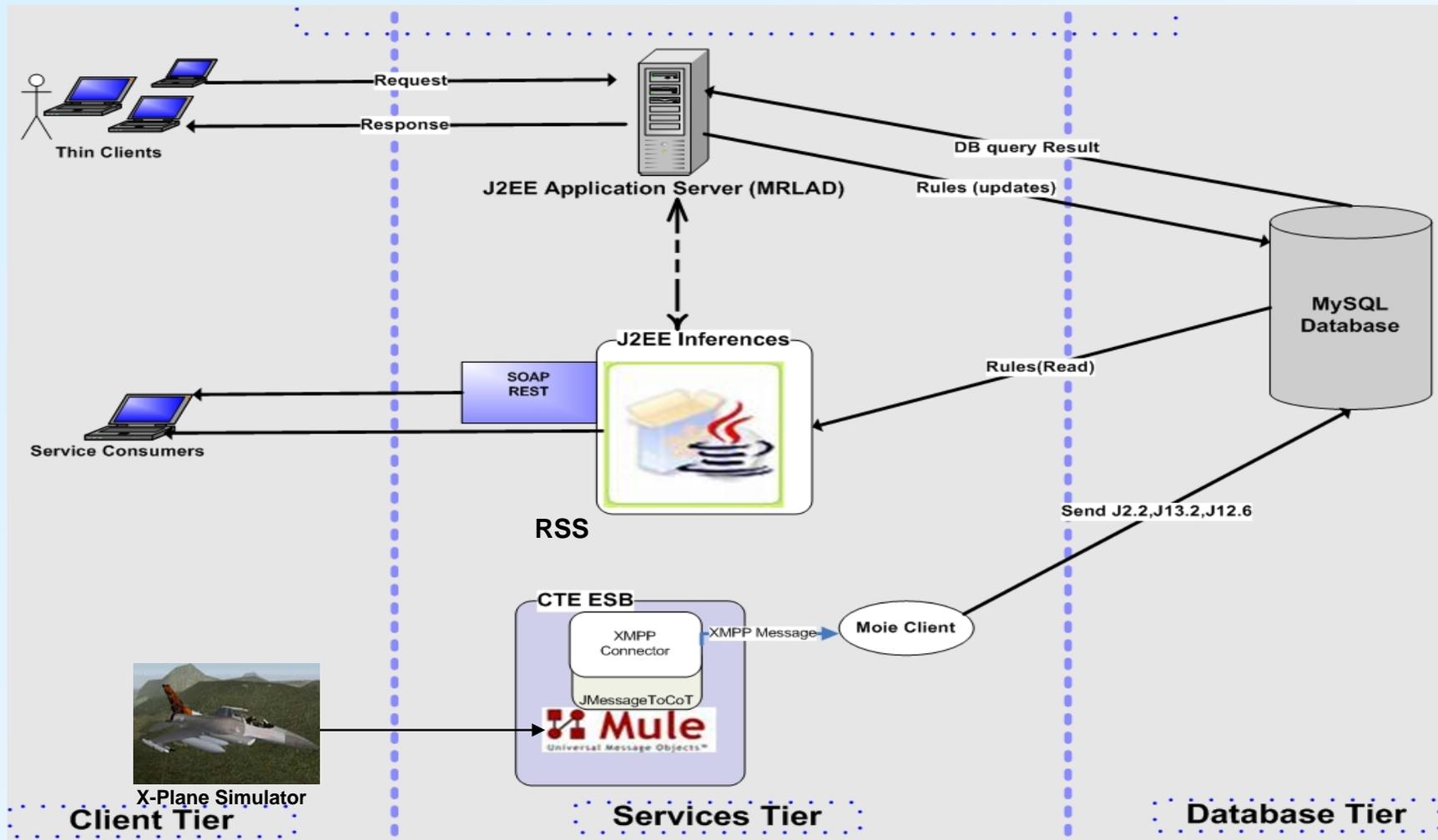
Scheduled for: 13:25

Asset: Argos (ARGS)

see subtasks (5)

- 0 **The status information used to populate the roll-up to the Operational Objectives is useful to many operators in the AOC**
 - **Planned targets not prosecuted**
 - = **ISR Cell can conserve resources by only collecting BDA for prosecuted targets**
 - = **Combat Operations can attempt to strike, within the same ATO period, planned targets that were not prosecuted**
 - = **Operational Assessment Team can re-roll targets that were not prosecuted by the end of the ATO**
- 0 **We can disseminate our data to anyone in the AOC with access to a web browser**
 - **Web pages that allow users to define dynamic queries**
 - **RSS feeds that provide requested data in a “ticker tape” format**

Architecture



Conclusion



- 0 **Tactical Network Data can be used to assess the status of Operational and Tactical Objectives during execution**
 - **Although less certain than a formal assessment, it can be done inside the current 3-day turnaround period**
- 0 **The information used to determine the status of Operational and Tactical Objectives also coordinates Combat Ops cells**
 - **ISR, TST, Dynamic Targeting, etc.**
- 0 **Collecting and disseminating this information will**
 - **Increase situational awareness**
 - **Decrease response time**
 - **Increase coordination across planning and execution**