Command World
C2 Modeling and Simulation

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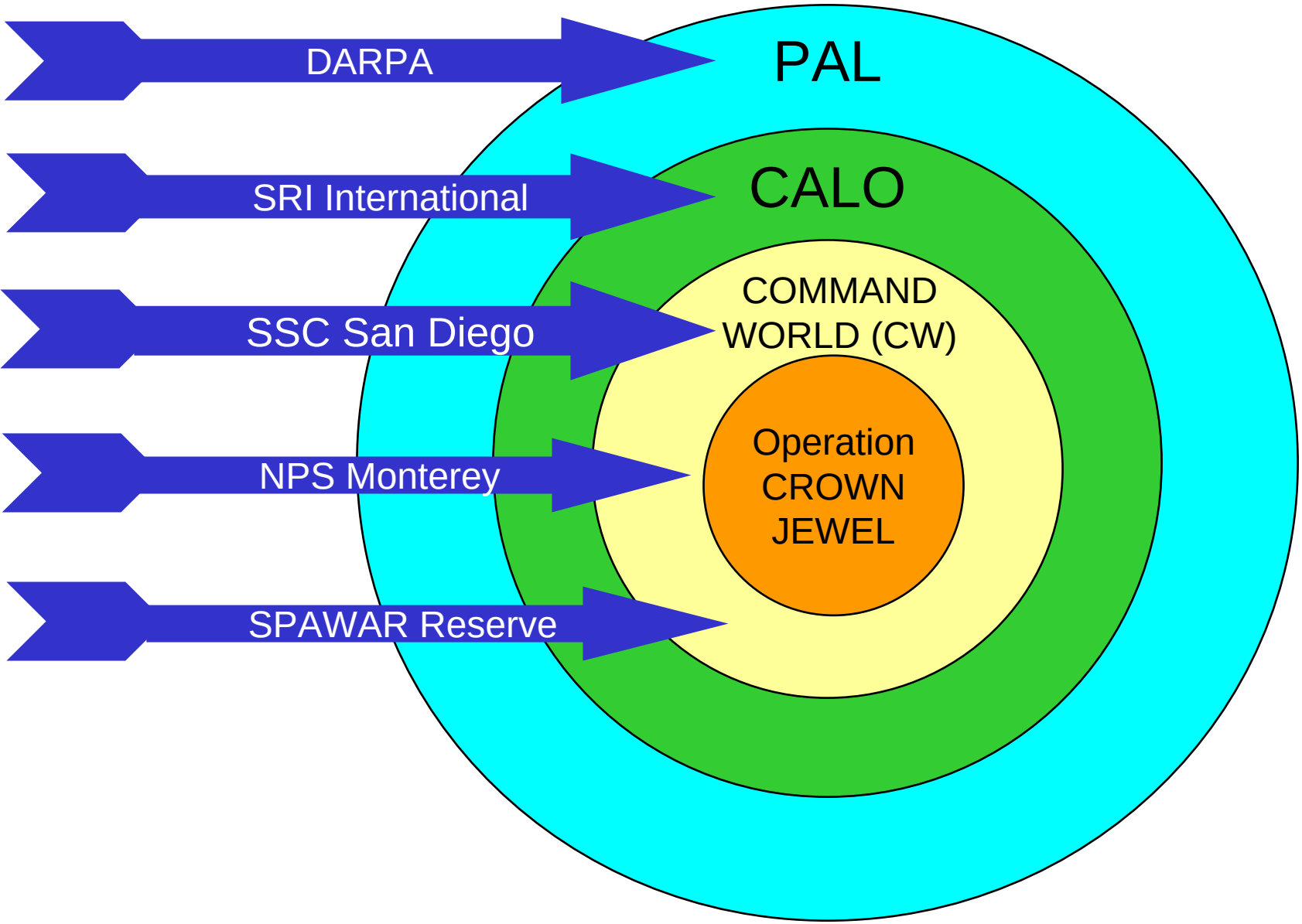
Overview

- Introduction
- DARPA Personalized Assistant that Learns (PAL)
- Cognitive Assistant that Learns and Organizes (CALO)
- COMMAND WORLD
  - Crisis Action Planning (CAP) Model
  - Operation CROWN JEWEL Scenario
- Simulation Domain / Experimentation
- Data Collection
- Summary & Questions

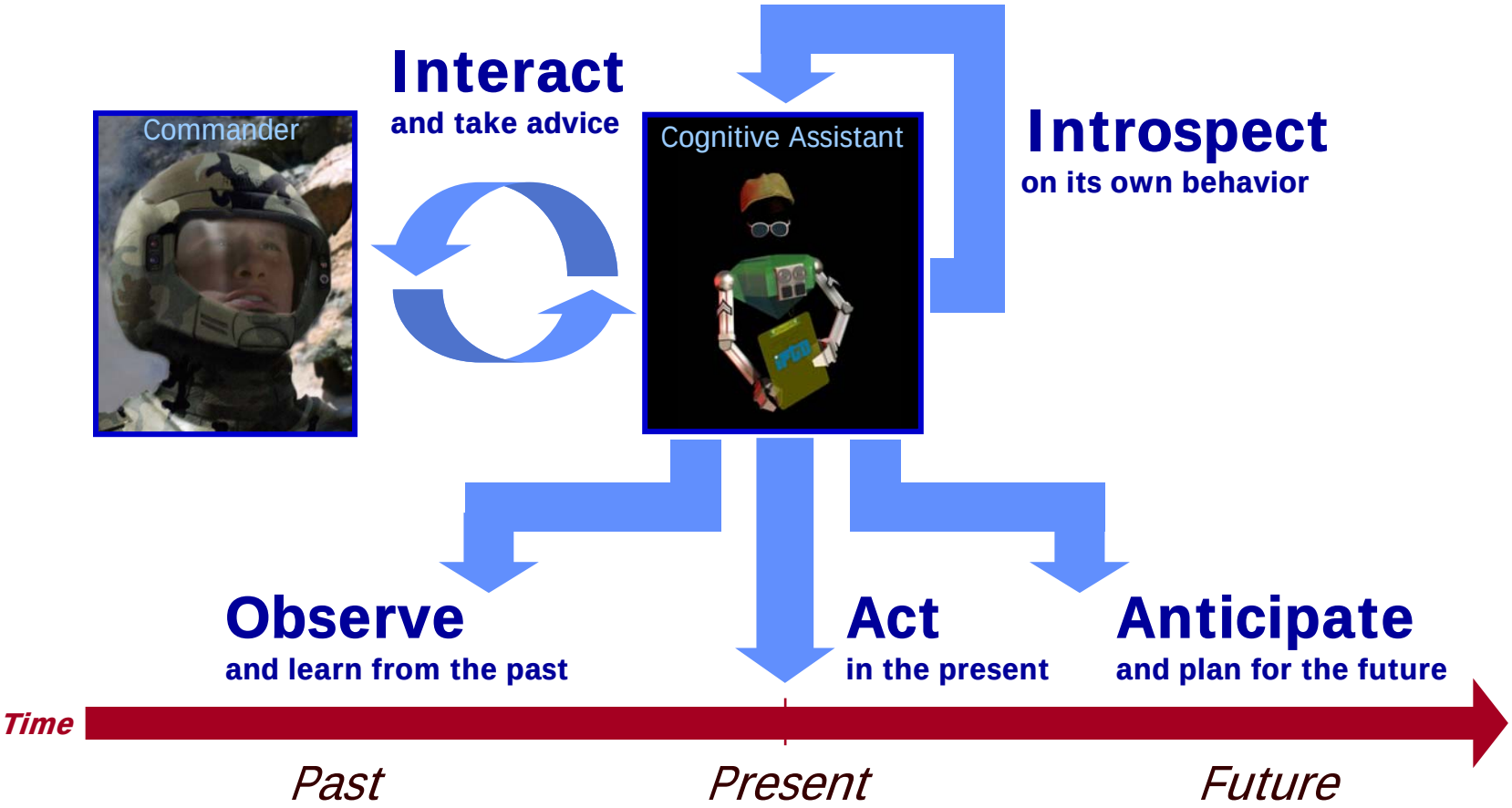
Introduction



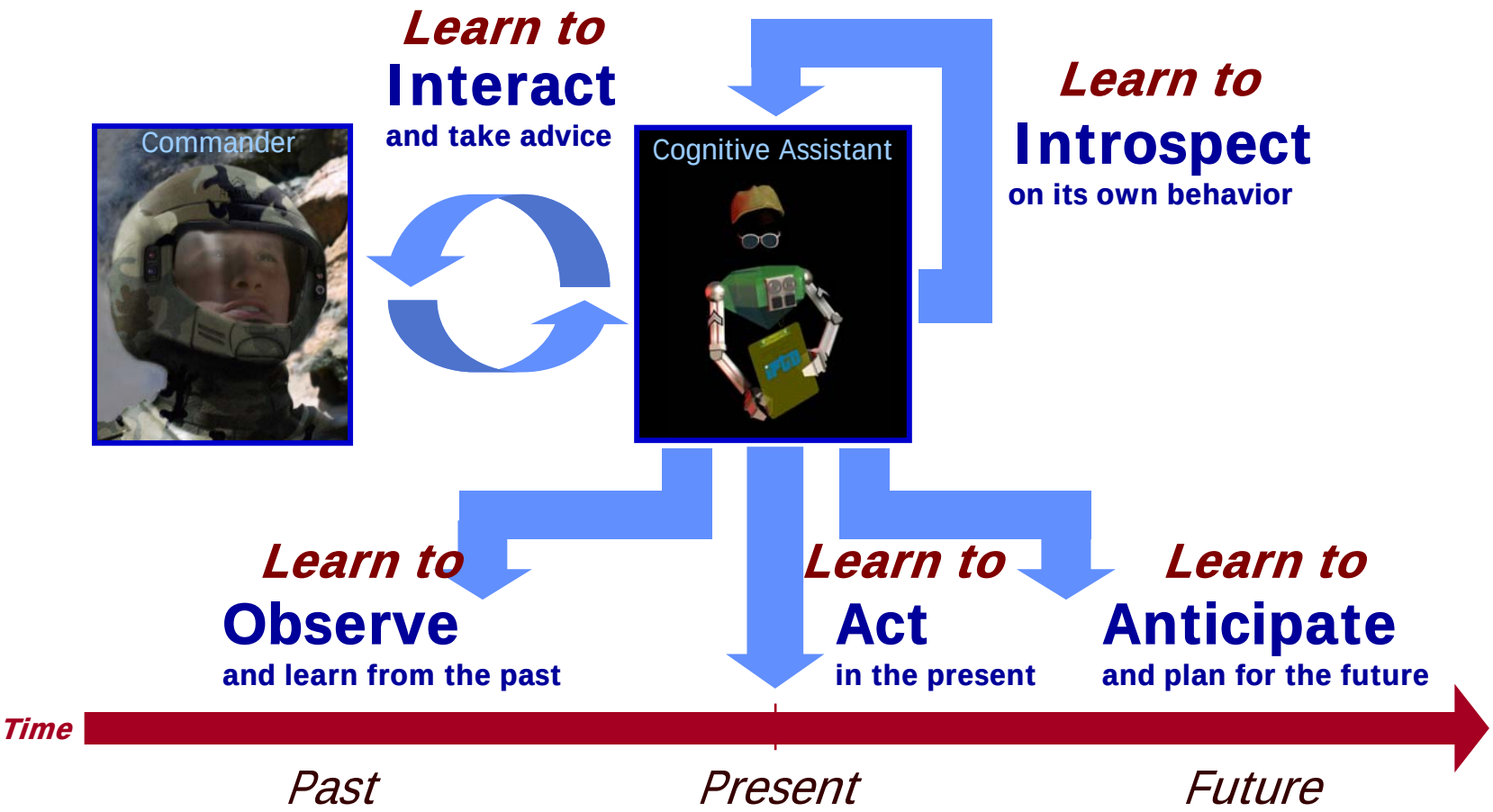
DARPA PAL Program

- Personalized Assistant that Learns (PAL) Program
  - PAL program is designed to explore the possibility of creating tools that will assist military planners in their tasks through the use of digital “assistants”
  - Spur pioneering research in cognitive information processing - including areas of artificial intelligence (AI), machine learning, knowledge representation and reasoning, machine perception, natural language processing, and behavioral studies
  - Administered by numerous educational institutions, evaluates two domains (civilian and military) and gathers usable data from each to achieve the project goals; COMMAND WORLD focus on the military domain

PAL Concept


Commander
Interact
and take advice
Cognitive Assistant
Introspect
on its own behavior
Observe
and learn from the past
Act
in the present
Anticipate
and plan for the future
Time
Past
Present
Future

PAL Concept


Learn to
Interact
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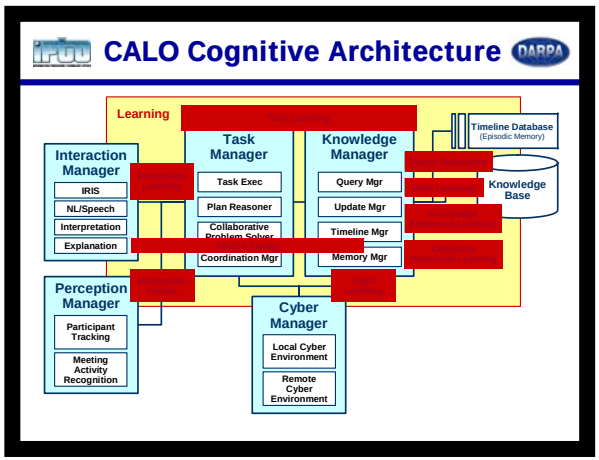
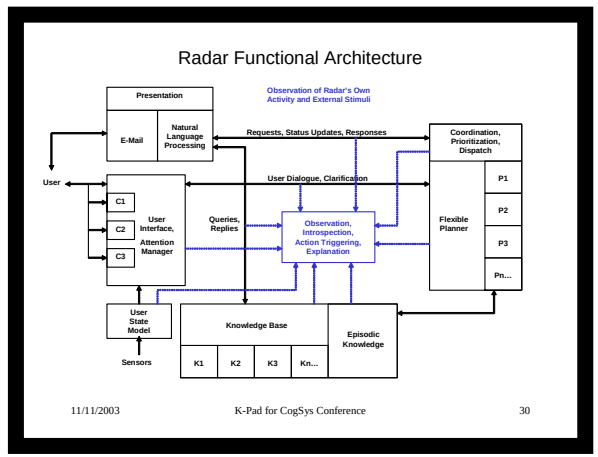
Two PAL Efforts

SRI Int. CALO

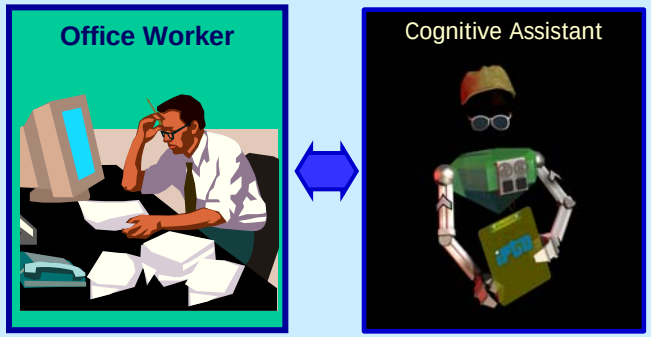


CMU RADAR



PAL Transition

Office Assistant

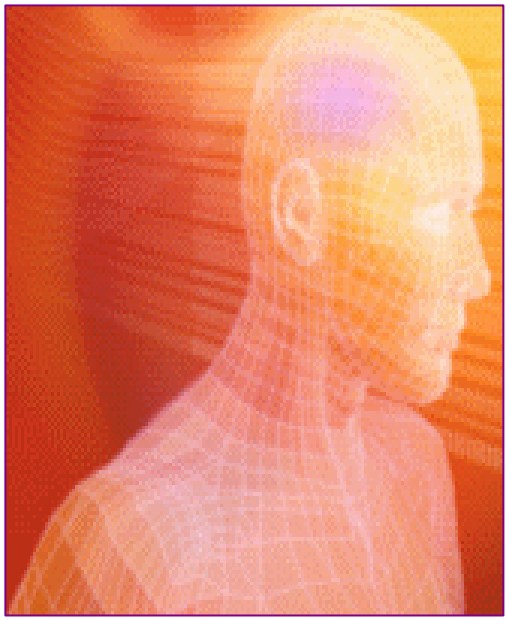


- Communication
  - E-mail, IM, Chat
  - Phone & Fax
- Planning & Scheduling
  - Project Planning
  - Travel and Event Planning
- Information Products
  - Project Status Reports
  - Technical Documentation
- Meetings & Discussions
- Alerts & Reminders

Command Assistant

- Communication
  - Messages, IM, Chat
  - Radio, Phone, & Coms
- Planning & Scheduling
  - Ops and Intel Planning
  - Logistics Planning
- Information Products
  - Commander's Daily Brief
  - C2 & ISR Web Services
- Meetings & Discussions
- Alerts & Reminders

CALO Project



Cognitive Assistant that Learns and Organizes (CALO)

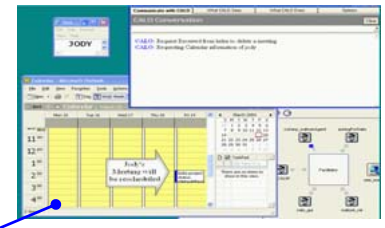
"I am an AI-based Personal Assistant dedicated to helping you manage your busy life. Researchers and programmers give me knowledge, but more and more, I am learning and acquiring new knowledge and abilities on my own. My creators call this 'learning in the wild'"

Learning in the Wild: CALO improves by adapting to the user and his environment

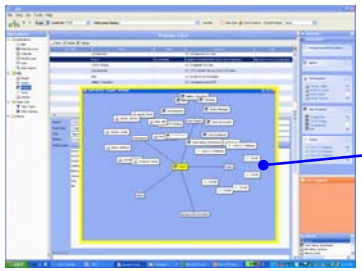
CALO Functionality

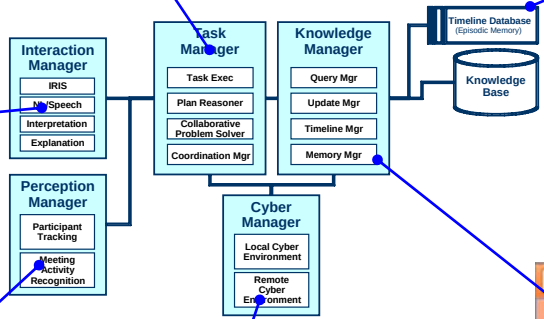
Monitor & Manage Tasks

Schedule & Organize in Time



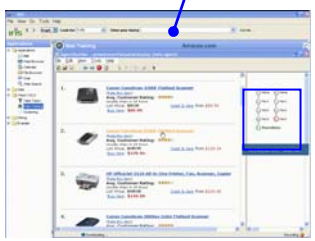
Organize & Manage Information





Prepare Information Products

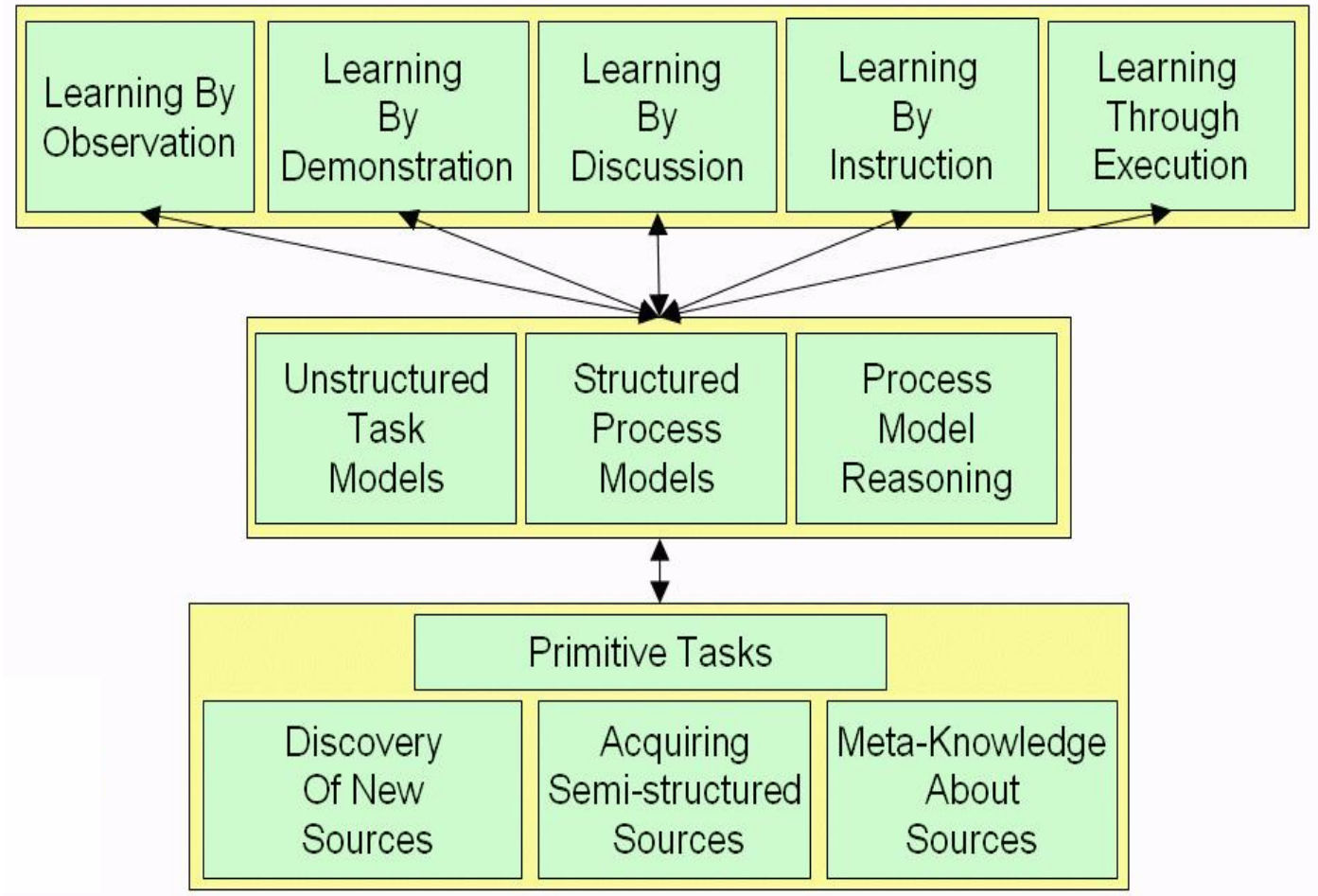
Observe & Mediate Interactions



Acquire, Allocate Resources

Supports commanders and decision-makers by learning from and adapting to their environment… Allows for better decisions from smaller teams

CALO Task Learning Components



CW Simulation Exercise

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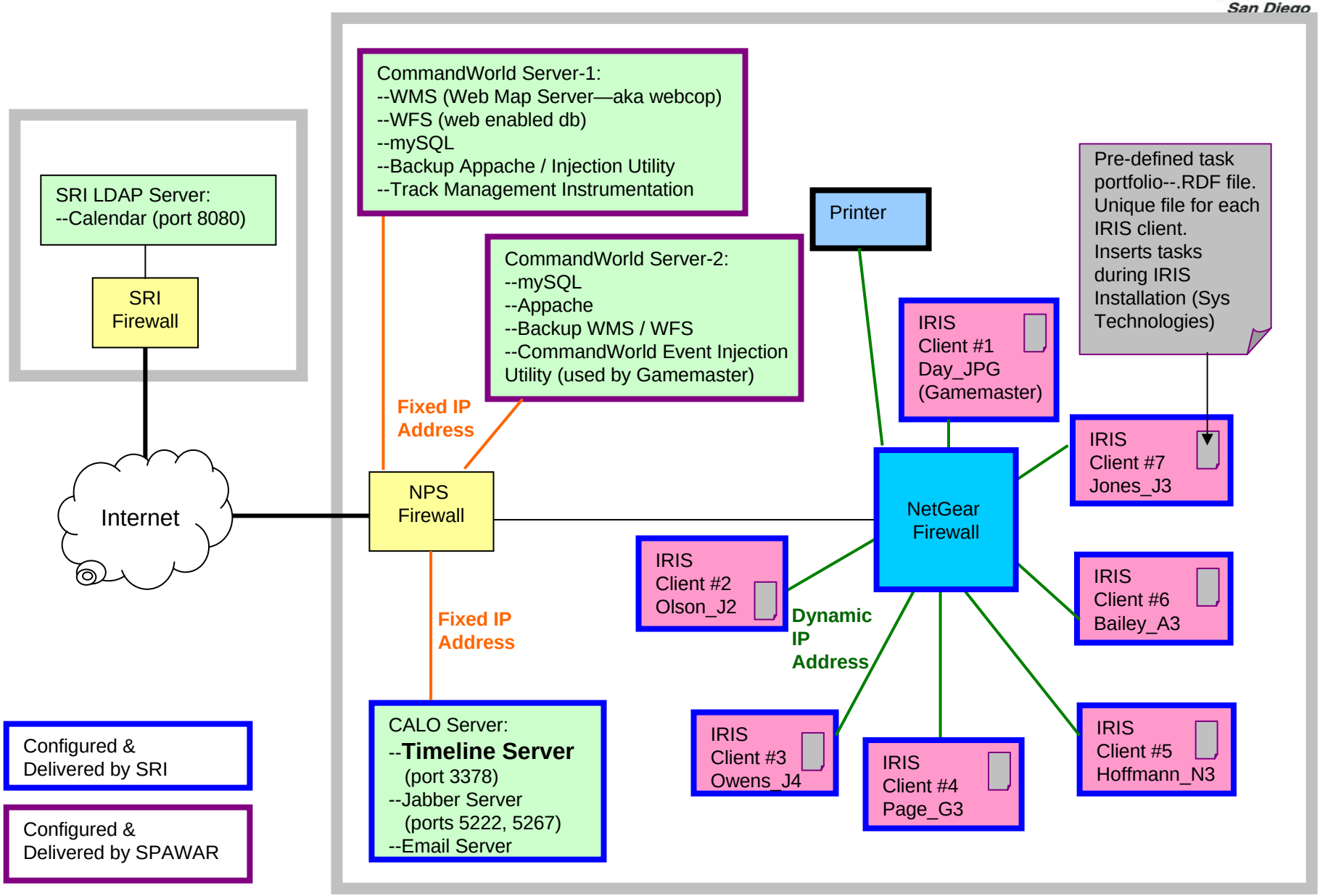
CommandWorld (CW) #5						
Hour	April 11, 2005	April 12, 2005	April 13, 2005	April 14, 2005	April 15, 2005	Hour
0730			(0745) Assume the Watch	(0745) Assume the Watch		0730
0800	Admin / Introduction (SSC/SPAWAR) (0.5 hr)	CALO Training (SRI) (3.0 hrs)	Scenario Event Two (CAP Phase I (SA)) (4.0 hrs)	Scenario Event Four (CAP Phase II (CA)) (4.0 hrs)	Busy People Transfer Learning Experiment (MIT/SRI/SSC) (4.0 hrs)	0800
0830	Privacy Form Review (NPS) (0.5 hr)					0830
0900	PAL/CALO Overview Brief (SRI) (1.0 hr)					0900
0930						0930
1000	CAP Training (SPAWAR) (1.0 hr)					1000
1030						1030
1100	Break	Break				1100
1130						1130
1200	(1215) CAP and Scenario Training (SPAWAR) (2.75 hrs)	(1215) Scenario Event One (CAP Phase I (SA)) (4.0 hrs)	Break	Break	Break	1200
1230						1230
1300			Scenario Event Three (CAP Phase II (CA)) (4.0 hrs)	Scenario Event Five (CAP Phase III (COA)) (4.0 hrs)	Wrap-up (2.0 hrs)	1300
1330						1330
1400						1400
1430						1430
1500	WebCOP Training (SYS) (1.0 hr)					1500
1530						1530
1600	Wrap-up and Review					1600
1630		Wrap-up and Review				1630
1700		Daily Wrap-up (SSC/SRI/SYS)	Daily Wrap-up (SSC/SRI/SYS)	Exercise Wrap-up (SSC/SRI/SYS)		1700

CW #5 Schedule

During CW #5, simulation exercise encompassed the first three phases of the CAP model, culminating with the submission of course of action (COA) alternatives to an Executive Decision-Maker

The Information System for CW

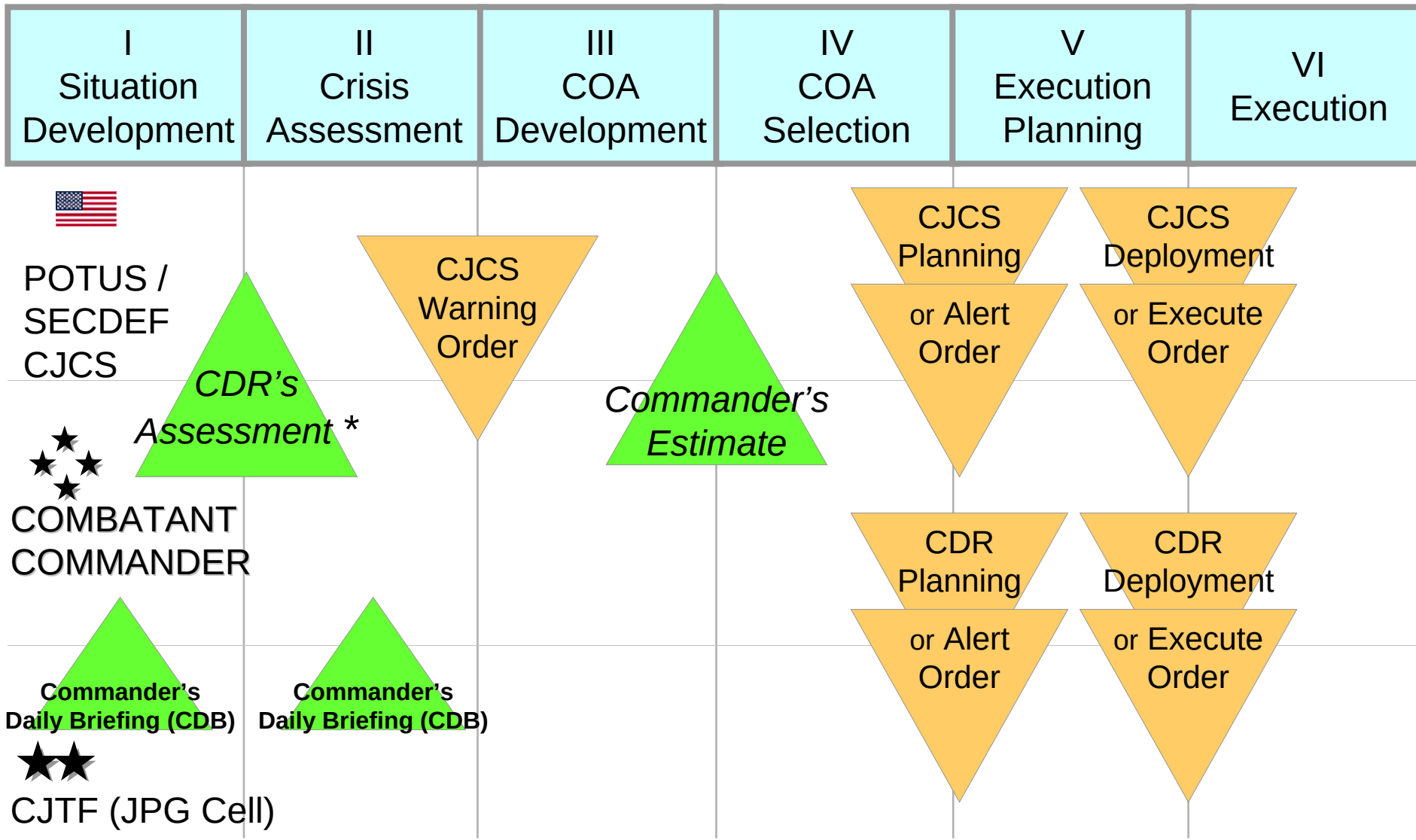


Crisis Action Planning (CAP) Model

- WHAT IS A CRISIS?
  - Develops rapidly; threat to national or regional interest
  - May require a military response
- CAP FEATURES
  - Facilitates rapid exchange of information
  - Requires collaborative & concurrent planning
  - Analysis of situations affecting possible COA
  - Developing valid COA and selecting the best
  - Coordinating plans and orders supporting execution
- WHY CAP?
  - Time constraints prevent deliberate planning
  - No existing operation plan applies
  - PACOM as example of COCOM - Over 70 crisis events planned and executed in past 10 years

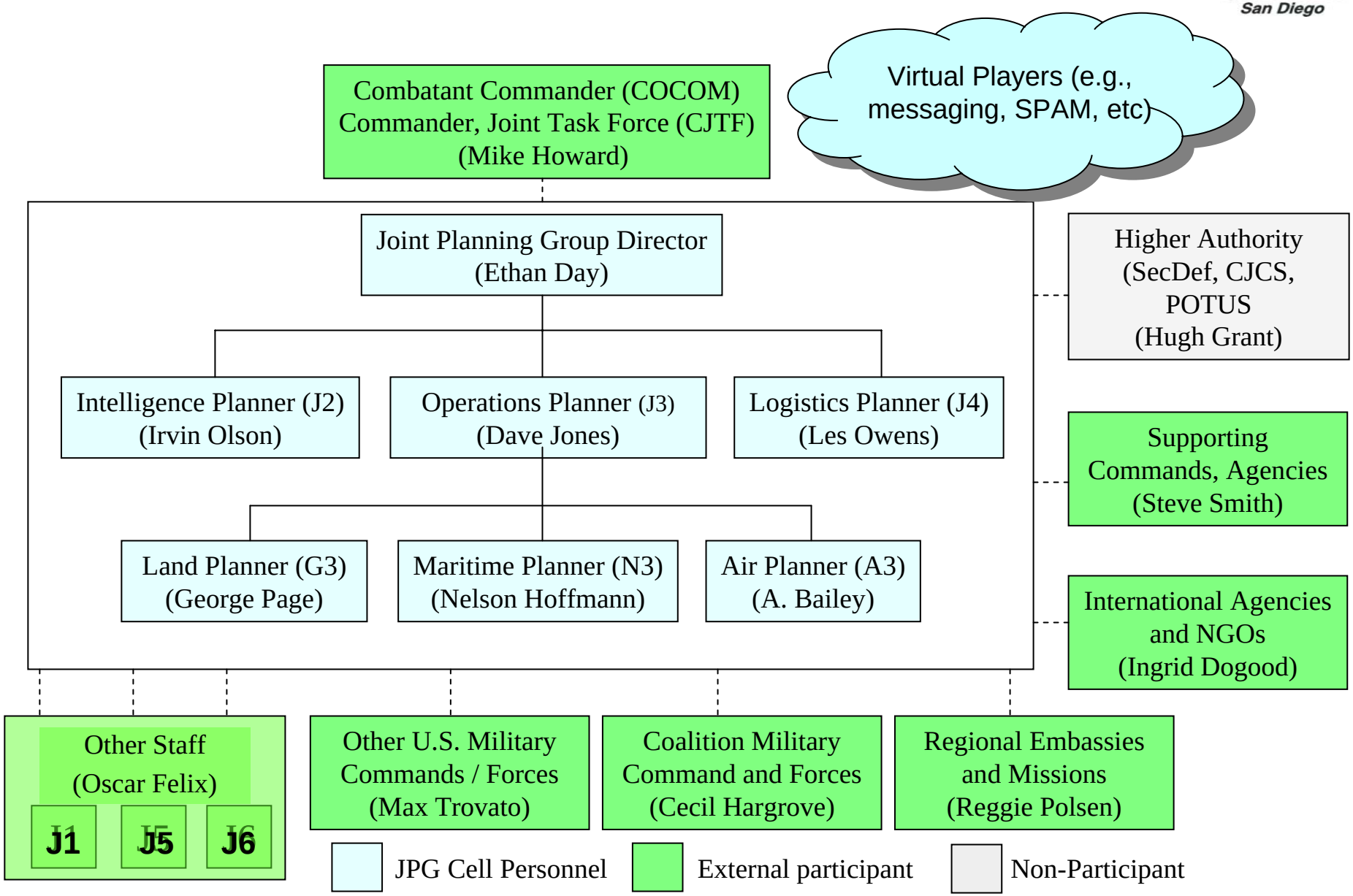
Designed to support a commander's efforts to develop, analyze, select and implement a military COA

The CAP Model



* - OPREP-3PCA

Operation CROWN JEWEL Scenario



Operation CROWN JEWEL Scenario

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Task Hierarchy Matrix

CAP Event	Scenario Task	Scenario Day	JPG Director Task	Intel Planner J2 Task
1.1 Assume watch and determine known facts, current status, rules of engagement (ROE) and conditions of Area of Operations (AO); Commence Crisis Action Planning (CAP)	**1.1.1** Log on to PC; conduct communications check (e.g., e-mail, chat), accustomation with IRIS desktop and training folders	**Day 1 26 January**	(1.1.1-00) Send exercise commencement e-mail and conduct roll call with all planners via chat (announce requirement for Information Deliverable - Commander's Daily Briefing (J2/J3/J4 as co-leads))	(1.1.1-02) Activate desktop (e.g., acknowledge commencement e-mail; activate chat functionality; open WebCOP)
	1.1.2 Determine current status of available forces	**Day 1 26 January**	(1.1.2-00) Task planners to review assigned forces and apportioned forces for planning (e.g., force tables, WebCOP)	(1.1.2-02) Review IRIS desktop, CW Reference Library website to determine status of MNF intelligence resources; commence research/collection efforts for Commander's Daily Briefing
	1.1.3 Conduct intelligence preparation of the AO; determine status of friendly intelligence support	**Day 1 26 January**	(1.1.3-00) Task J2 as lead planner in developing intelligence summary for AO	(1.1.3-02) Review IRIS desktop, CW Reference Library website to determine intelligence (including Weather and Topographical information) summary; engage other planners accordingly to solicit information requirements
	1.1.4 Provide forces available, readiness status of MNF, host nation political situation, availability analysis	**Day 1 26 January**	(1.1.4-00) Task planners to consolidate information summary depicting apportioned forces (availability), MNF forces (availability), intelligence summary	(1.1.4-02) Review IRIS desktop, CW Reference Library website to determine status of MNF intelligence apportioned forces, MNF forces; provide status to JPG Director
	1.1.5 Provide logistic readiness of available forces, logistic impact of available port infrastructure in operational area, status of "hard to obtain" materials and services	**Day 1 26 January**	(1.1.5-00) Task J4 as lead planner in developing logistics summary for AO (e.g., port infrastructure, materials, services)	(1.1.5-02) Support J4 as required
	1.1.6 Provide communication factors and status regarding topographical constraints, available communications resources, communications readiness of available resources	**Day 1 26 January**	(1.1.6-00) Task J6 (non-participant) as lead planner in developing communications summary for AO	(1.1.6-02) Support J6 as required

Each event linked to task for planners

Operation CROWN JEWEL Scenario

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Information Deliverables:

- Commander's Daily Briefing (CDB) - daily: Status update on forces (disposition, availability), space (AO), SOE
- Commander's Assessment - Phase I: Operational Report 3 – Pinnacle Commander's Assessment (OPREP 3-PCA)
- Commanders Estimate - Phase III: Mission statement, Situation Update, COA (three), COA constraints and additional planning concerns
- "Free-play" products: administrative requests, requests for information (RFI) germane to game-play
- Questionnaire / Event Log – End of Scenario: game participants to identify potential capabilities of PAL technology / system or scenario improvement

Simulation Domain / Experimentation

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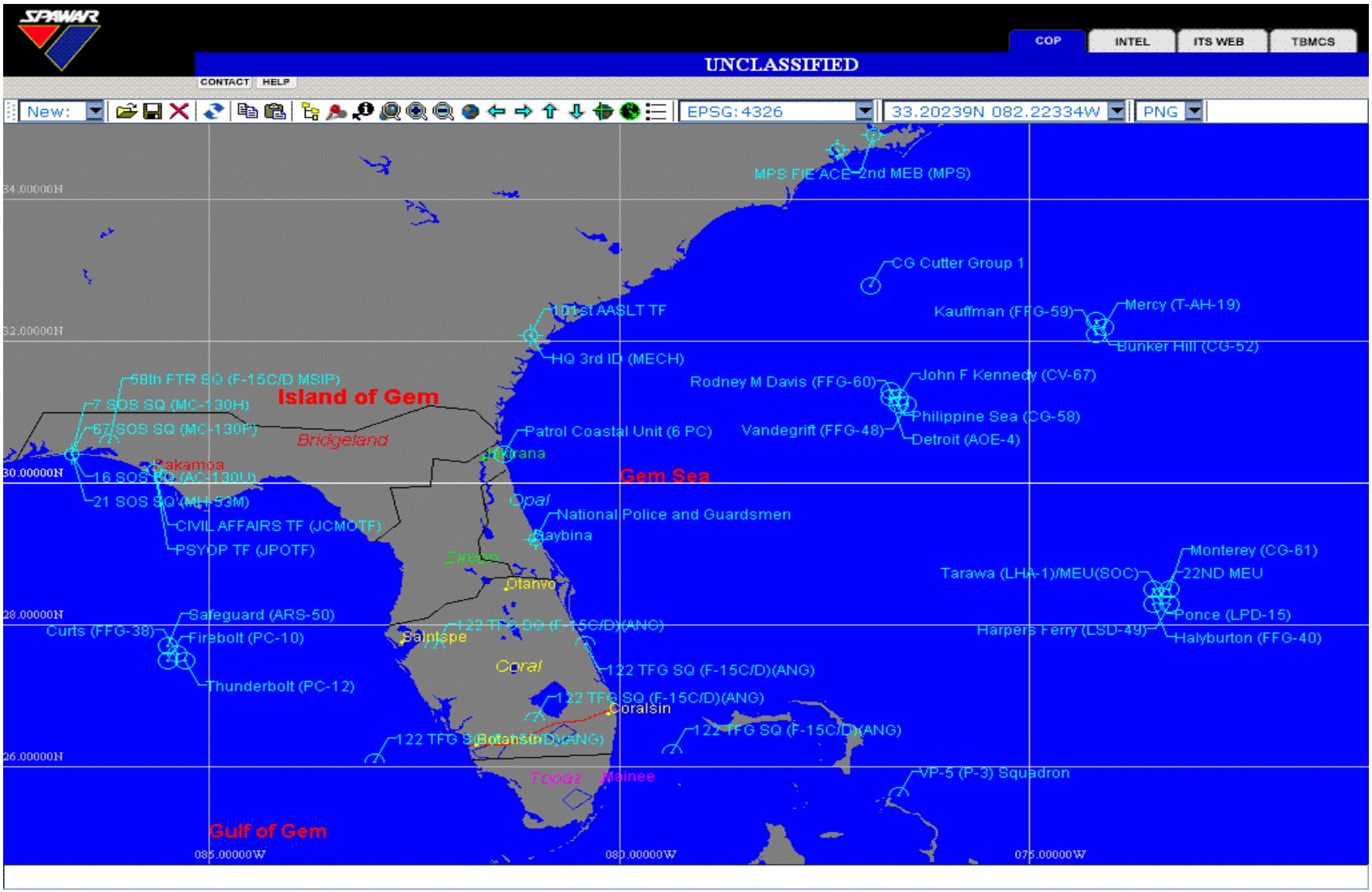
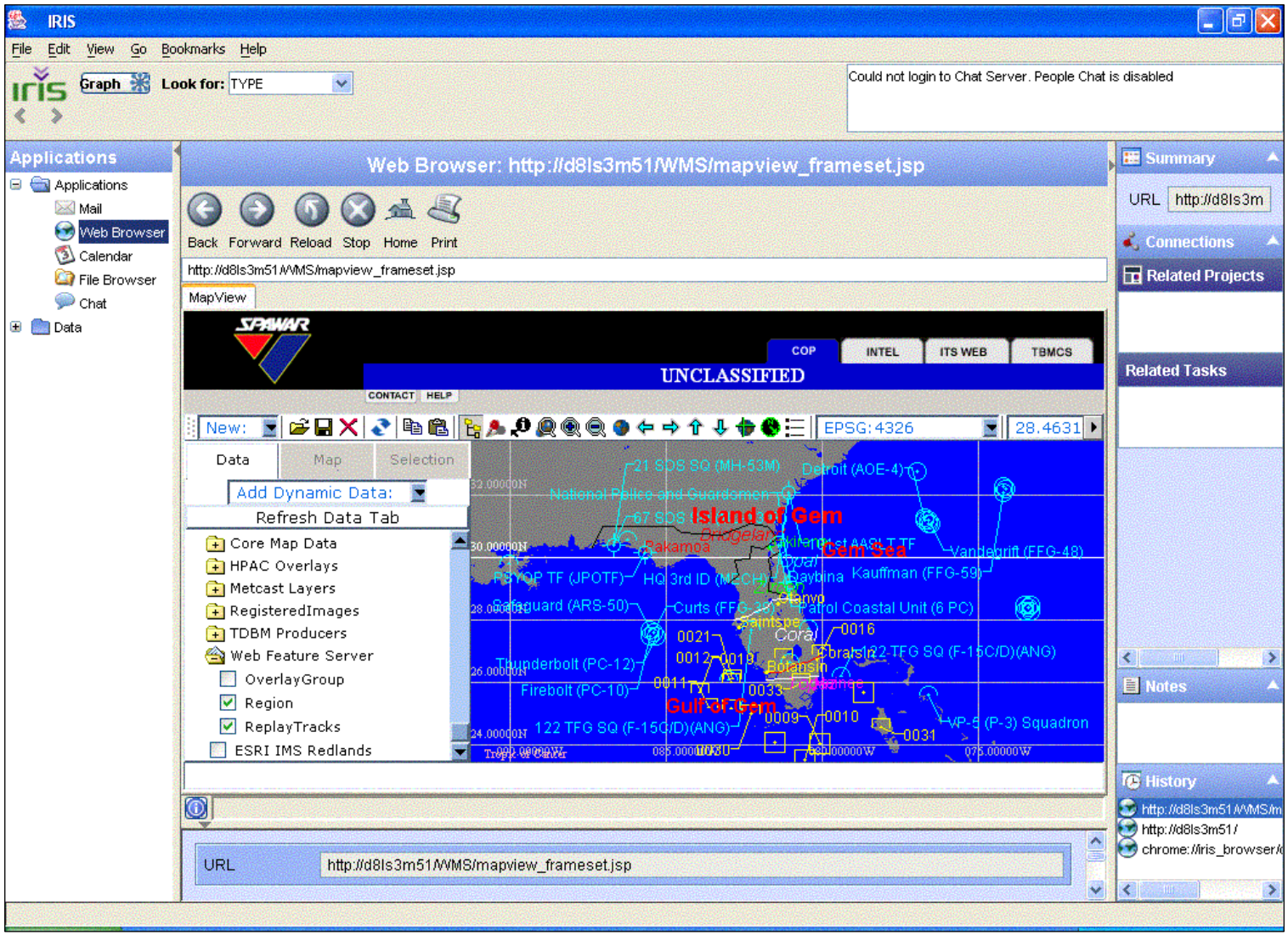


WebCOP

Simulation Domain / Experimentation



IRIS (and WebCOP)

Data Collection

- Each participant notebook computer hosted a client that logged all MS Office activities to a central database on the networked CALO server via the following software modules:
  - FileSystemWatcher (FSW)
  - Internet Explorer (IE) Plug-in
  - MS OUTLOOK
  - Outlook Plug-In
  - Timeline Server
  - Timeline Viewer

C2 Experimentation Summary

- In support of data collection for the CALO leaning algorithm development:
  - Exercise generated over 236,173 logged events
  - Scenario scripts were sufficient for participants to perform essential CAP tasks
  - Unclassified exercise provided realistic baseline data from a military domain for the test and evaluation of CALO software; overall feeling that team developed cohesive bond and became more efficient as function of time (expected behavior)
- Good attention to exercise rhythm and sequence of trigger events were conducive to more creative and innovative (realistic) game-play
- Lack of collaborative tools (e.g., “white board”) was limitation to game “realism”

Questions & Discussion