CAPABILITIES BASED TEST & EVALUATION (CBTE)

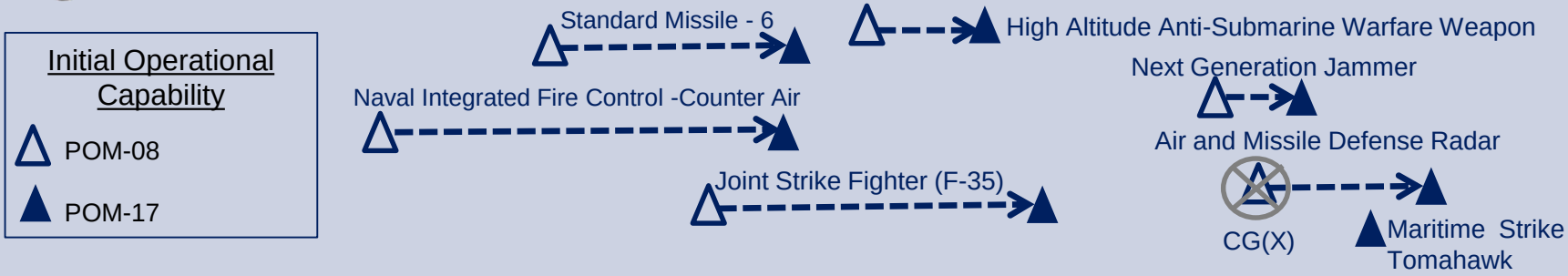
KENNETH SENECHAL

The Need for Change

USN vs PLA(N) Capability Fielding Trends

How? Acquiring Designs – No DOD 5000 – No Bureaucratic Process Requirements

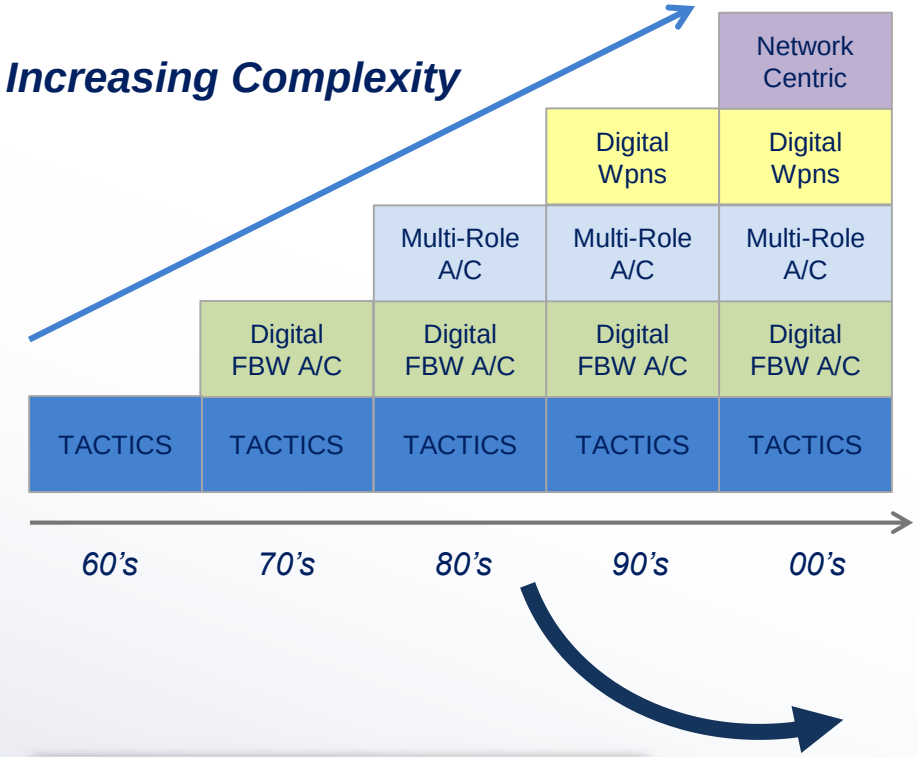
We're Slower!



Open Source Information

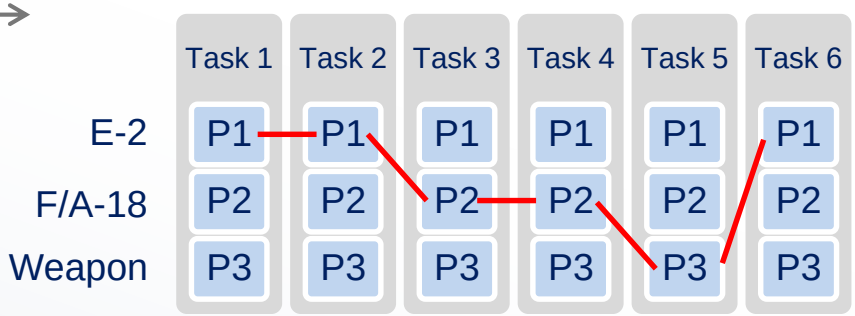
USN Warfighting Advantage Against PLA(N) has Steadily Eroded

Warfighting Has Changed



Increased weapon system complexity enables changes in warfighting requiring evolution in testing across platform boundaries

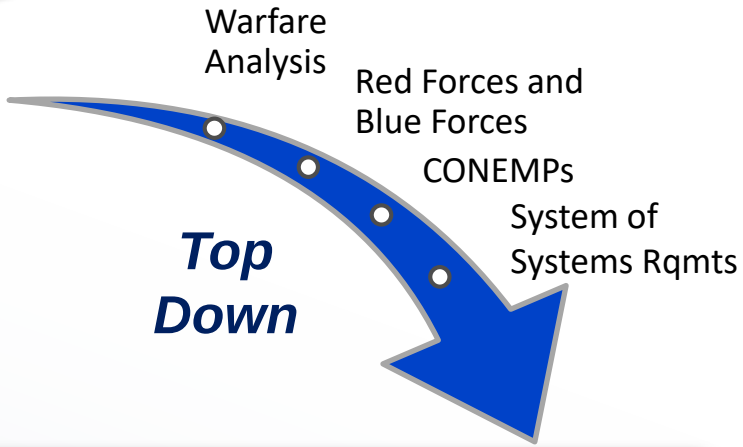
How We Fight – Today



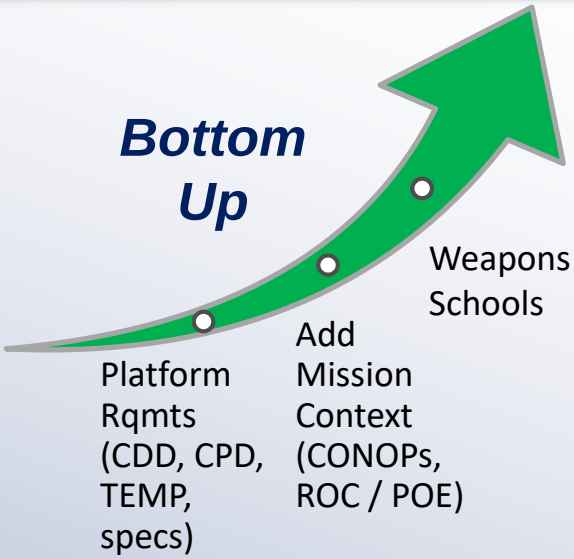
Example: Multiple Platforms performing Mission Tasks in an Integrated Fashion

CBTE Overview

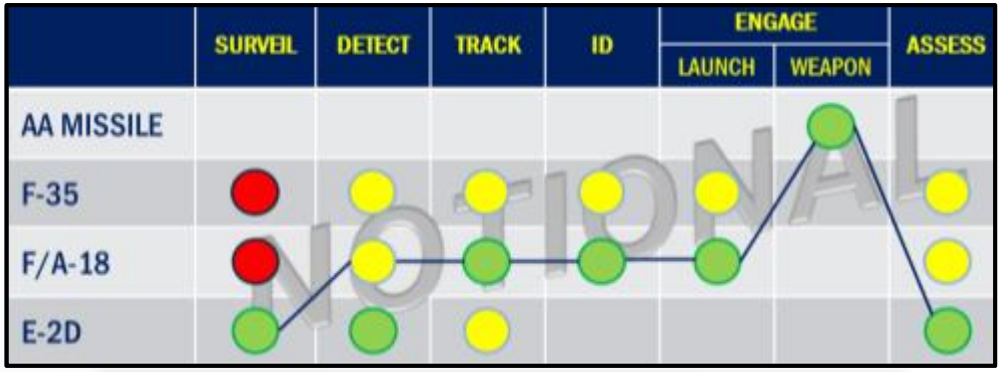
What is CBTE?



Integration with COTF's Mission Based Test Design (MBTD)



TEST LIKE WE FIGHT!



CBTE evaluates the effects chain in a mission context

CBTE Applied to NIFC-CA

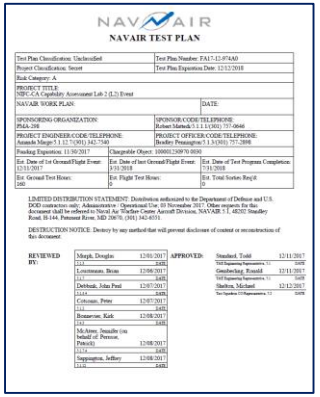
GIVEN

… + many others…

NIFC-CA SoS Requirements

NIFC-CA T&E Strategy

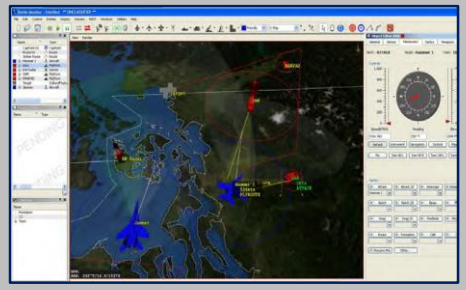
Joint squadron / test team test plan – Mission Test Engineer



CBTE Test Execution using LVC

Manned Flight Simulator "F/A-18"

E-2 System Test and Evaluation Lab "E-2D"



Next Generation Threat System "Warfighting Environment"

LVC Reports

Mission Report

"Crawl-Walk-Run" approach across multiple events, gradually increasing in number of assets and scenario complexity

CBTE Applied to MH-60

Existing Test Points Mapped to the Surface Warfare Mission Thread

Prepare / Configure	Search	Detect	Track	ID	Engage	Assess	Post Msn Tasks
• Test Point 1 • Test Point 2	• Test Point 3 • Test Point 5	• Test Point 6 • Test Point 7 • Test Point 9	• Test Point 3 • Test Point 7	• Test Point 9		• Test Point 6 • Test Point 7 • Test Point 8	• Test Point 3 • Test Point 5

Defend

• Test Point 3
• Test Point 7

Helmet Display and Tracker System

- Simple requirements from the PMA
- No defined CONOPS
- Test developed by a combined DT / OT / Weapons School team

CBTE Reporting Tool

Intelligence Mission Thread

Prepare/ Config.	Collect	Process/ Exploit	Analyze/ Product	Disseminate	Evaluate	Defend	Post-Mission
Conduct Mission Planning	Execute Surveillance Plan	Collect/ Convert Sensor Data	Correlate/ Fuse Data	AIS/Radar Tracks Via Link-16	Dynamic Retask of UA	Conduct Evasive Maneuvers	Maintain COP
Conduct Mission Plan Upload	Detect-Radar	Process Imagery	Evaluate/ Validate Info	AIS/Radar Tracks via GCCS-M	Timeliness to Produce/ Disseminate	Detect/ID Threats	Dynamic Tracking/ID of High Value Targets
Conduct Taxi, Departure, and Transit	Detect-ESM	Process METOC	Analyze/ Interpret Info	FMV via UVDS			
Conduct In-Flight Replanning	Detect-AIS	Process NGA/ Map Data	Produce Targeting Products	FMV via LOI-2			
	Track-Radar		Produce Secondary Image Products	NITFs/Clips via DEN/DAN			
	Track-ESM		Produce Intelligence Reports/Briefs	NITFs via LOI-2			
	Track-EO/IR		Product METOC Reports/Briefs				

Mission Capable
Capable with Limitations
Inoperable/Capability Not Available

Notional

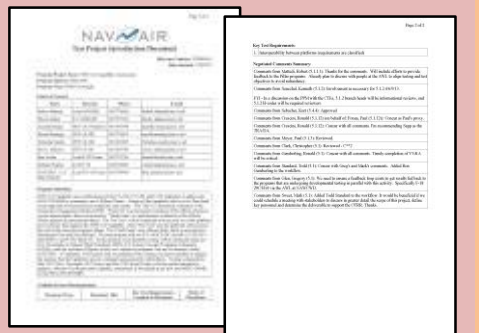
CBTE Enablers

- Live-Virtual-Constructive (LVC)
- Mission Based Test Design (MBTD)
- Design of Experiments (DoE)
- Mission T&E During System Development
- System of Systems Testing
- Human Performance
- Mission Analysis
- Mission Training

NAVAIR CBTE Implementation

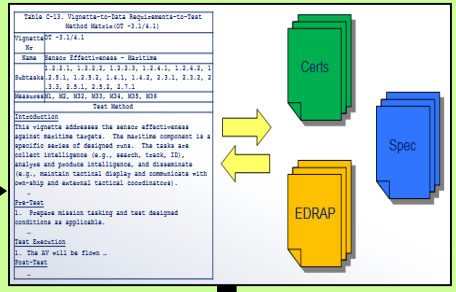
CBTE "Process"

Test Program Introduction Document

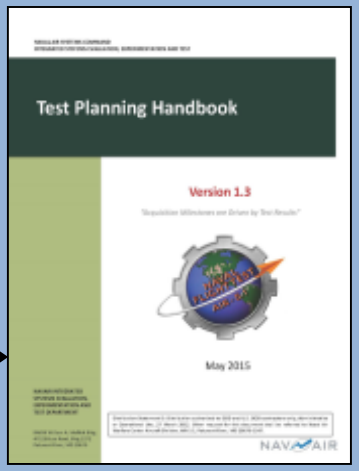


Mission Based Test Design

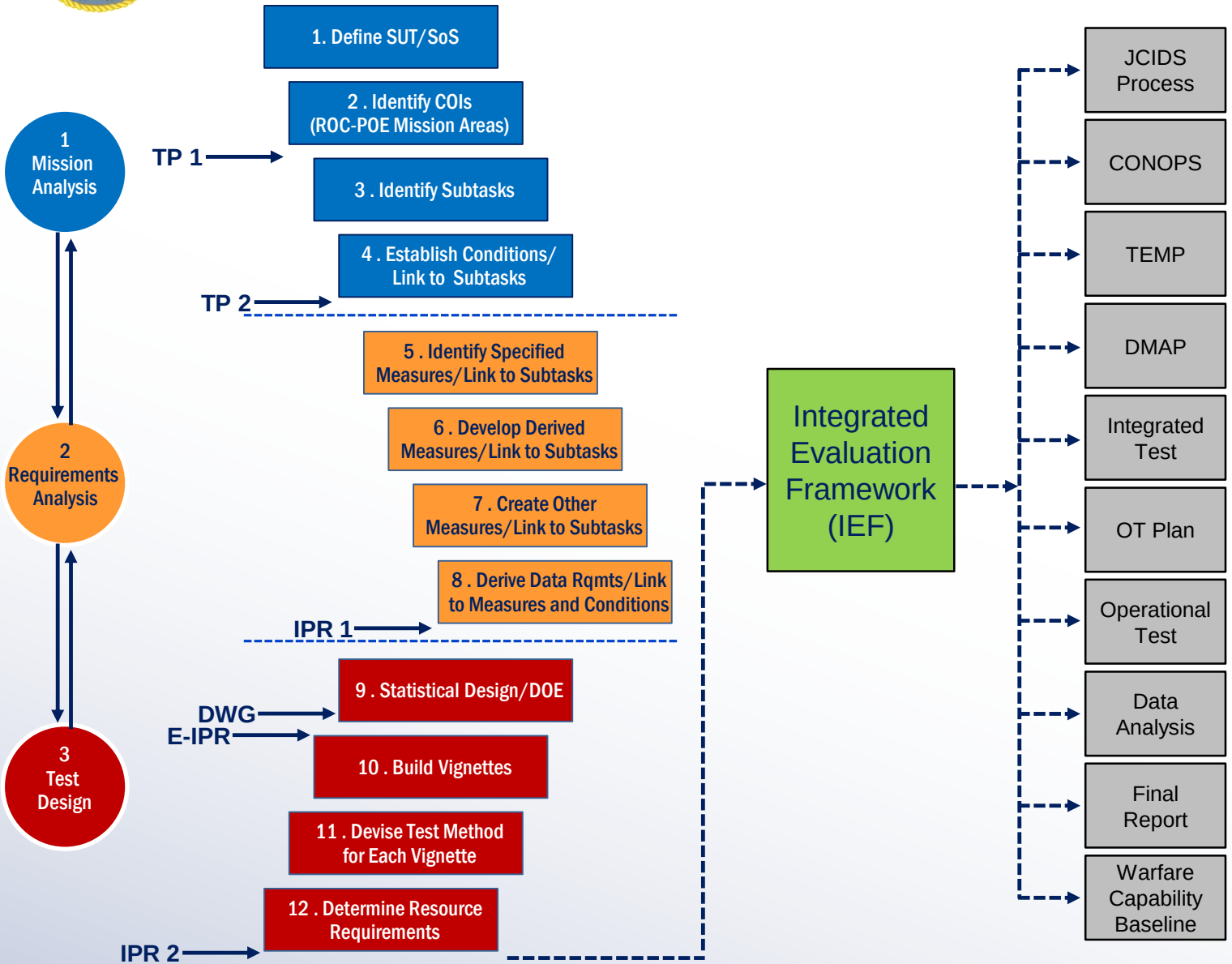
Engineering / Test Collaboration



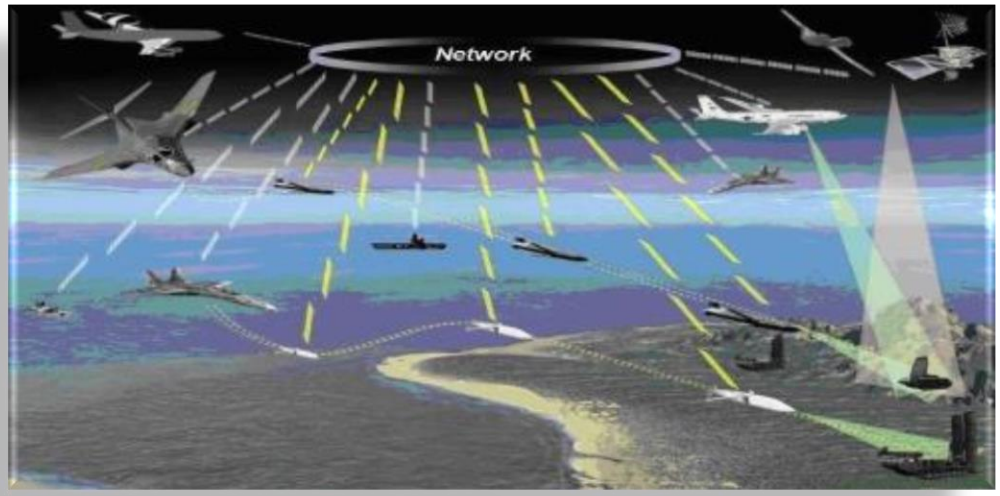
Test Planning



Mission Based Test Design (MBTD)



Benefits of CBTE



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Speed to the Fleet

- Reduce development time and cost through early discovery of mission-related technical issues
- Reduce overall test time by collaboratively testing with COTF

2

Systems of Systems Testing

- Specifically addressed via test design and planning

3

Closing the Loop with Warfare Analysis

- Answers the big “so what” question on whether the delivered system meets fleet needs

Near Term CBTE Implementation

- **Spread a common understanding of exactly what CBTE is and is not**
- **Working with COTF to implement Mission Based Test Design in DT**
  - True ITT with a common test matrix to reduce dedicated OT
  - Develop a test design and execution plan for pilot programs
- **Use of CBTE enablers (LVC, mission analysis, etc.) to reduce cost and schedule**
- **Implementation is dependent on current program phase**
  - New programs or spirals – “baked in” from the beginning
  - Programs mid-execution – shifting where possible and using CBTE enablers
- **Development of an “Environment-in-a-Box”**
  - Enables a shift left by giving the vendor a virtual and constructive tool to begin testing earlier with a digital twin (ties in with the digital thread)
- **Establishing the I&I / SET Feedback loop**
  - Integrate MTB/ICTB products for test design into pilot programs
  - Establish the infrastructure to report decision quality capability data to allow mission thread level trades

COTF CBTE Involvement

COTF / NAVAIR Alignment

- **Truly Integrated Test is the goal—a single process defining the data needs supporting independent assessments using side by side execution**
- **Earlier entry into MBTD in order to maximize efficiency and eliminate duplication**
- **Meaningful insight into mission effect through all phases—M&S, LVC and Live—with feedback**
- **Critical M&S Strategy injection point (part of CNO "Lines of Effort" to achieve high velocity learning)**

Focus on the "So What" – the Mission Effect

CBTE Opportunities

- **Allows for earlier resourcing of OT activities (COTF entry at TPID)**
- **Expands Design of Experiments expertise leading to better tests to meet sustained demand**
- **Focus on the Mission Effects Chain and provide the feedback loop for analysis**

More Agility in the Execution of Test Programs!

COTF's Commitment

- **Side-by-side execution of CBT&E**

Better Test Designs, More Efficient Execution, More Meaningful Results—Faster!

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Questions?