

# MISSION:

A WORLD OF INNOVATION

## Test Perspectives for Architecture

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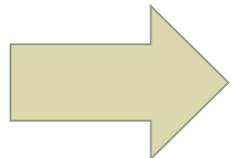
# Test Perspectives for Architecture

- **Strategic Partnerships**
  - Test strategy concepts
  - Architecture views with test strategy insight
  
- **Successful Applications**
  - Program #1: Architecture feedback during test planning
  - Program #2: Additional architecture products to support test planning
  - Program #3: Test team engagement with architecture development
  
- **Sample Conversations**
  - Define incremental capability
  - Partition functionality

**Streamline Test Program While  
Reducing System Complexity**

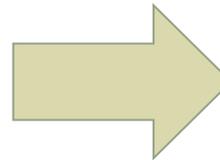
# Strategic Partnerships

# Need Test Planning to be Strategic



*If you compared your integration effort to a soccer team, would it be the way 8 year olds play or the way professionals play?*

*How much does your verification success depend on SMEs and heroes?*



**Transition Luck and Heroics into Strategy**





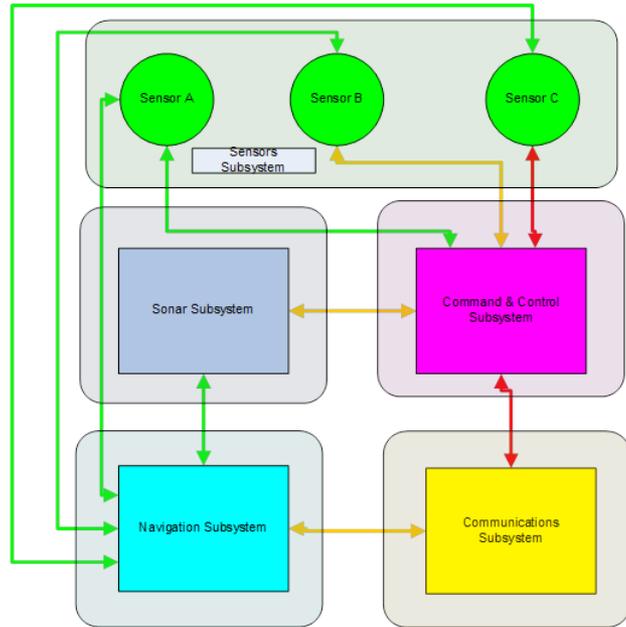
# Successful Applications

Program #1: Architecture feedback during test planning

Program #2: Additional architecture products to support test planning

Program #3: Test team engagement with architecture development

# Program #1 Complexity Feedback



Are there changes in the architecture that can simply integration (and design)?

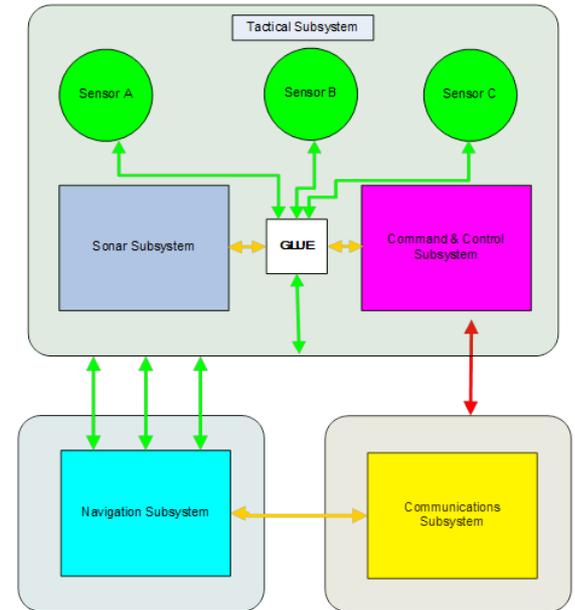
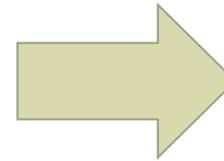


Table 4-3 Interface Level

		Compatibility Level						
		1	2	3	4	5	6	7
Complexity Level	A	1A	2A	3A	4A	5A	6A	7A
	B	1B	2B	3B	4B	5B	6B	7B
	C	1C	2C	3C	4C	5C	6C	7C
	D	1D	2D	3D	4D	5D	6D	7D
	E	1E	2E	3E	4E	5E	6E	7E
	F	1F	2F	3F	4F	5F	6F	7F
	G	1G	2G	3G	4G	5G	6G	7G

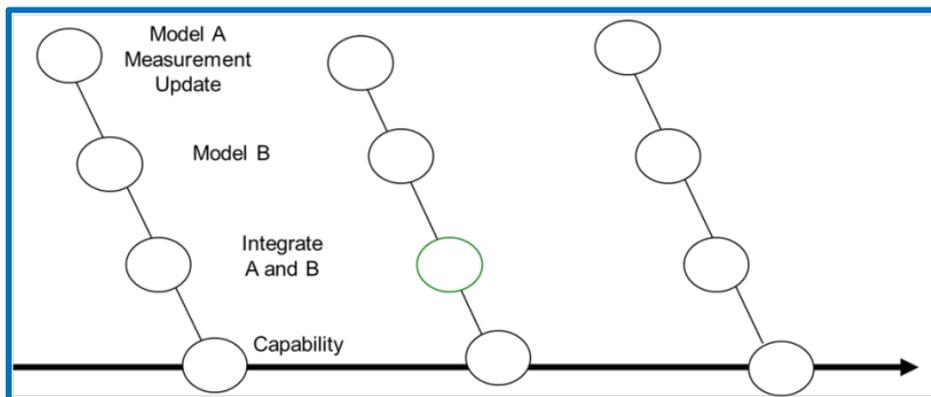
Interface Ranking

**Test Architect Can Simplify Interfaces**

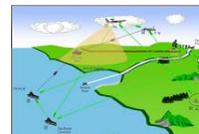
# Program #2

## Additional Architecture Products

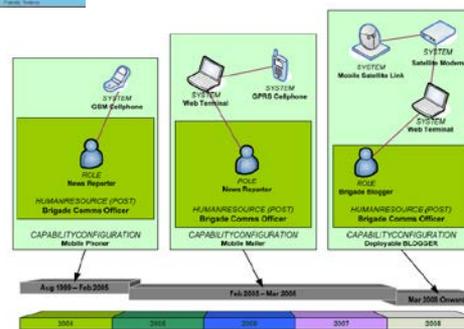
### Fishbone from Test Architect



OV-1s from System Architect



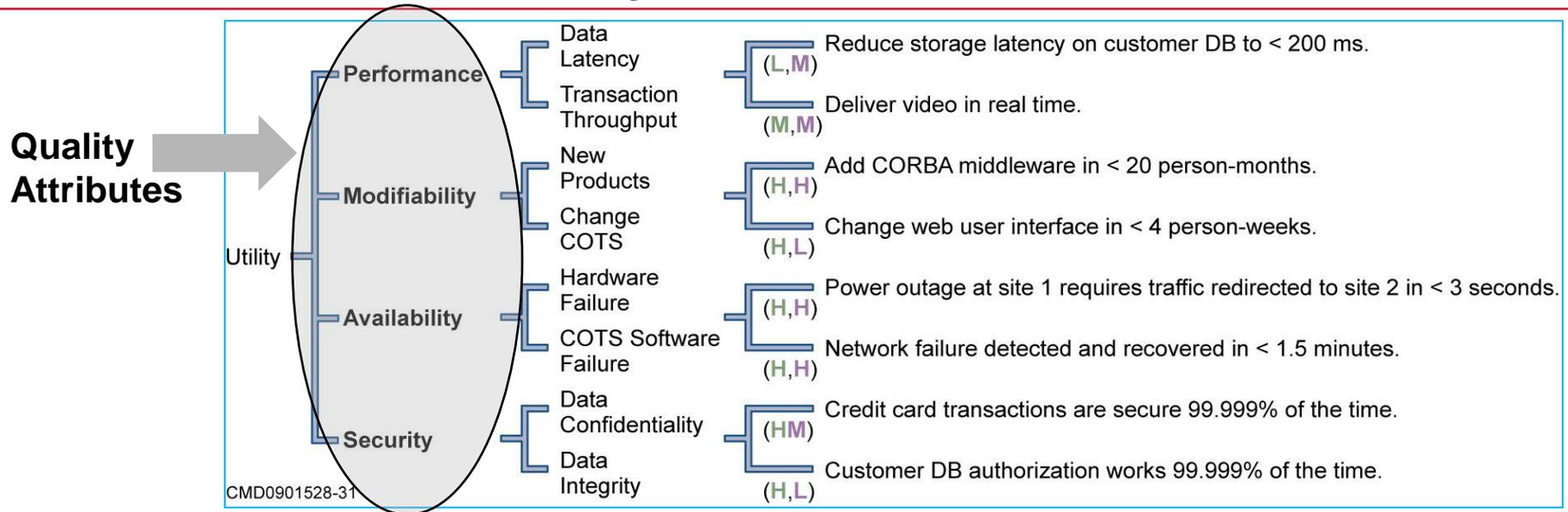
Resulting SV-8  
Depicting Incremental (and Early) Capability



SV-8 System Evolution

**Incremental capability as pursuit win theme**

# Program #3: IV&V Tactics for Quality Attributes

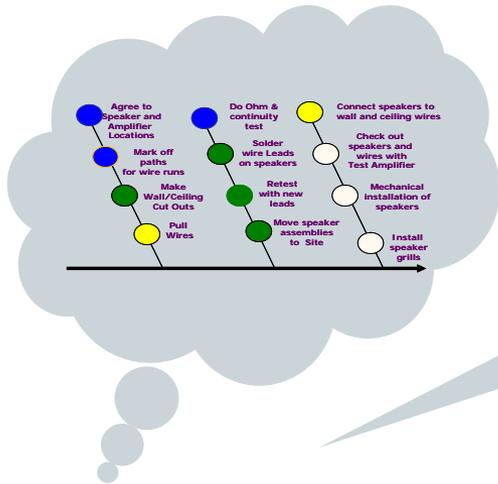


Quality Attribute	HW	SW	IV&V
Interoperability	COTS standard hardware	Open architecture	Low risk interfaces
Usability	Reduce number of monitors	Intuitive workflow processing	Early integration of HMI to influence user acceptance
Scalability	Computing environment with growth	Multi-threading	Focus on integration strategy and capability build up

# Conversations

Define incremental capability  
Partition functionality

# Conversation #1: Capability Build-up



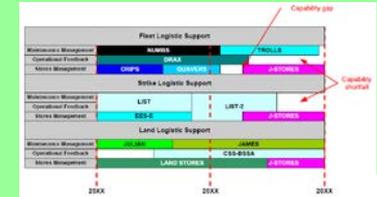
Test Architect

I need to define the integration strategy. Do you have a view of the architecture that shows how the capabilities come together?

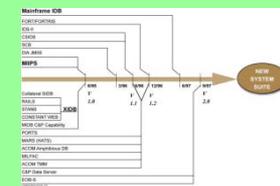
REAP doesn't require that I do a Capability View, so I didn't do that one.

It's an important view for me. I have these test events, but don't know how capability needs to be integrated to support them.

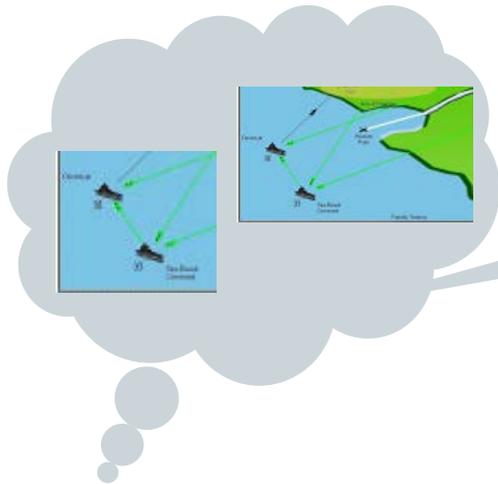
We can work together to define the incremental capability build-up. I think you are looking for a systems evolution description (SV-8), not a capability phasing (CV-3).



System Architect



# Conversation #1: Capability Build-up



I also need those lightning bolt charts you do for each event.

Test Architect

Sub-system A won't be available at this event, but I can build an emulator for that. I can't do that for sub-system B – is there any way to change the architecture to allow a more incremental build-up?



I only have the complete system view. We can develop OV-1s to reflect each node.

System Architect

I could change the functional allocation. The customer really wants early capability so that would work well.

# Conversation #2: Partitioning Functionality



Table 4-3 Interface Level

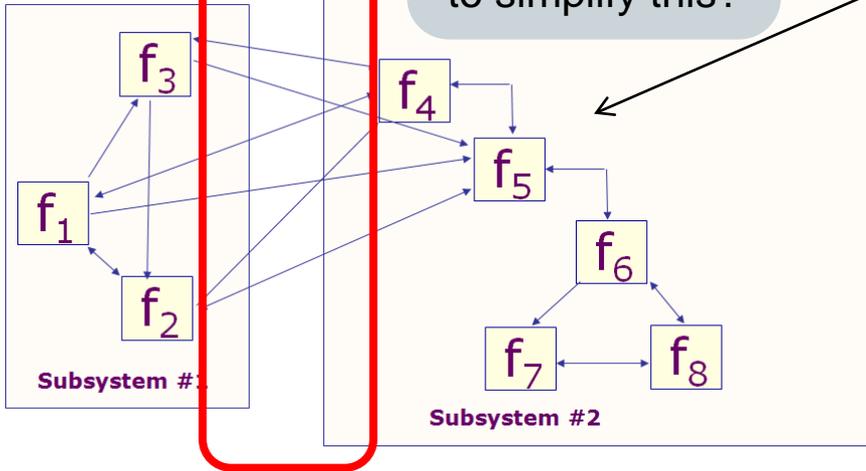
		Compatibility Level						
		1	2	3	4	5	6	7
Compatibility Level	A	AA	AB	AC	AD	AE	AF	AG
	B	BA	BB	BC	BD	BE	BF	BG
	C	CA	CB	CC	CD	CE	CF	CG
	D	DA	DB	DC	DD	DE	DF	DG
	E	EA	EB	EC	ED	EE	EF	EG
	F	FA	FB	FC	FD	FE	FF	FG
	G	GA	GB	GC	GD	GE	GF	GG

Test Architect

This interface is ranked as a high-risk integration effort. Why is it so complicated?

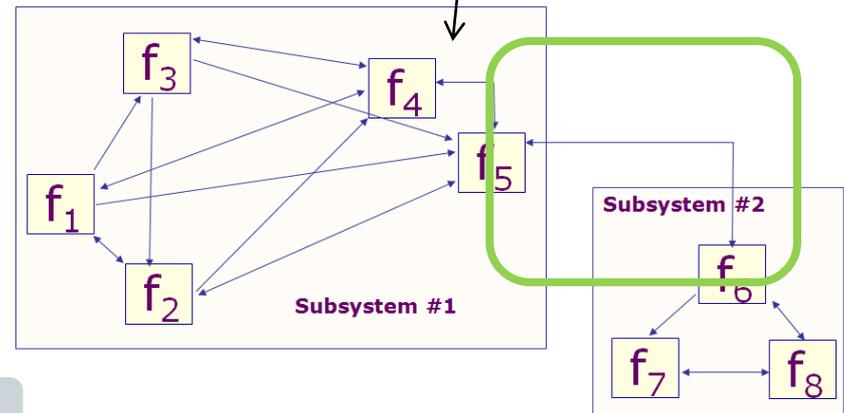
Here is the problem. Is there any way to simplify this?

Here is the SV-4 (Systems Functionality Description) for that.



System Architect

I can partition the functionality differently. Does this help?



Much better!

# Summary

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- Test and Architecture interaction is a rich opportunity
  - Design streamlined test program
  - Reducing system complexity.
  
- Test and Architecture partnerships have been successful
  - Incremental capability
  - Simplified interfaces
  - Test impact on quality attributes

**Look for Test Perspectives for Architecture Products**

# Abstract

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The intersection between test strategy and architecture development is rich with opportunity to design a streamlined test program while reducing system complexity. The presentation will highlight three successful applications of this overlap showing that the test strategy can provide feedback to simplify the architecture and architecture products can be defined that will define the test strategy. The presentation will then identify test perspectives for architecture development through hypothetical conversations between the test and architecture leads. The examples focus on defining incremental capability and partitioning functionality.

# Biographies

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- **Joe Manas** is an Engineering Fellow with Raytheon Company. Over the last 28 years, he has worked within the defense & aerospace industry, 25 years of which has been with Raytheon. Joe has held leadership positions in the disciplines of System Engineering, Software Development and Test & Evaluation across multiple product lines. He holds a B.S. in Electrical Engineering from Worcester Polytechnic Institute, MA.
- **Dr. Beth Wilson** is a Senior Principal Engineering Fellow who earned her PhD in Electrical Engineering from the University of Rhode Island. Since joining Raytheon in 1983, she has worked as a design engineer, program manager, research scientist, functional manager, and test director on sonar, satellite, and radar programs. She is the NDIA Developmental Test and Evaluation committee chair, and co-chair for the INCOSE and NDIA System Security Engineering committees. Previous assignments have included a character-building deployment to Shemya, Alaska as the Test Director for the Cobra Dane Upgrade. Beth is a Raytheon Certified Architect (RCA), INCOSE Expert Systems Engineering Professional (ESEP), and a Raytheon Certified Six Sigma Expert.