Acquisition in a World of Joint Capabilities: A Study of Interdependency Complexity

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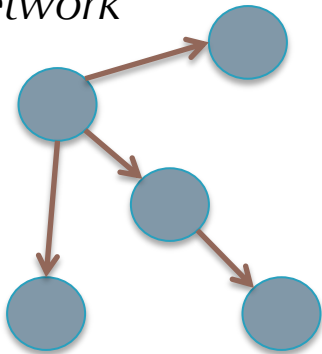## Graham Owen
UNC Charlotte

Battle Space

Awareness

Interdependency is defined as dependence on an external source for:

- data,
- money,
- staff,
- facilities, or
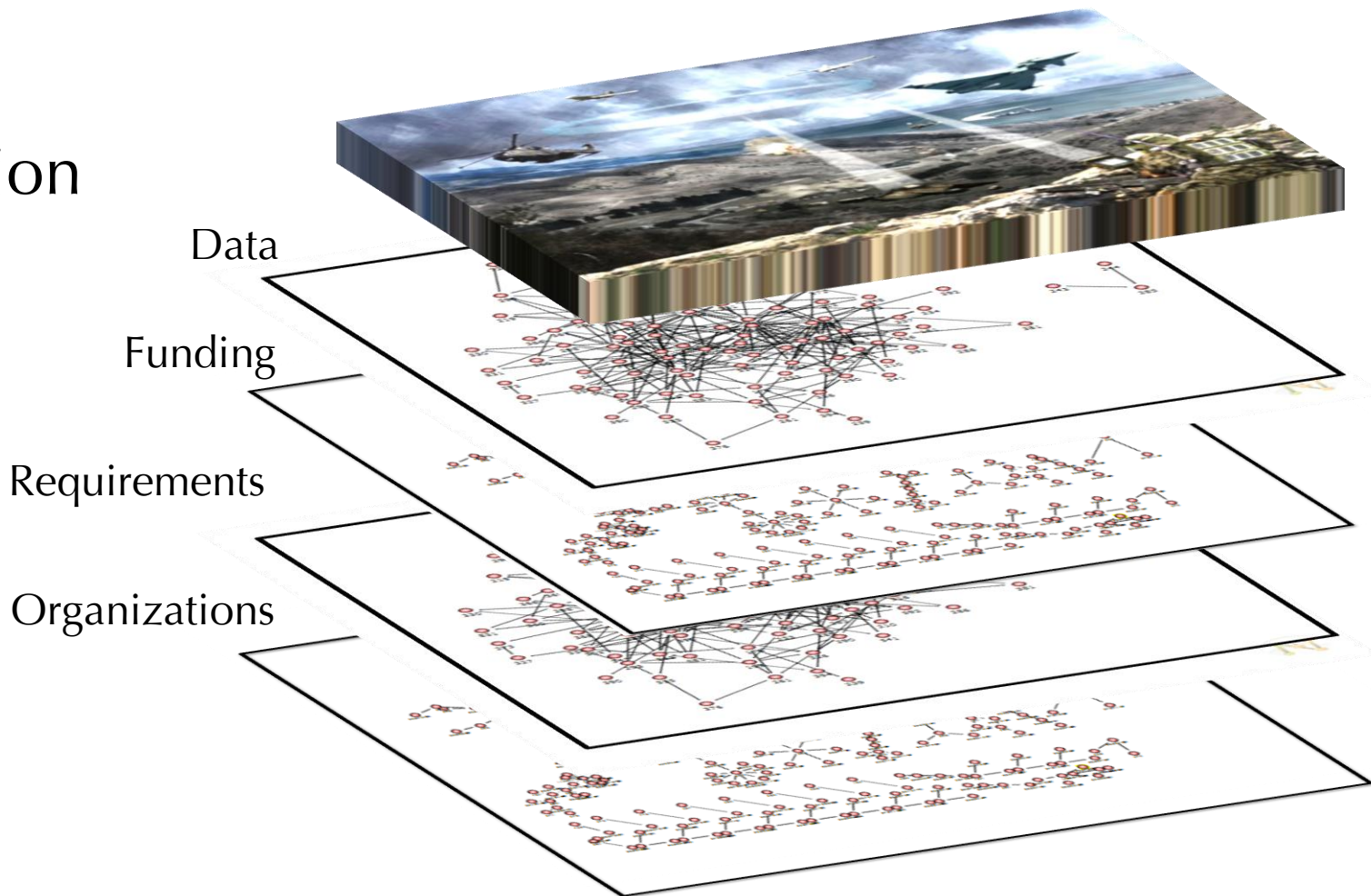- requirements

beyond the normal acquisition workflow

network

Complexity has been further clarified as a function of the ties of interdependent activities

Affordability and the Value chain

Acquisition

Data

Funding

Requirements

Organizations

Goal is to identify **_methods_** that allow

early observation of

cost, schedule, performance risk from AT&L

authoritative data

Historical Findings

Small co-located initiatives

Large initiatives temporary

Measurement Problems

Negative Effects

More Recent Findings

Tremendous debate about the influence that interdependencies exert on program performance

Evidence that programs should strive for weak ties
Evidence that programs should strive for strong ties

Lack of methods for isolating the risk of interdependencies

5th year of the research

Built a database from DoD authoritative data

Tested both stochastic and deterministic methods to isolate the influence of interdependencies

Conducted a number of qualitative interviews

Objectives:

1) Test the Influence of interdependencies on MDAP performance

2) Test Data and Funding Cascades – upstream program's effect on downstream programs

Cost & Funding

Cost Variance

R Docs

P Docs

DAES

Interdependencies

All MDAPS

Acquisition Visibility Efforts
DAMIR
SAR & DAES

R & P Docs
Comptroller

2005 to 2011

Characteristics

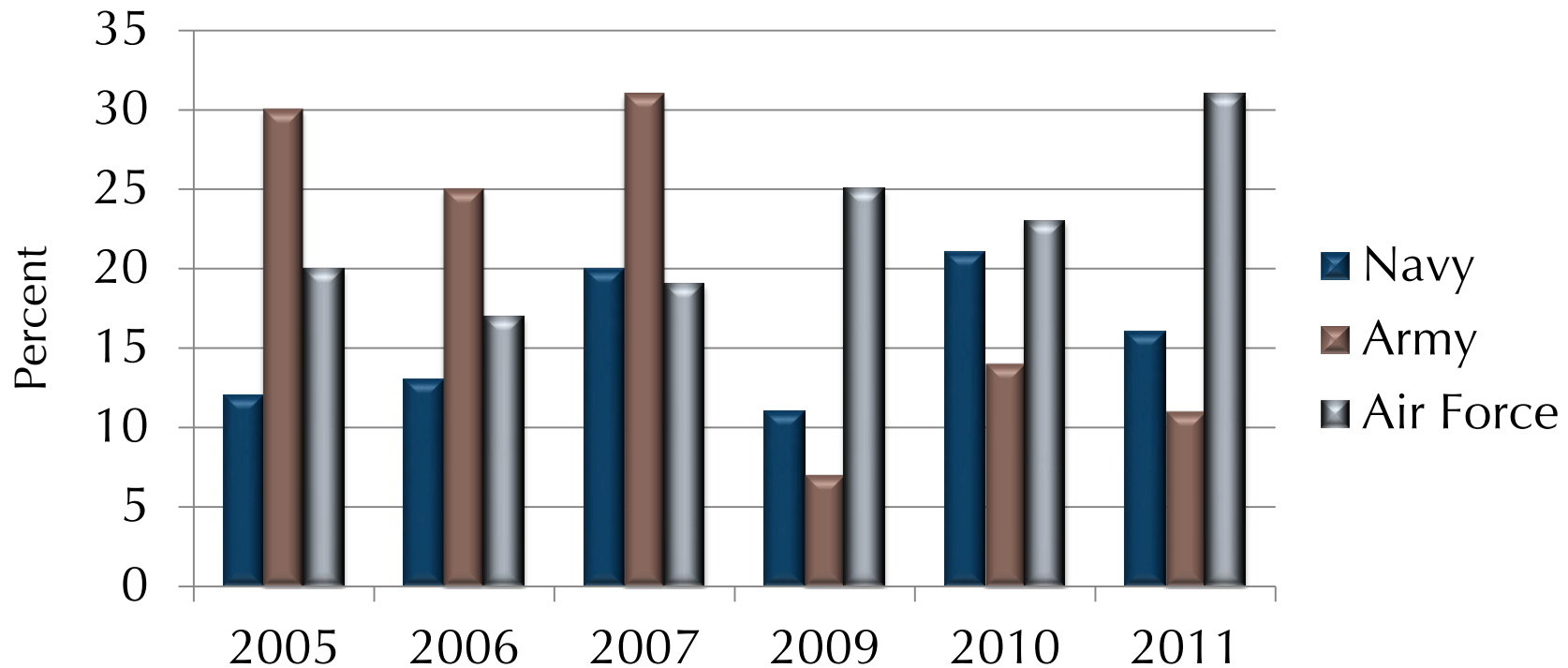|	
20%	Joint
28%	1 Program element
26%	2 Program elements
17%	3 Program elements
20%	4-33 Program elements
56%	No MDAP data connections
4%	2 MDAP data connections
5%	3 MDAP data connections
9%	4 MDAP data connections
22%	5-21 MDAP data connections

Average Percent Change
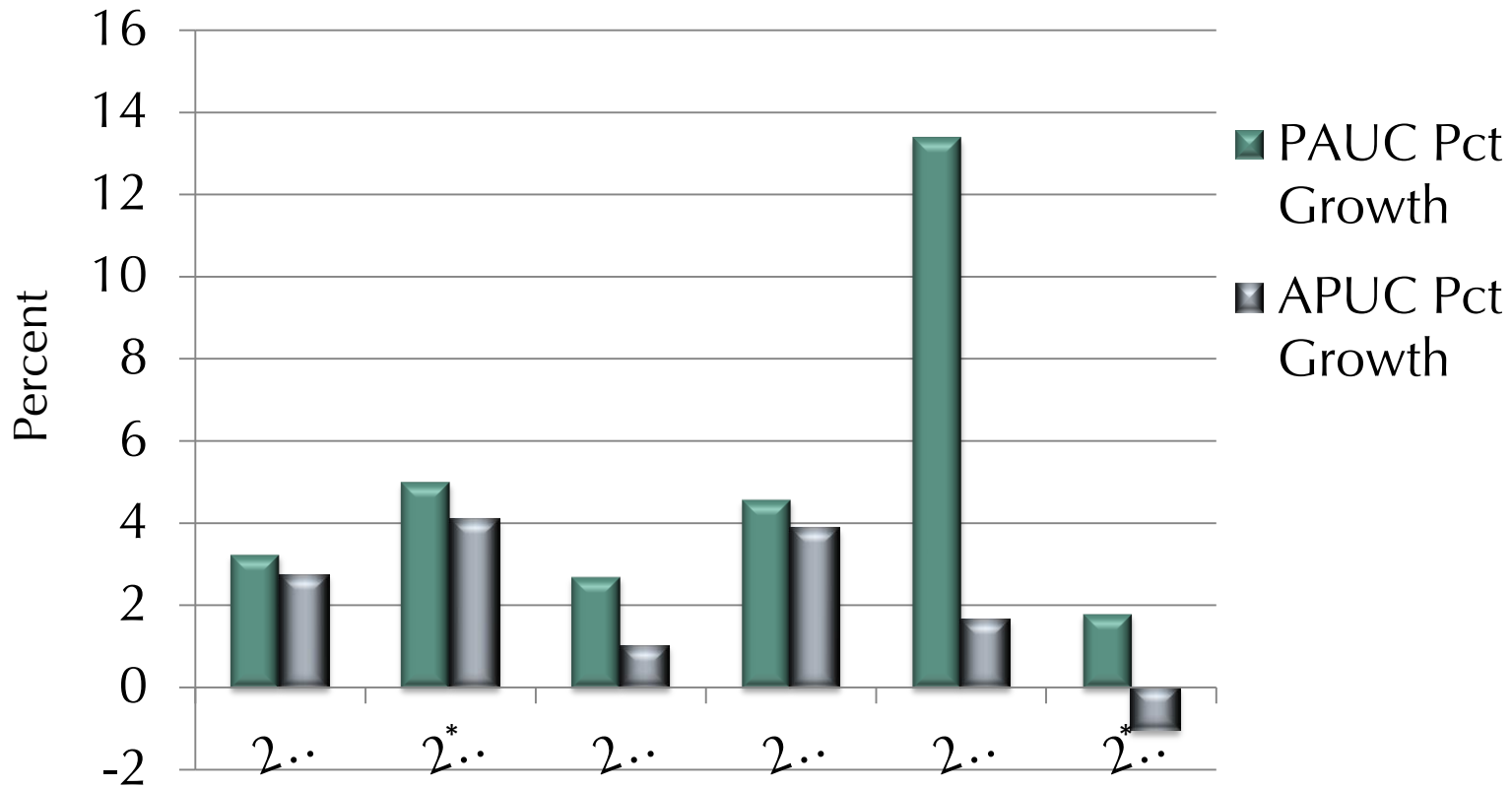
Data Links

	Air Force	Army	DoD	Navy
Air Force	**<u>36%</u>**	7%	17%	1%
Army	19	**<u>77</u>**	17	4
DoD	11	4	**<u>23</u>**	9
Navy	34	11	43	**<u>86</u>**

Outside Service Funding

A grouped bar chart titled "Outside Service Funding" showing Percent on the y-axis (0 to 35) by year for Navy, Army, and Air Force.

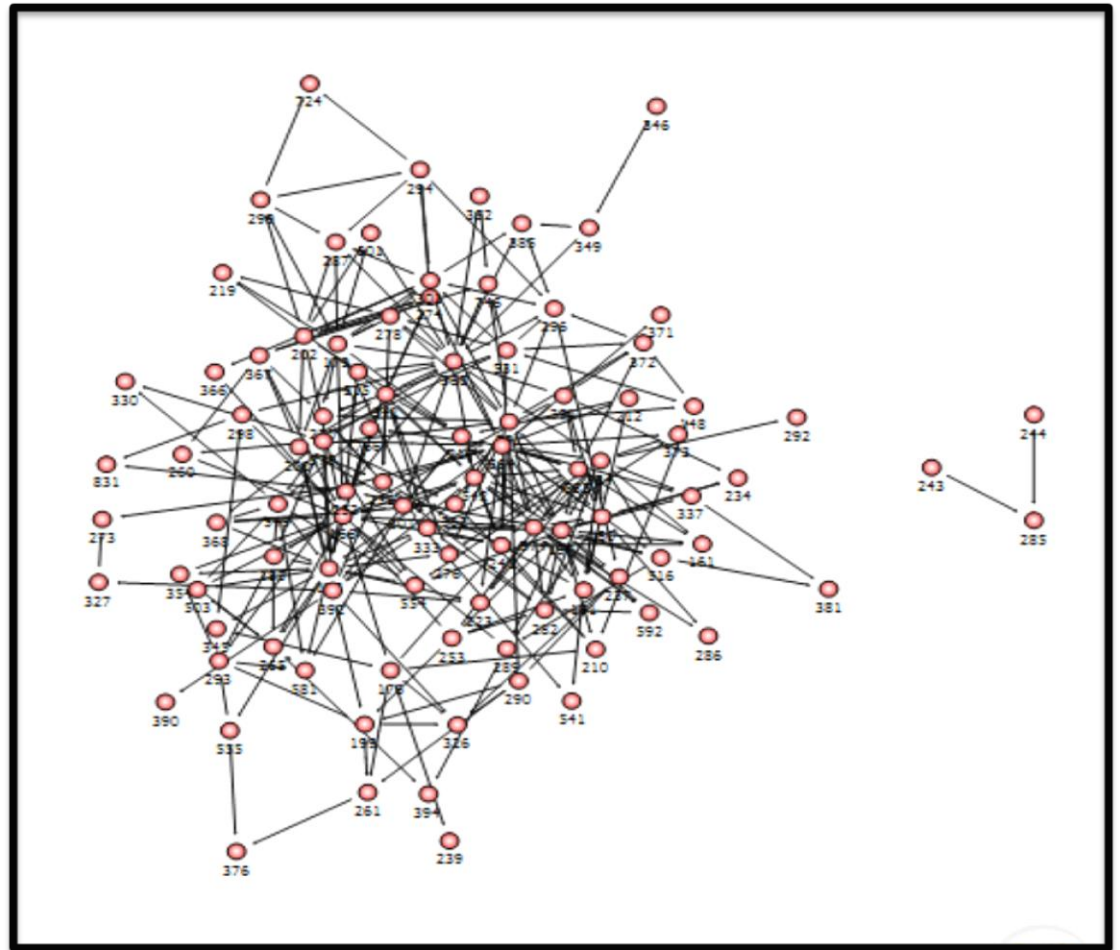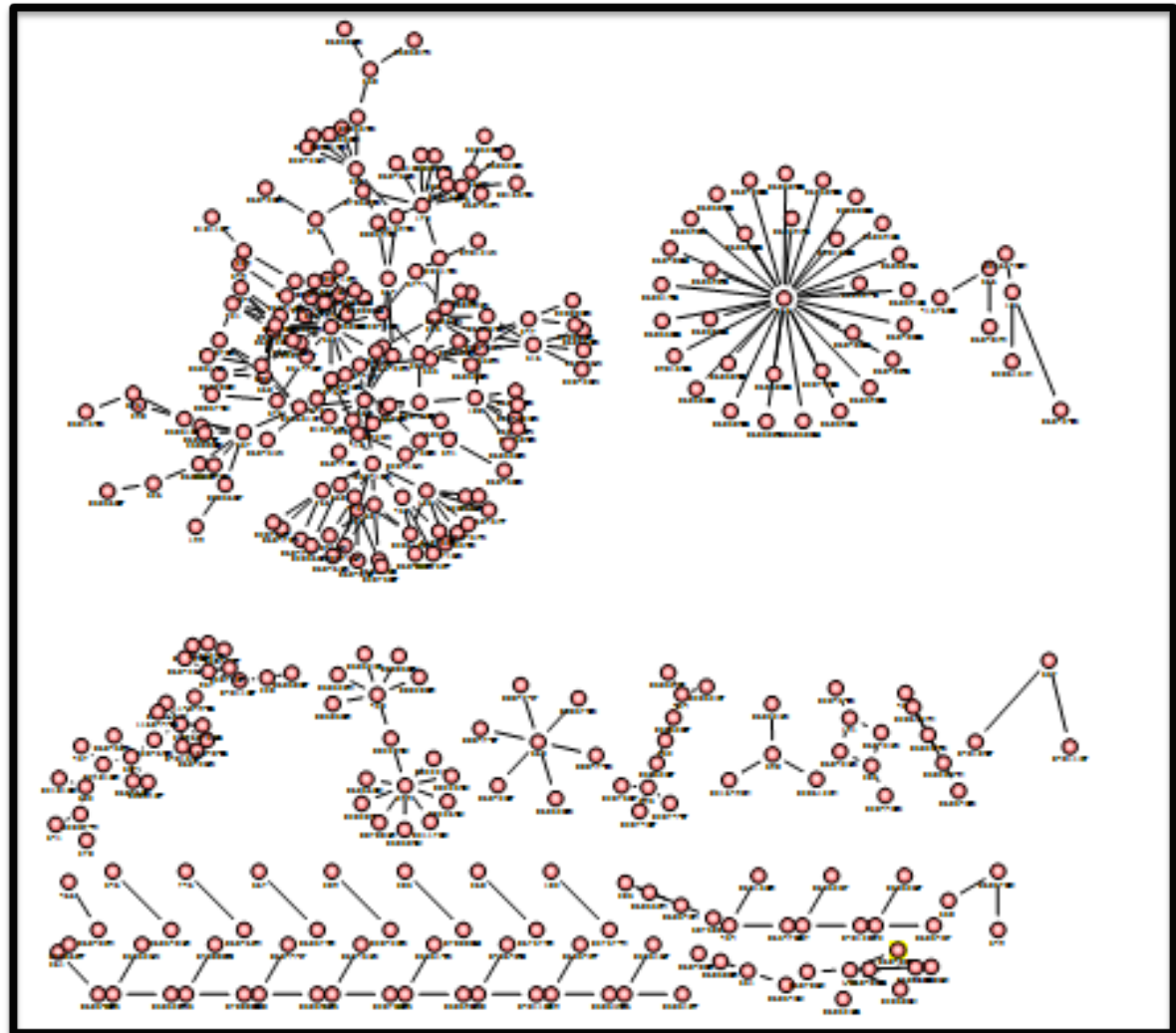| Year	Navy	Army	Air Force
2005	12	30	20
2006	13	25	17
2007	20	31	19
2009	11	7	25
2010	21	14	23
2011	16	11	31

75% of Interdependencies are with non-MDAPS

Funding

Interdependencies

Test 1: Individual Interdependency Analysis

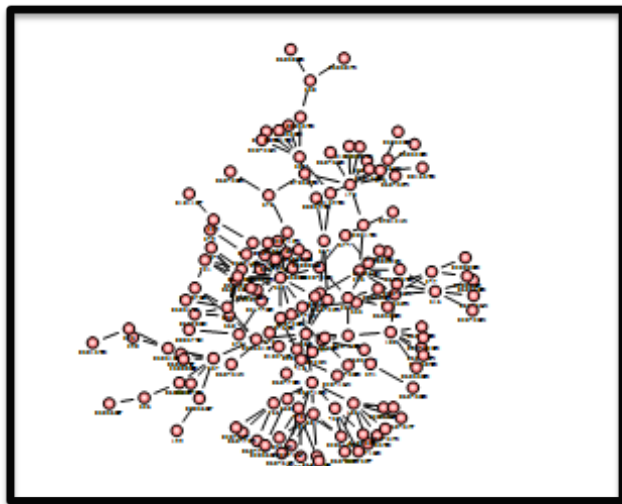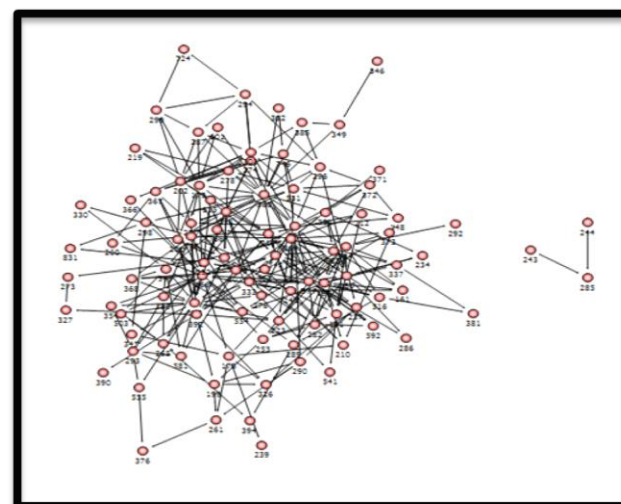|	Pct PAUC Growth	Pct APUC Growth
Number of Data Links	+	
Number of Funding Links		−
Joint Status		
Dev Estimate		
Stage		
Year		

Test 2: Cascade Analysis

Undirected Network

Directed Network

Dyadic Analysis - Multilevel Fixed Effects Modeling Regression Analysis

Test 2: Cascade Analysis – Shared Program Elements

	Downstream Pct PAUC Growth	Downstream Pct APUC Growth
Downstream # of Data Links	**+**	**+**
Downstream # Funding Links	**–**	
Downstream Joint Status	**+**	**–**
Upstream Program PAUC	**+**	
Upstream Program APUC		**–**
Downstream Dev Estimate		
Downstream Stage		
Year	**+**	**+**

Test 2: Cascade Analysis – Data Downstream

	Downstream Pct PAUC Growth	Downstream Pct APUC Growth
Downstream # of Data Links	+	
Downstream # Funding Links	−	−
Downstream Joint Status	+	
Upstream Program PAUC	+	
Upstream Program APUC		
Downstream Dev Estimate	−	+
Downstream Stage	−	−
Year	+	

Future Steps

Include Non-MDAPS

Weight the Ties

Capture more interdependency data

Integrate MAIS

Take Aways

Criticality of DoD Acquisition Visibility Effort

Interdependencies Matter

Methodologies that allow Multidimensional, Multi-perspective, Cross-Temporal Approaches are needed