



Workforce and Culture Transformations in Digital Acquisition

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- → Introduction & Background
 - Methodology: Multi-level Sociotechnical Modeling & Enterprise Systems Analysis
 - Context Background: DE Transformation; Workforce & Culture
 - Systemigram
 - Outcomes & Next Steps



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Introduction

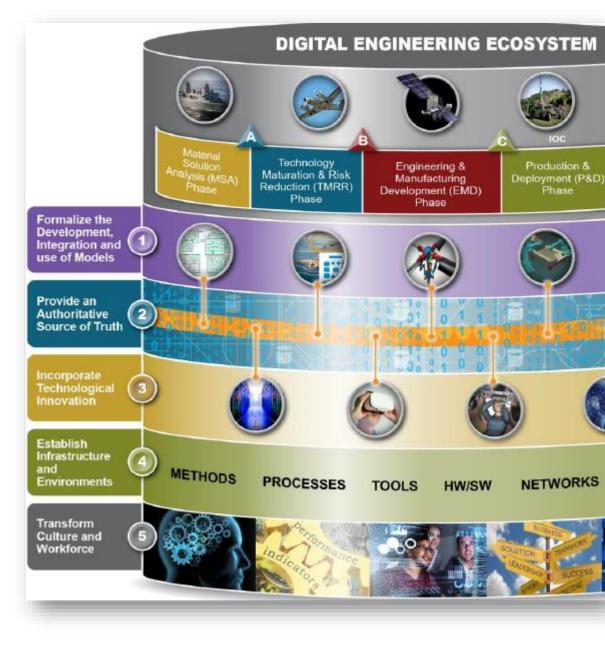


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SERC Project RT-182 Digital Thread Enabled Acquisition

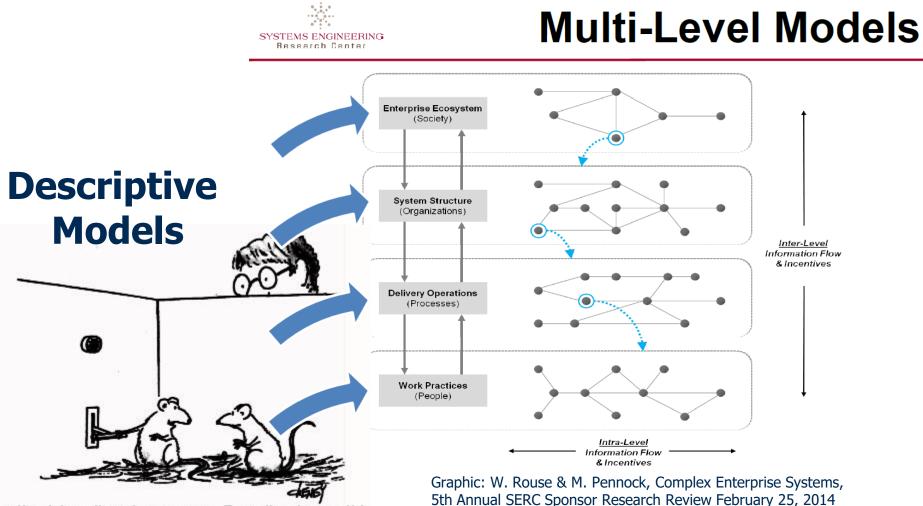
- Research project to evaluate the impacts of DE on current DoD acquisition enterprise processes
- Digital Thread is still in the early stages of development and adoption
- Discussions around digital thread and digital engineering focuses on the technological and modeling aspects
 - Overlooked is the human role and associated changes to culture & workforce
- Created holistic model of DoD Acquisition Enterprise change as DE is gradually adopted



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Methodology: Multi-level Sociotechnical Modeling & Enterprise Systems Analysis



It's a rather interesting phenomenon. Every time I press this lever, that post-graduate student breathes a sigh of relief.

Graphic: smumn.edu/facpages/~dbucknam/rat_cartoon.jpg

Methodology, continued

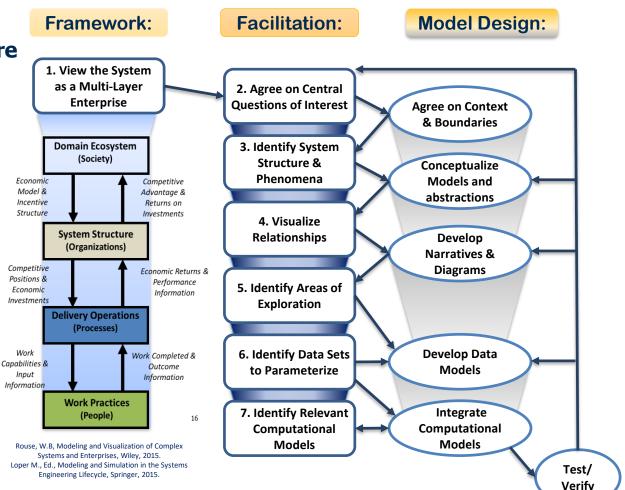
- 1. Context Analysis
- 2. Central Questions of Interest
- 3. Identify System Structure & Phenomena
 - Background Research
 - Interviews
- 4. Visualize Relationships
 - Systemigram Narratives & Diagrams

5. Identify Areas of Exploration

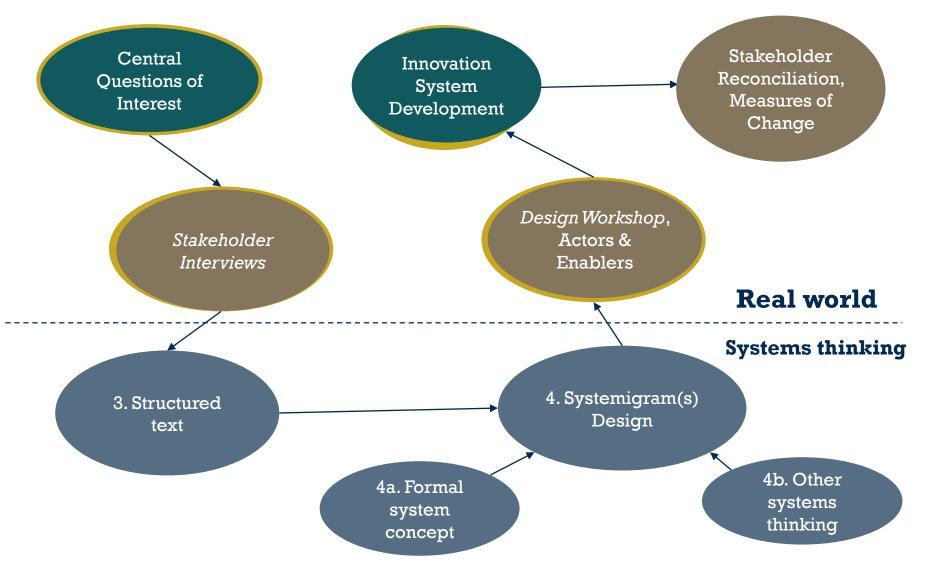
- Innovation System Analysis
- Key stakeholders
- Critical enablers & barriers to change

6. Identify Data Sets to Parameterize

- What are the measurement areas that will drive change?
- What measures are collected versus what should be collected



In Practice: Using Enterprise Systemigrams

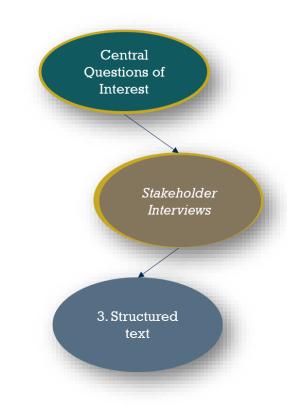


A qualitative stakeholder-driven process to produce quantitative goals

Stakeholder Interviews & Research

- 15 Project Visits Completed, 25 People Interviewed
 - DASD/SE
 - Aerospace Corp
 - JHU APL
 - SAF/AQ
 - Army PM-Aviation
 - Army Future Vertical Lift Program Office
 - Ground-Based Strategic Deterrent Program Office
 - SPAWAR San Diego
 - TARDEC
 - J8 JCIDS office
 - DOT&E
 - NASA-Langley
 - NASA-Marshall
 - JPL

- Also:
 - -~50 documents reviewed
 - –6 facilitated meetings with DASD/SE team



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Context Background

	Ena	abling Environment	Key Actors & Resources	Interactions/Activities	Outcomes/Outputs
Domain	•	Operational Context –	 Manufacturing 4.0 drivers 	 Curate models across domains, 	• Goal 1: Formalize the development,
		increasing complexity	 Global innovation in DE 	fidelity, phases and the lifecycle	integration and use of models to inform
	•	DoD DE Strategy			enterprise and program decision making
					• Map the realm of the possible with warfighter
					needs
Institutions	•	Develop, mature, and use	 INCOSE and other professional 	 Digital program documents 	Goal 2: Provide an enduring authoritative
		IT infrastructures	organizations	 Enterprise owns the ontology and 	source of truth (AST)
	•	Define and govern		data layer for analytical	Goal 4: Establish a supporting infrastructure
		authoritative source of		approaches	and environment
		truth		 Libraries of reusable models 	
				 Pay once for data, reuse 	
				everywhere	
Processes	•	Lexicon, taxonomies,	• Communities: Standards, guides	 Digital twin that injects data back 	Goal 3: Incorporate technical innovations to
		ontologies	 Communicators/ matchmakers 	into the models	improve the engineering practice
	•	Paperless system and	 Model governance/version 	 System data accessible from a 	 opportunities that can be gained from deeper
		technical information	control mgmt.	single portal	information in the AST
			 Better informed Decision makers 	Eliminate human process of	 make the process more efficient and reduce
P				finding and using data	rework
				• Everything needed is on desktop,	 capture and maintain lessons learned
				what's been done before is there	
				to reuse	
	•	Comfort with technology	 Leadership & messaging 	Enhance collaboration	Goal 5: Transform Culture and Workforce
	•	Usability of DE methods	 Older vs younger workforce 	Humans can focus on creative	 easier to ingest new processes and incorporate
<u>e</u>		& tools	 Human capital - skills 	work and machines can take care	acquisition expertise into the tools
People	•	Organizational and	 A-Teams & B/C-Teams - 	of mundane tasks	 make the B-team and C-team players perform
P		cultural resistance	performance	 Understand incremental value of 	more at the A-Team level
	•	Learning systems that		all trades, done dynamically	
		adapt to individual			
		abilities			
			3. Structure	ed 4.8	Systemigram(s)
			text		Design
					K
				4a. Formal	4b. Other
				system	systems thinking
10				concept	

Workforce & Culture

- Most stakeholders and experts do agree there is a cultural change at play
- Divergence in perspective in regards to what this might look like
 - Change in the "old guard" to "new guard", whether or not there are workforce capabilities and the "talent" will look like
- Substantial workforce shift: new tools which bring in digital natives and will be a merger of new technology and existing experience
 - Are there capabilities and resources to address the changes?
 - Tensions between the old and new guard
- Evolution of Systems Engineering and System Modeling roles & methods
- Digital collaboration and access to truth data is a key enabler
- Commitment of leadership is essential
 - Investment, common messaging, safe places to experiment
- What innovations will drive the future DE desktop environment?

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DE Transformation Systemigrams

Workforce and Culture

Much of the discussions around digital thread and digital engineering focuses on the technological and modeling aspects. While those are integral to the changing dynamics and processes, often overlooked is the human role and associated changes, and how it will shift and might change over time, as the broader system seeks to become more agile.

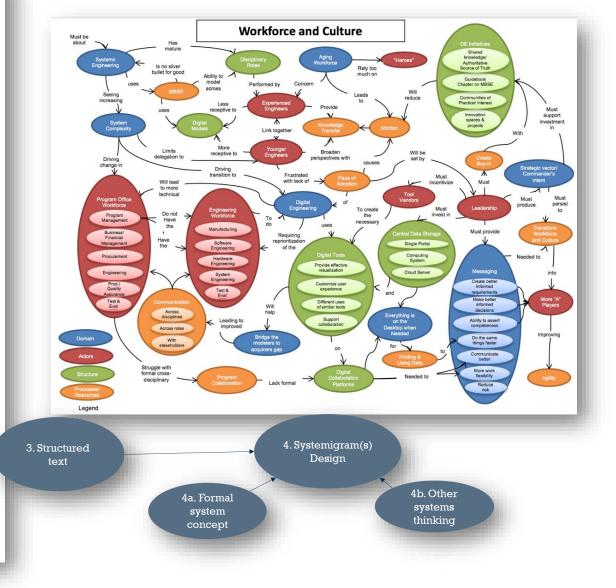
Most stakeholders and experts do agree there is a cultural change at play, along with needs for the workforce to adapt and change with the broader trends at play as well. There are divergences in perspective in regards to what this might look like, the change in the "old guard" to "new guard", whether or not there are workforce capabilities and the "talent" will look like.

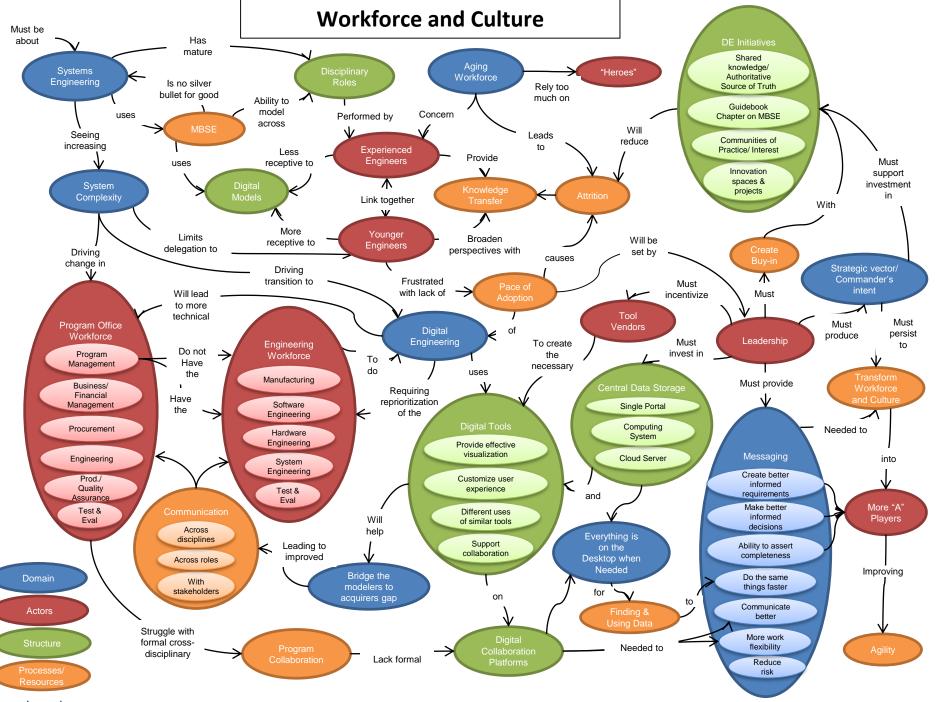
DE is a cultural change in and of itself. There are the new tools which bring in digital natives and will be a merger of new technology and existing experience. As such, the workforce shift will be substantial. There will be big struggles to learn new ways. The goal is having the models to feed the decision processes, which requires training of modelers and a new breed of decision makers. However, it's a challenge to get a large group of people to change. Culture change is not done without resistance or done overnight. There is an extraordinary advantage to maintain the status quo and temptation to "do it like how we did last time". Culture change is organizationally dependent and unchangeable.

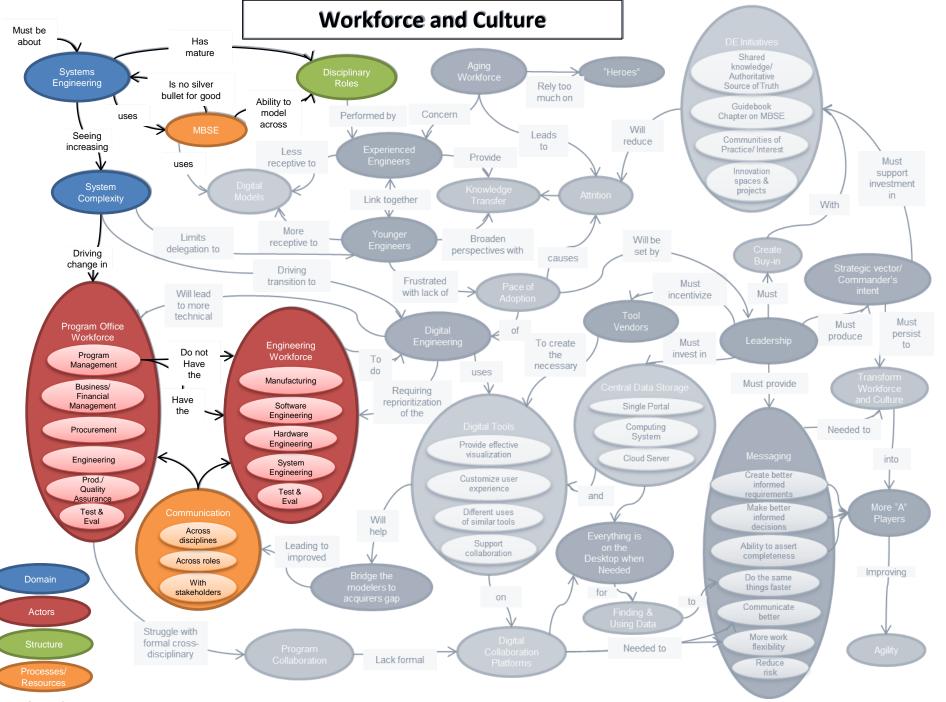
One of the bigger points of diversion amongst stakeholders is whether or not there is a workforce in place to grapple with the changes at play, and if so, whether there are capabilities to address the changes. On the one hand, DE is done today often times without the realization that is being applied. People who do models do it without thinking about it. However, there lacks the process and culture to bring together the emerging digital natives with grizzled veterans and their domain knowledge.

On the other hand, there is the belief that much of the workforce is an aged workforce that looks back at the way things were done rather than looking to the future. The younger group coming in also has shortfalls. The younger workforce is more skilled in a single discipline rather than a broad perspective. There needs to be an effort to better train the younger workforce to oversee multiple different domains to provide a more robust understanding of digital environment. However, bureaucracy and paperwork make it hard to train due to time constraints. Additionally, there is not enough money or time to train older workforce to train them how to use new tools as well.

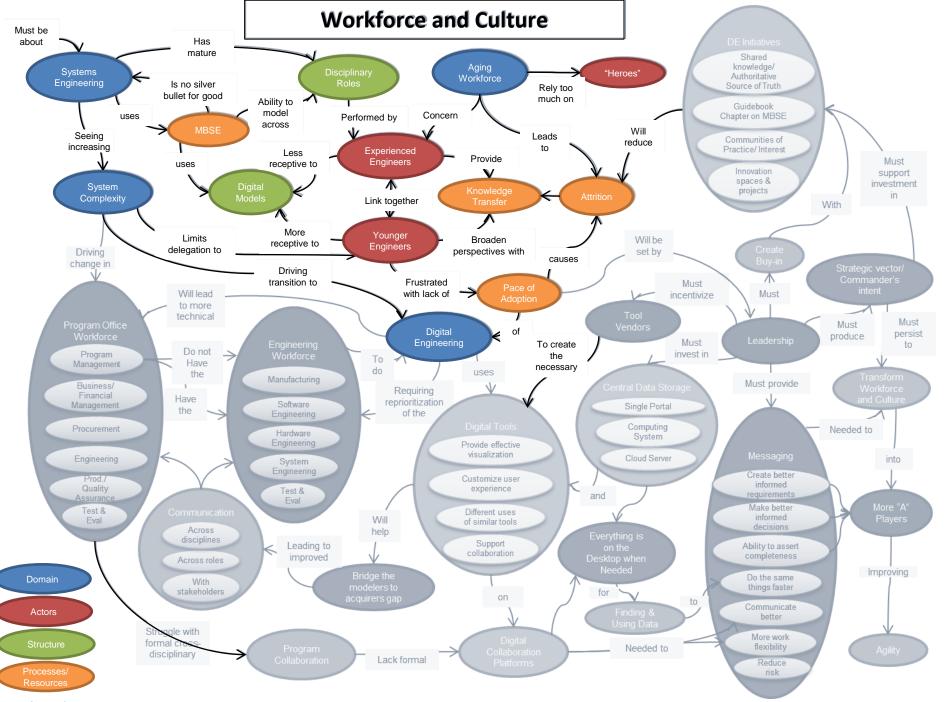
This squeeze on resources also impacts the focus on SE, as discipline workforces are less and less SE focused and system implications. Labor is expensive and systems are expensive to implement. There are no expectations to think about larger system aspects from the onset. Hiring managers are worried about finding MBSE workers, but there should be more of an effort place finding systems engineers.

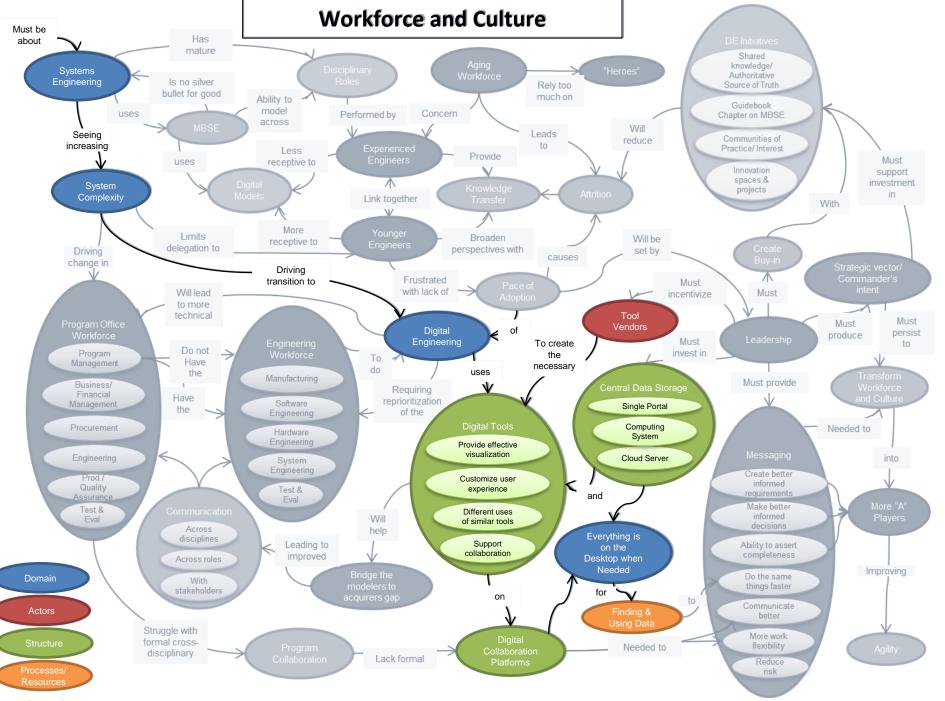


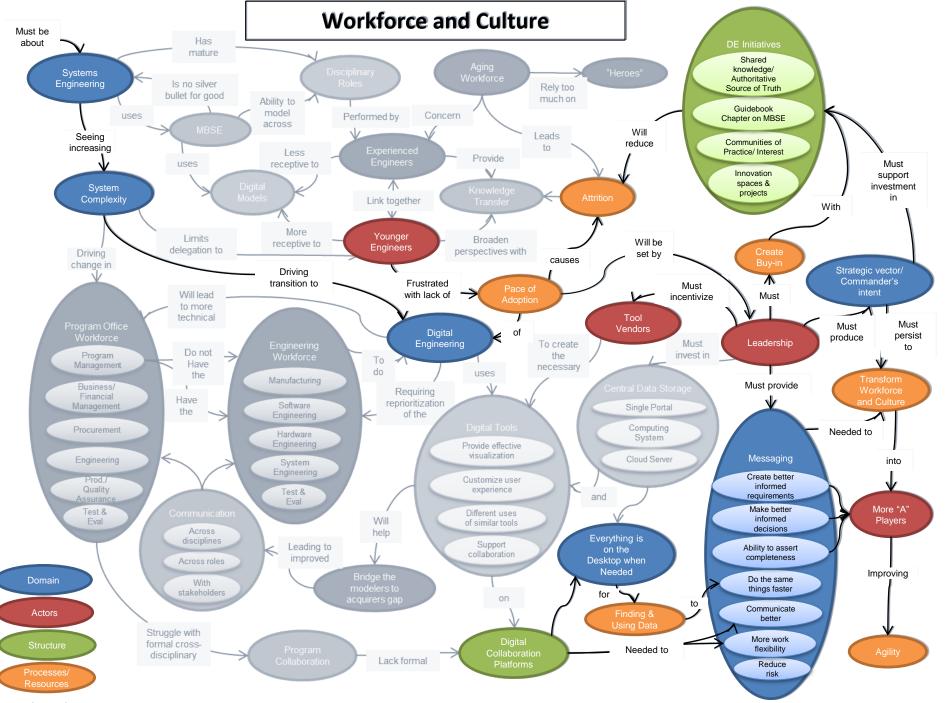




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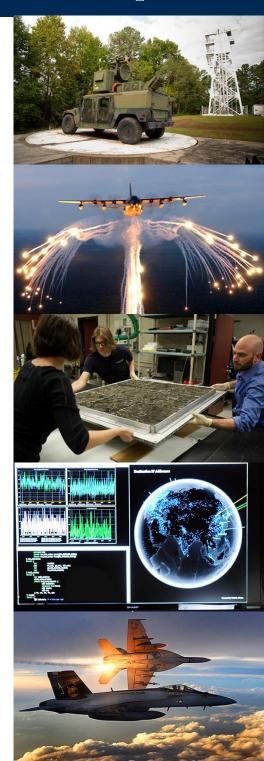






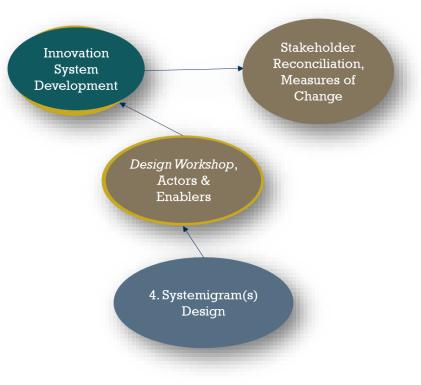
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Outcomes & Next Steps

- Created holistic model of DoD Acquisition Enterprise change as DE is gradually adopted
- Good agreement across stakeholders on the nature of the strategy
- Descriptive modeling process reveals scope of change
- Testing insights in multiple forums
 using Systemigrams
- Next steps:
 - What do program offices need to emphasize?
 - What are the short and long-term metrics for success?





Questions?



Thank you!