

# Workforce and Culture Transformations in Digital Acquisition

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**SYSTEMS**  
ENGINEERING  
RESEARCH CENTER



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ALABAMA IN HUNTSVILLE



# Agenda

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

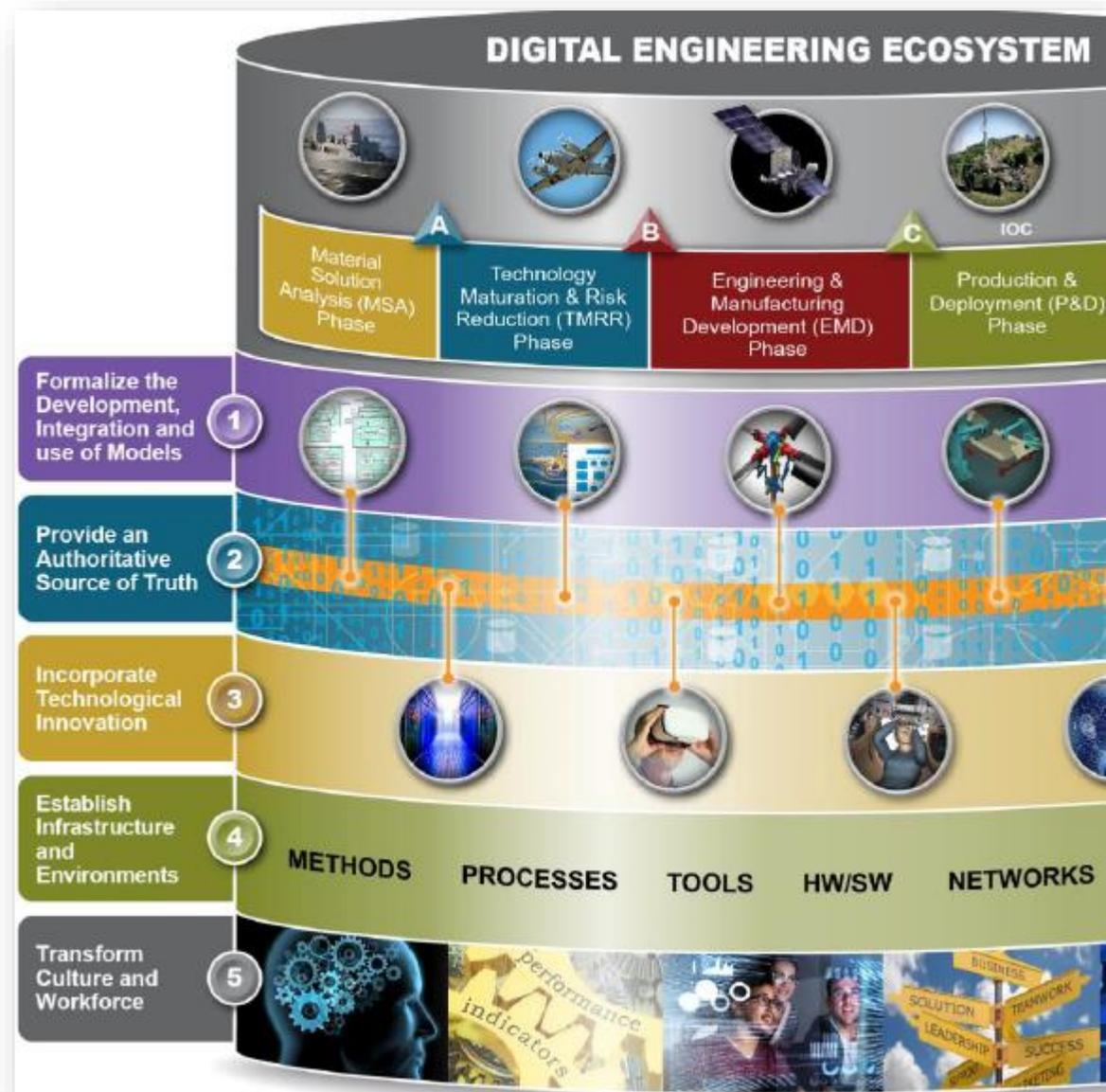


# Introduction

- 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



## SERC Project RT-182 Digital Thread Enabled Acquisition



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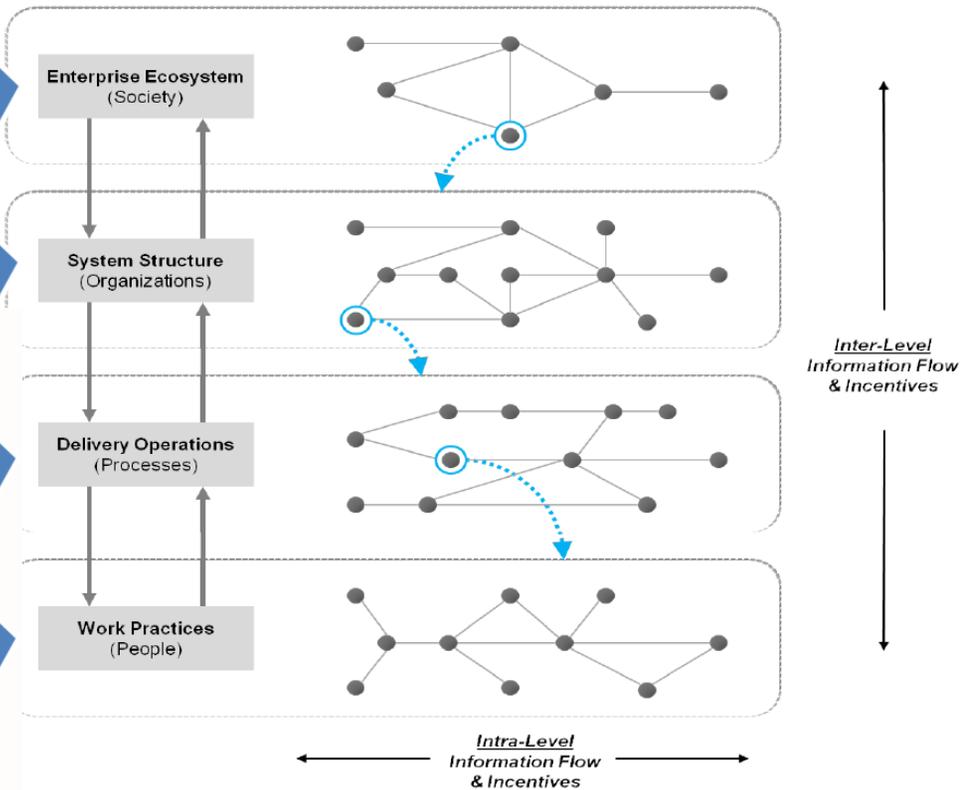
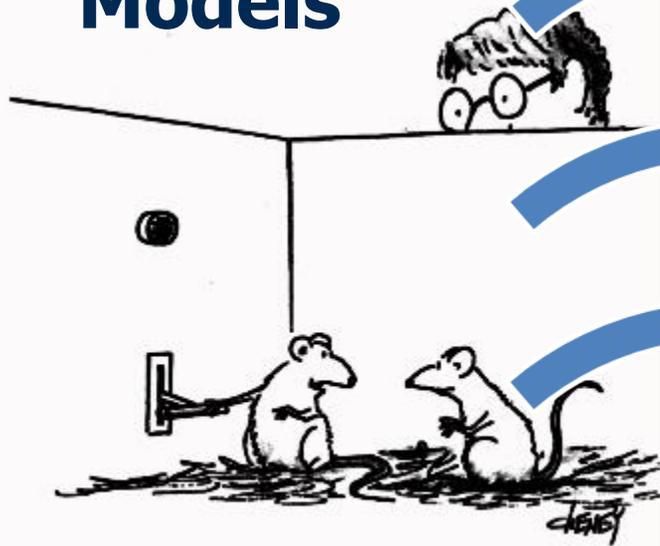


# Methodology: Multi-level Sociotechnical Modeling & Enterprise Systems Analysis



## Multi-Level Models

### Descriptive Models



Graphic: W. Rouse & M. Pennock, Complex Enterprise Systems, 5th Annual SERC Sponsor Research Review February 25, 2014

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](http://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

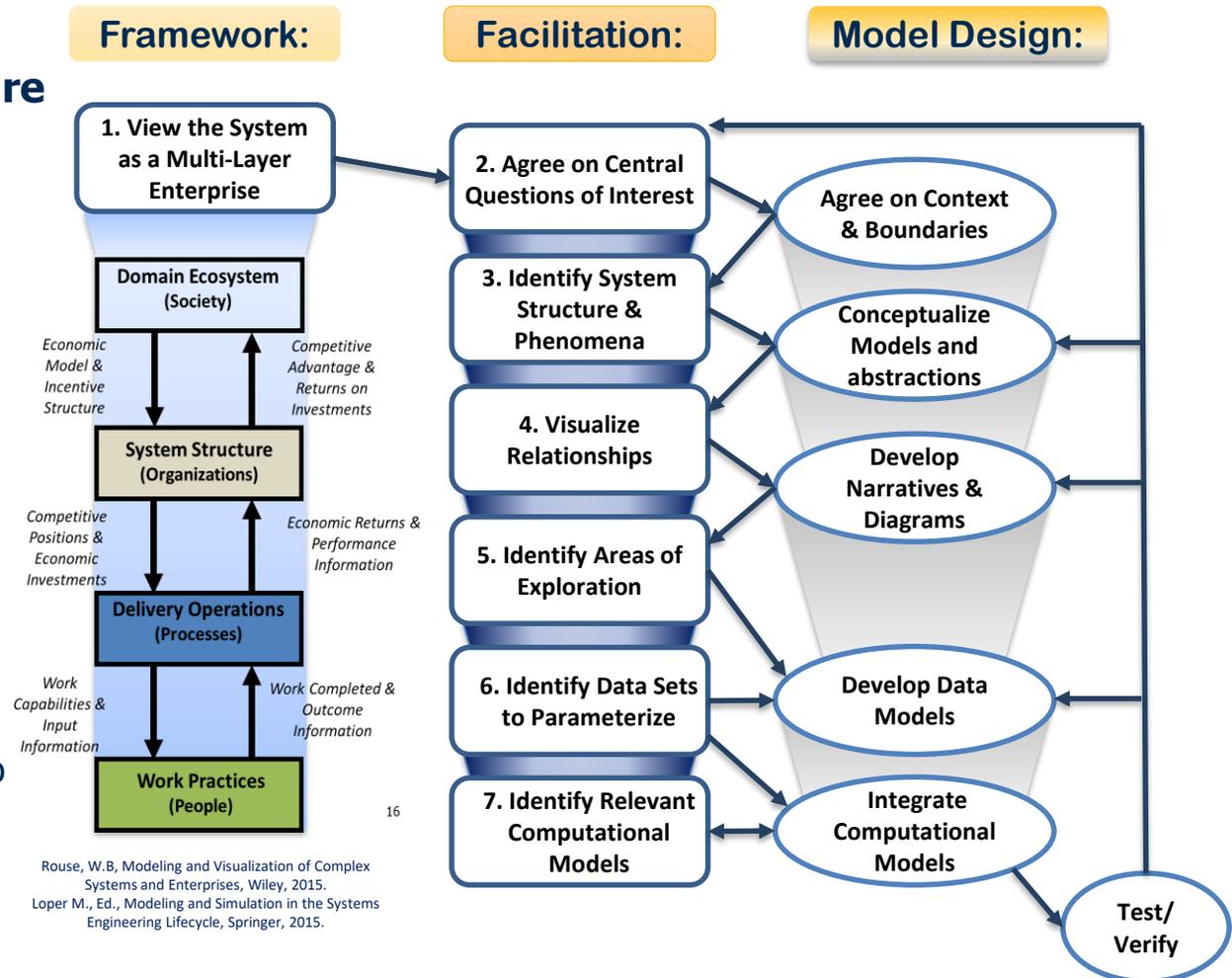
- Systemigram Narratives & Diagrams

## 5. Identify Areas of Exploration

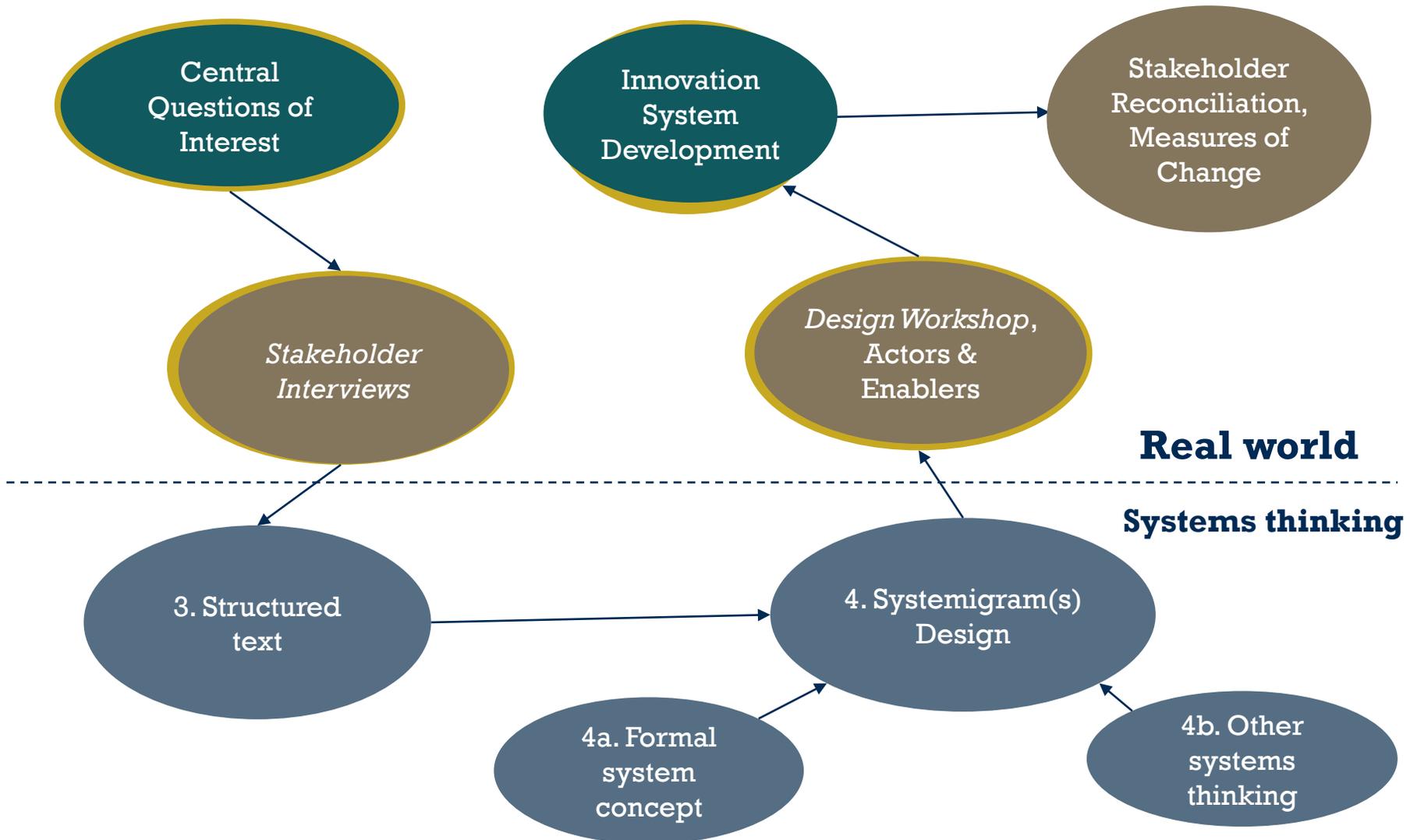
- Innovation System Analysis
- Key stakeholders
- Critical enablers & barriers to change

## 6. Identify Data Sets to Parameterize

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



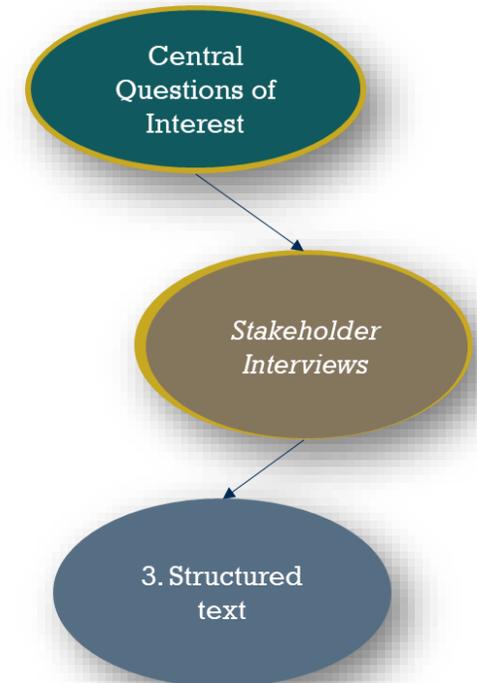
# In Practice: Using Enterprise Systemigrams



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



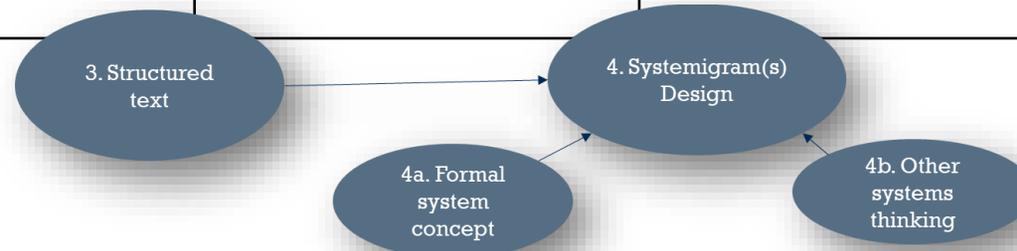
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# Context Background

	Enabling Environment	Key Actors & Resources	Interactions/Activities	Outcomes/Outputs
Domain	<ul style="list-style-type: none"> <li>Operational Context – increasing complexity</li> <li>DoD DE Strategy</li> </ul>	<ul style="list-style-type: none"> <li>Manufacturing 4.0 drivers</li> <li>Global innovation in DE</li> </ul>	<ul style="list-style-type: none"> <li>Curate models across domains, fidelity, phases and the lifecycle</li> </ul>	<ul style="list-style-type: none"> <li><b>Goal 1: Formalize the development, integration and use of models to inform enterprise and program decision making</b></li> <li>Map the realm of the possible with warfighter needs</li> </ul>
Institutions	<ul style="list-style-type: none"> <li>Develop, mature, and use IT infrastructures</li> <li>Define and govern authoritative source of truth</li> </ul>	<ul style="list-style-type: none"> <li>INCOSE and other professional organizations</li> </ul>	<ul style="list-style-type: none"> <li>Digital program documents</li> <li>Enterprise owns the ontology and data layer for analytical approaches</li> <li>Libraries of reusable models</li> <li>Pay once for data, reuse everywhere</li> </ul>	<ul style="list-style-type: none"> <li><b>Goal 2: Provide an enduring authoritative source of truth (AST)</b></li> <li><b>Goal 4: Establish a supporting infrastructure and environment</b></li> </ul>
Processes	<ul style="list-style-type: none"> <li>Lexicon, taxonomies, ontologies</li> <li>Paperless system and technical information</li> </ul>	<ul style="list-style-type: none"> <li>Communities: Standards, guides</li> <li>Communicators/ matchmakers</li> <li>Model governance/version control mgmt.</li> <li><b>Better informed Decision makers</b></li> </ul>	<ul style="list-style-type: none"> <li>Digital twin that injects data back into the models</li> <li><b>System data accessible from a single portal</b></li> <li><b>Eliminate human process of finding and using data</b></li> <li><b>Everything needed is on desktop, what's been done before is there to reuse</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Goal 3: Incorporate technical innovations to improve the engineering practice</b></li> <li>opportunities that can be gained from deeper information in the AST</li> <li><b>make the process more efficient and reduce rework</b></li> <li>capture and maintain lessons learned</li> </ul>
People	<ul style="list-style-type: none"> <li>Comfort with technology</li> <li>Usability of DE methods &amp; tools</li> <li>Organizational and cultural resistance</li> <li>Learning systems that adapt to individual abilities</li> </ul>	<ul style="list-style-type: none"> <li>Leadership &amp; messaging</li> <li>Older vs younger workforce</li> <li>Human capital - skills</li> <li>A-Teams &amp; B/C-Teams - performance</li> </ul>	<ul style="list-style-type: none"> <li>Enhance collaboration</li> <li>Humans can focus on creative work and machines can take care of mundane tasks</li> <li>Understand incremental value of all trades, done dynamically</li> </ul>	<ul style="list-style-type: none"> <li><b>Goal 5: Transform Culture and Workforce</b></li> <li>easier to ingest new processes and incorporate acquisition expertise into the tools</li> <li><b>make the B-team and C-team players perform more at the A-Team level</b></li> </ul>



# 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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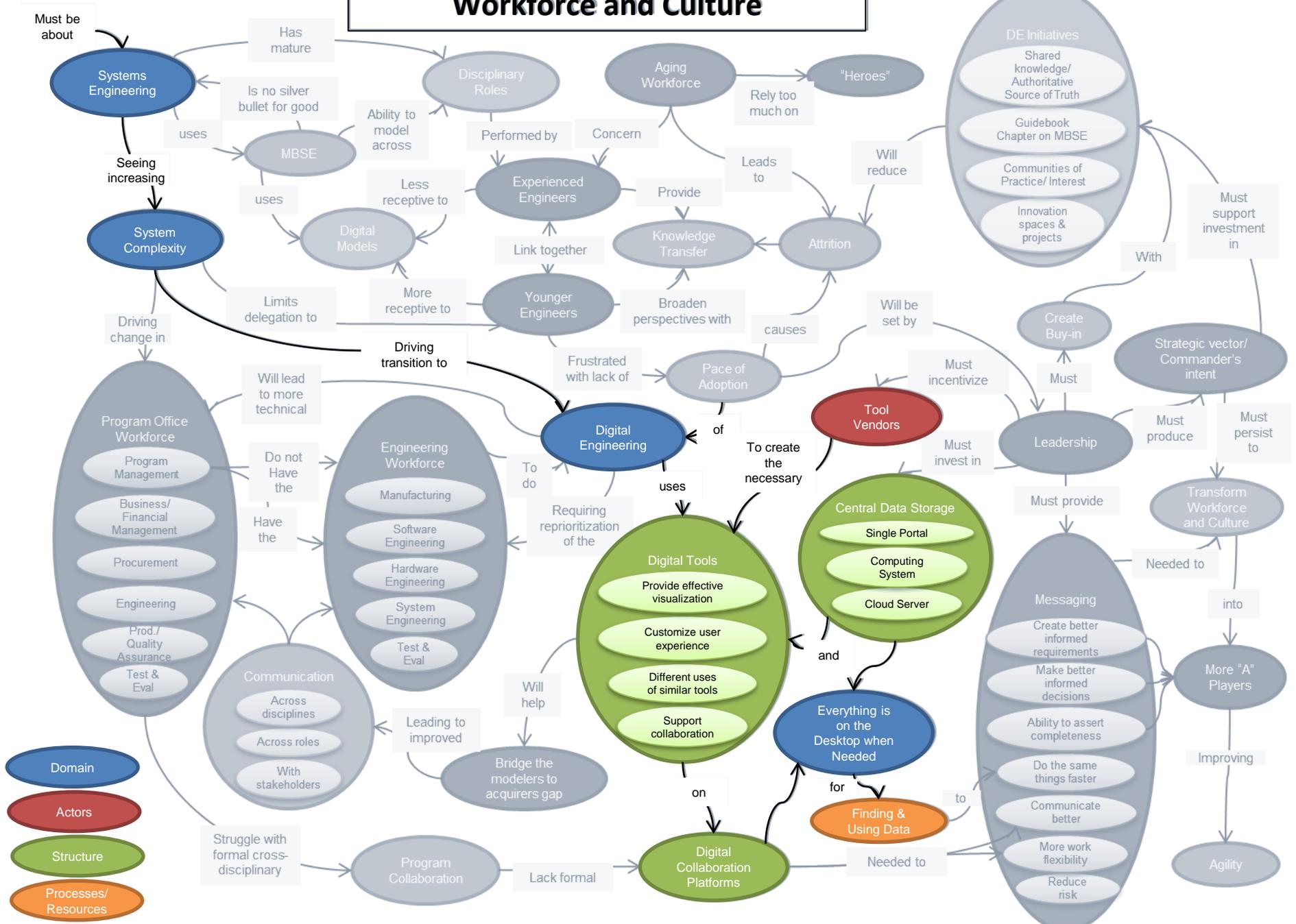






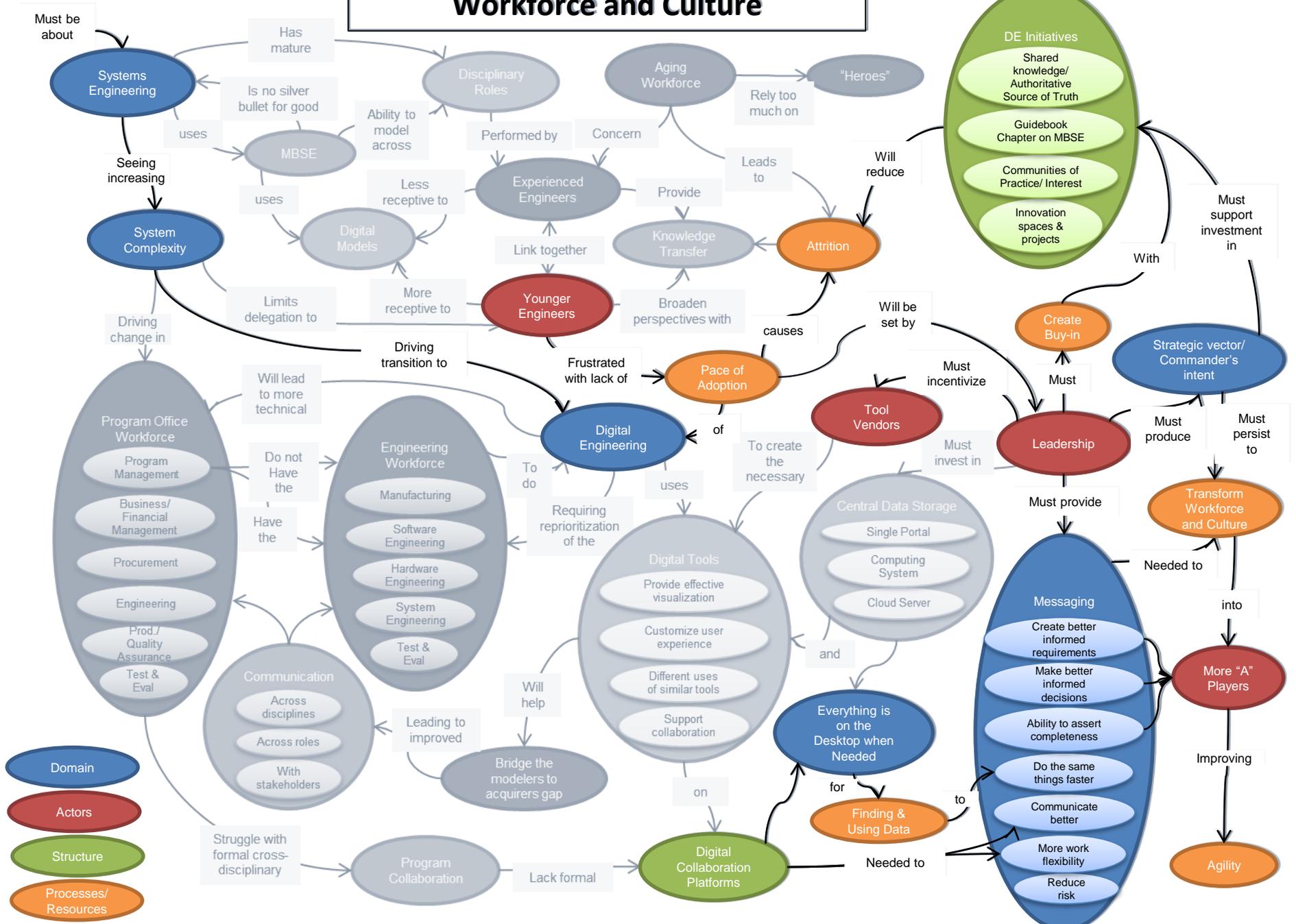


# Workforce and Culture



- Domain
- Actors
- Structure
- Processes/Resources

# Workforce and Culture



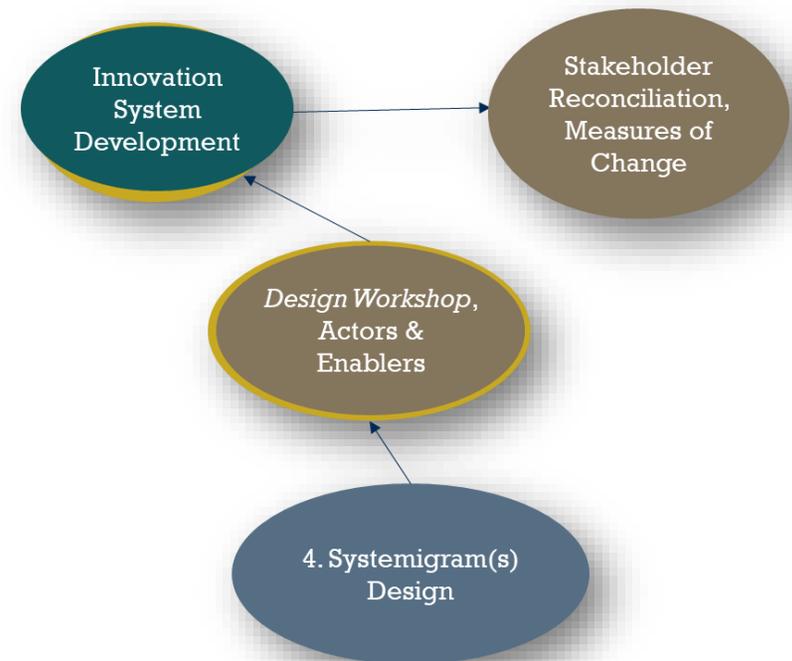
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# Outcomes & Next Steps

- 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!**