



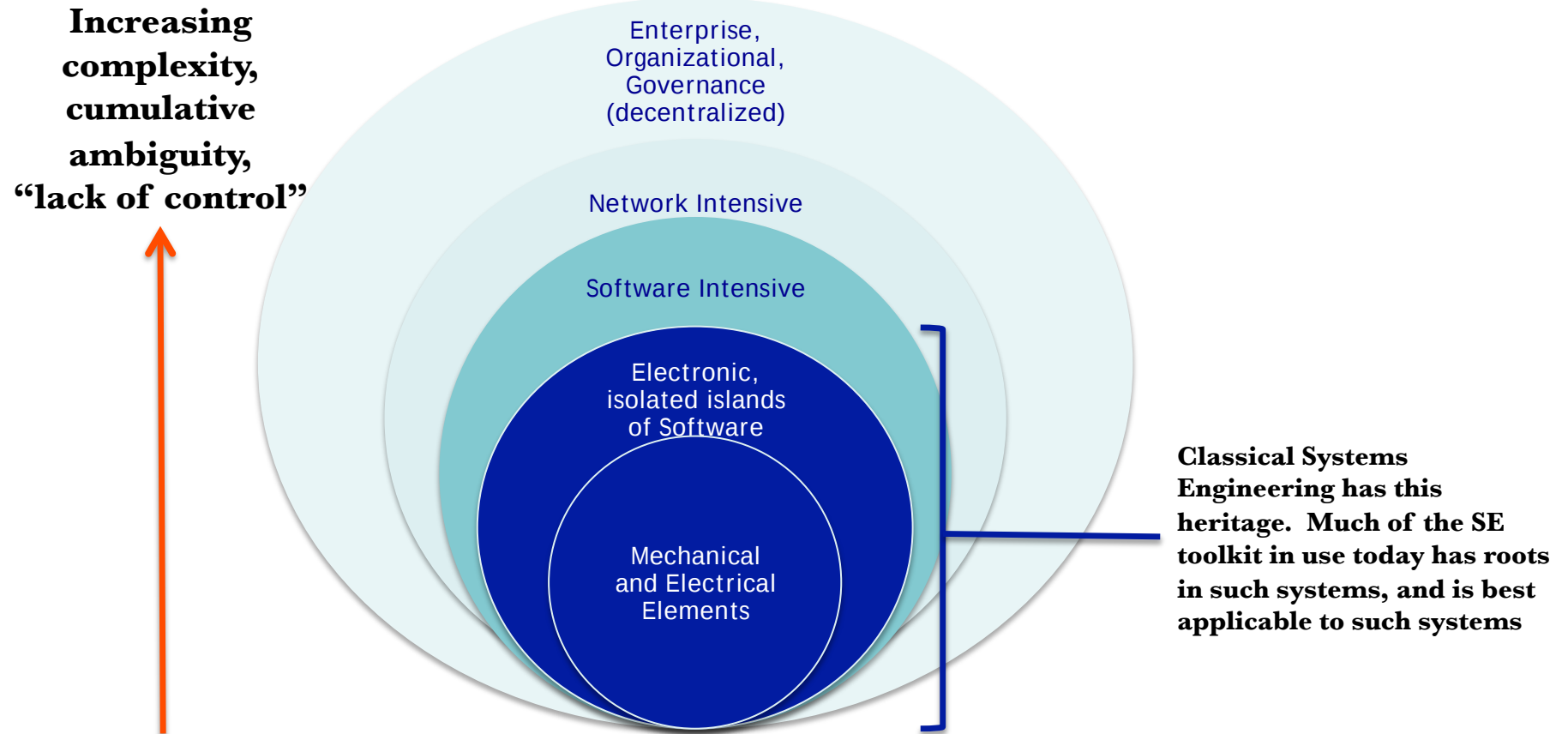
SERC Research Council Panel: The Future of Systems Engineering Research

November 9, 2010

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Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 09 NOV 2010		2. REPORT TYPE		3. DATES COVERED 00-00-2010 to 00-00-2010	
4. TITLE AND SUBTITLE SERC Research Council Panel: The Future of Systems Engineering Research				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Stevens Institute of Technology, Systems Engineering Research Center (SERC), 1 Castle Point on Hudson, Hoboken, NJ, 07030				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES Presented at the 2nd Annual SERC Research Review Conference, 9-10 Nov 2010, College Park, MD. SERC is sponsored by the Department of Defense. U.S. Government or Federal Rights License					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 12	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Complexity & Scope



Accelerating Rates of Change

Threats are adaptive and quickly evolving

Uncertainty in our new environment is demanding a rapid response

Yet we are often constrained by legacy

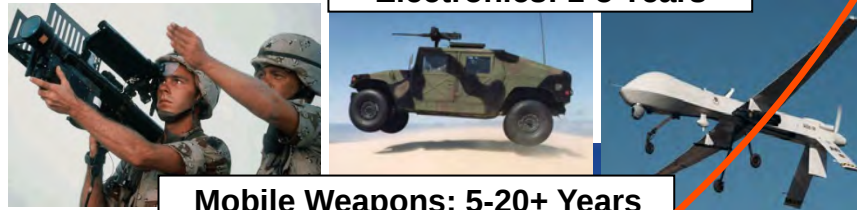
Self-Adaptive: μ s to seconds



IEDs & Software: days to months



Electronics: 1-5 Years



Mobile Weapons: 5-20+ Years



Infrastructure: 10-25+ Years



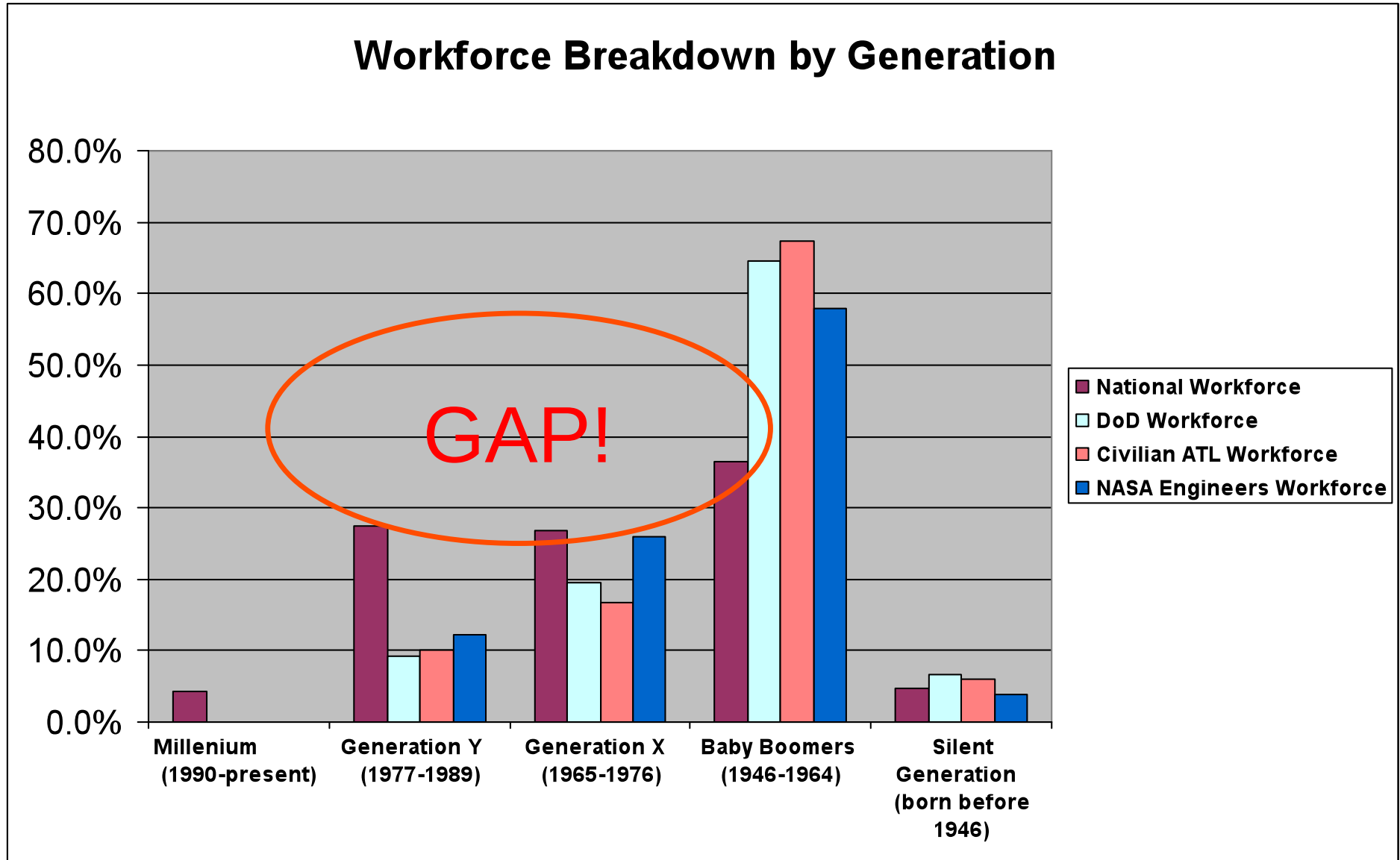
Platforms: 10-50+ Years

Rate of
Change

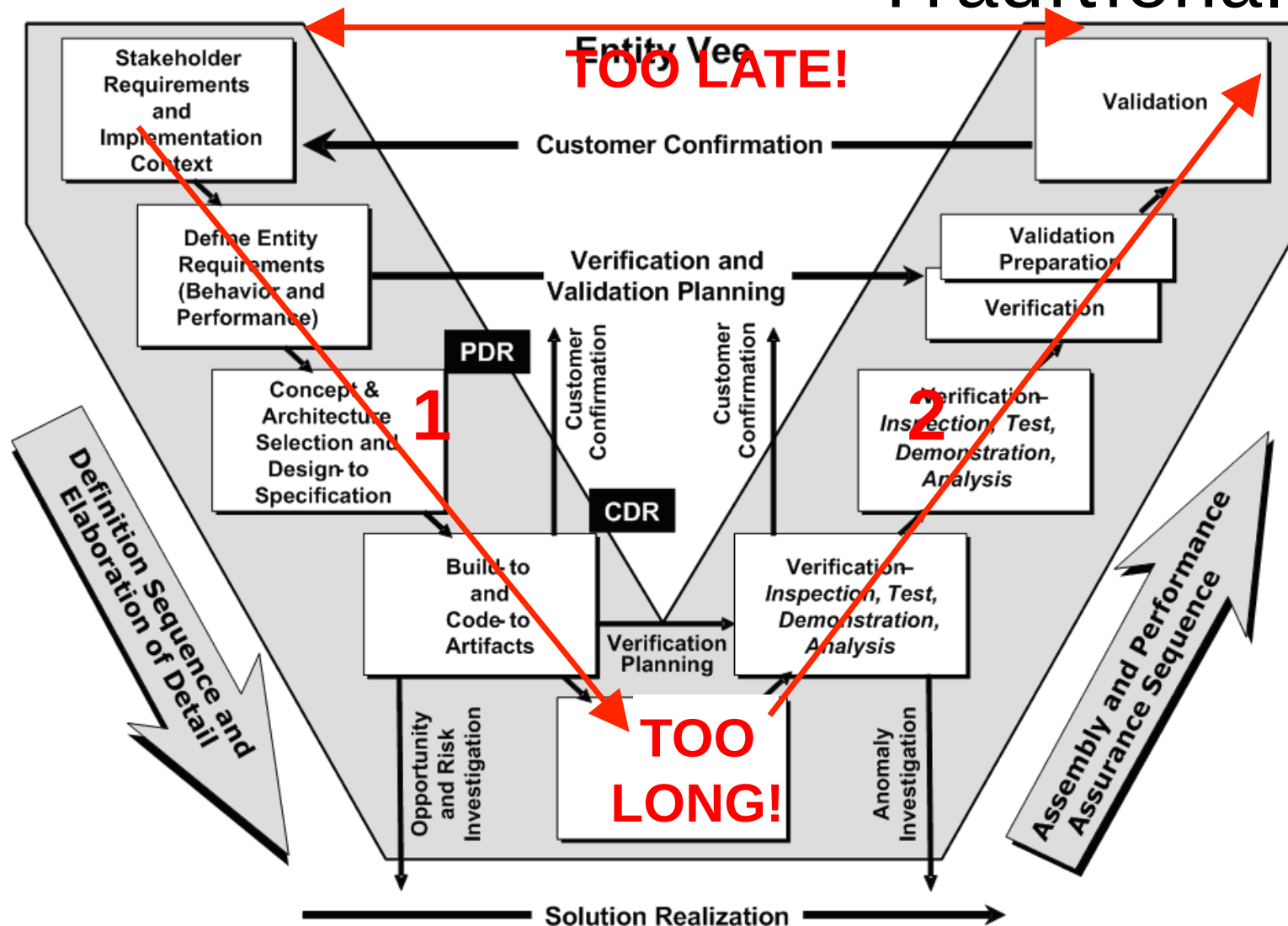
Criticality



Workforce Shortages

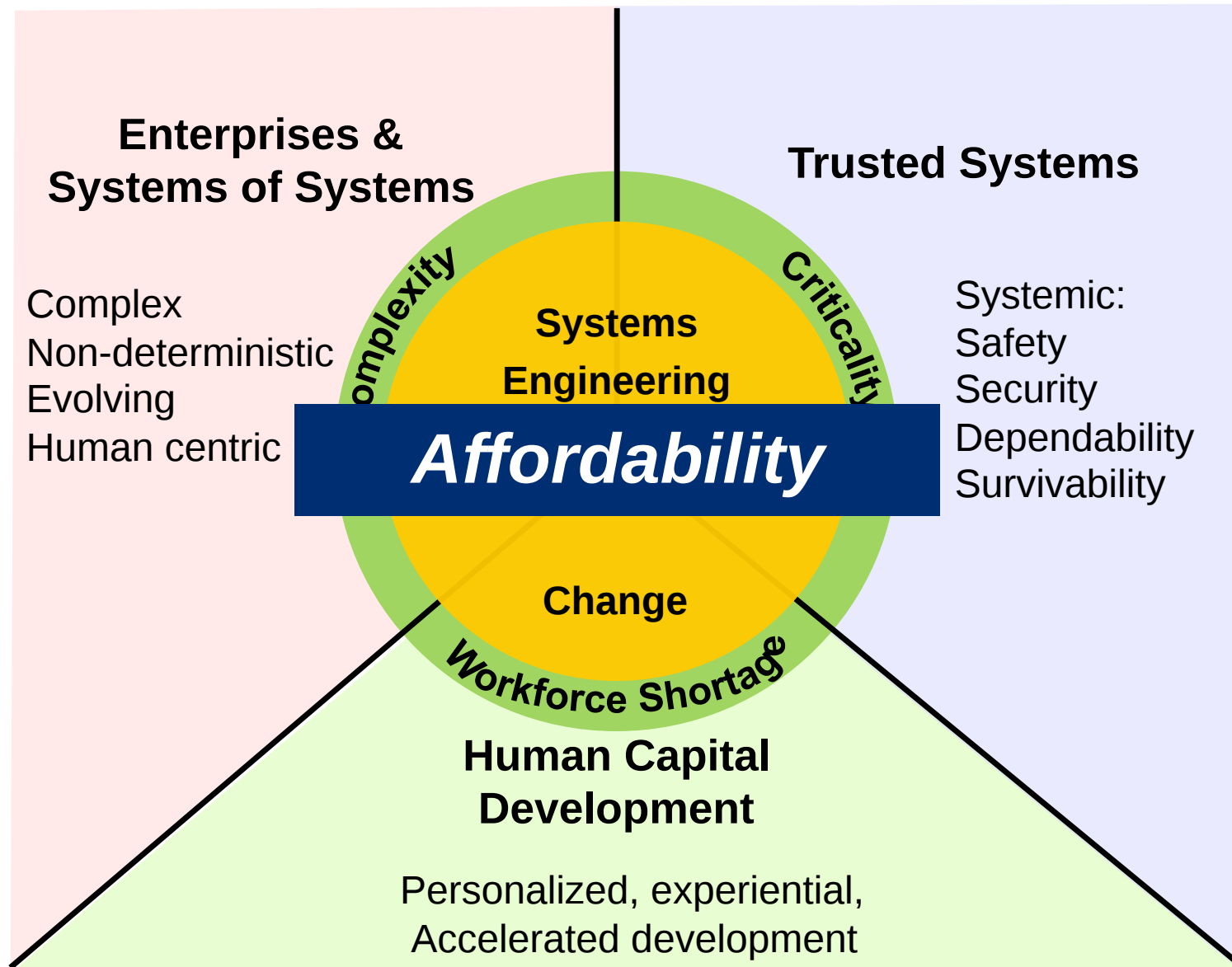


Traditional SE



Source: wpedia.goo.ne.jp/enwiki/Dual_Vee_Model

SE Research Areas



SERC Research Portfolio

SE & Mgmt Transformation

Systems Engineering
Transformation (10)

DoD Systems 2020 (20)

Rapid CONOPS Development
Environment for Agile SE (3)

Integration of Modeling and
Simulation, Software Design,
and DoDAF (24)

Verification, Validation
and Accreditation
using Modeling and
Simulation (21)

Assessing SE
Effectiveness (15)

Evaluating MPTs (9)

Reconfigurable
Architecture for SE
Knowledge (2)

System Maturity
Model & Mgmt
Tools (12)

Valuing Flexibility (18)

Enterprise & SoS

Requirements
Definition for Net-
Centric
Enterprises (25)

FAA NextGen
Governance (28)

Trusted Systems

Security Systems
Engineering (8)

Human Capital Development

SE Development Experience
Accelerator (16)

SE Capabilities within
Universities (STEM) (19)

Develop SE Technical Leaders (4)

SE Body of Knowledge
and Graduate Reference
Curriculum (1)

Research Focus Areas

Enterprise Systems and Systems of Systems:
Addresses the evolving needs of Enterprise scale systems, also known as Systems of Systems. These are complex systems in which the human behavioral aspects are critical and emergent behavior is the norm.

Research Focus Areas

Trusted Systems: Addresses the challenges in conceiving, developing, deploying and sustaining systems that are safe, secure, dependable and survivable. These are all emergent properties for which it is essential that the complete system is considered, once again, including the human element.

Research Focus Areas

Systems Engineering and Management Transformation: Address the challenges of complex systems with rapidly changing requirements and technology, while being deployed into evolving legacy environments. Decision making capabilities to manage these systems are also critical as determining how and when to apply different strategies and approaches. The focus is on the creation of MPTs that leverage the capabilities of computational, visualization, communication and IT technologies to keep systems engineering and management on the curve.

Research Focus Areas

Human Capital Development: Addresses the challenges presented by the retirement of the baby boomer generation, the reduced numbers of US citizens entering the technical workforce and the new systems challenges facing our technical staff. Research is needed to determine the critical knowledge and skills required for our workforces as well as determining the most efficient and effective means by which this can be instilled in our workforce over the their entire career.