SYSTEMS ENGINEERING
Research Center

Defense Acquisition University

Accelerating the Development of Senior Technical Leaders

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With appreciation for the contributions of David Pearson and Dr. John Snoderly of DAU and Dr. Peter Dominick and Prof. William Robinson of Stevens

Agenda

- Technical Leadership Challenge
- Research Hypothesis
- Solution Architecture and Design
- Research Pilots and Results
- Conclusions and Future Plans

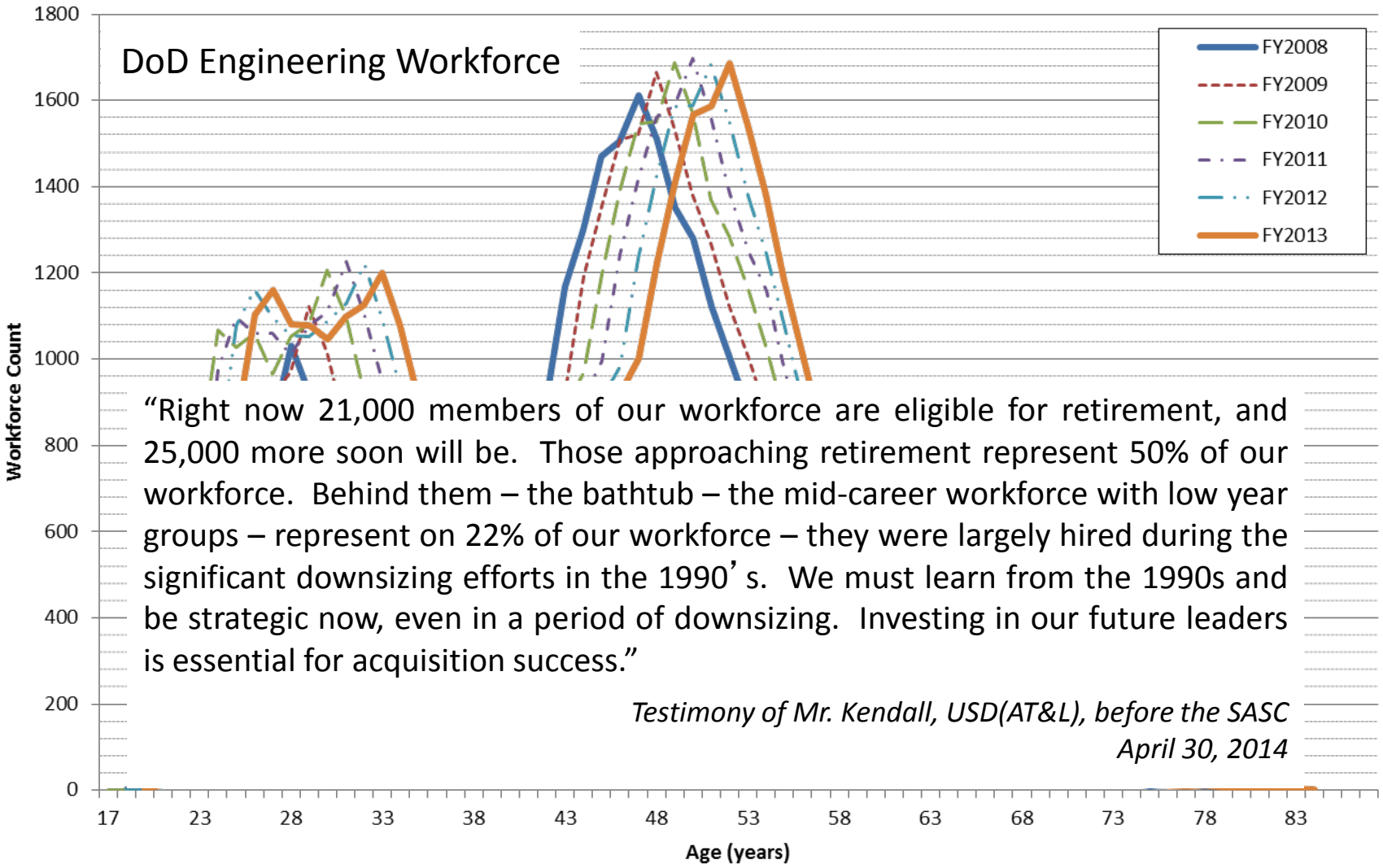
The Complexity Challenge

- "Our workforce must deal with complexity. The problems we solve are not simple—we are entrusted to develop and field some of the most complicated and technically advanced systems in military history**. It is an illusion to believe that defense acquisition success is simply a matter of applying the right, easily learned 'check-list' approach** to doing our jobs. There are no silver bullets that apply to all situations.

- "It is not enough to know acquisition best practices; **acquisition professionals must understand the 'why' behind the best practices**—that is, the underlying principles at play. Many of our products consist of thousands of parts and millions of lines of code. They must satisfy hundreds of requirements, and take several years to bring into production. Managing and understanding complexity is central to our work."

Testimony of Mr. Kendall, USD(AT&L), before the SASC
April 30, 2014

The Demographic Challenge

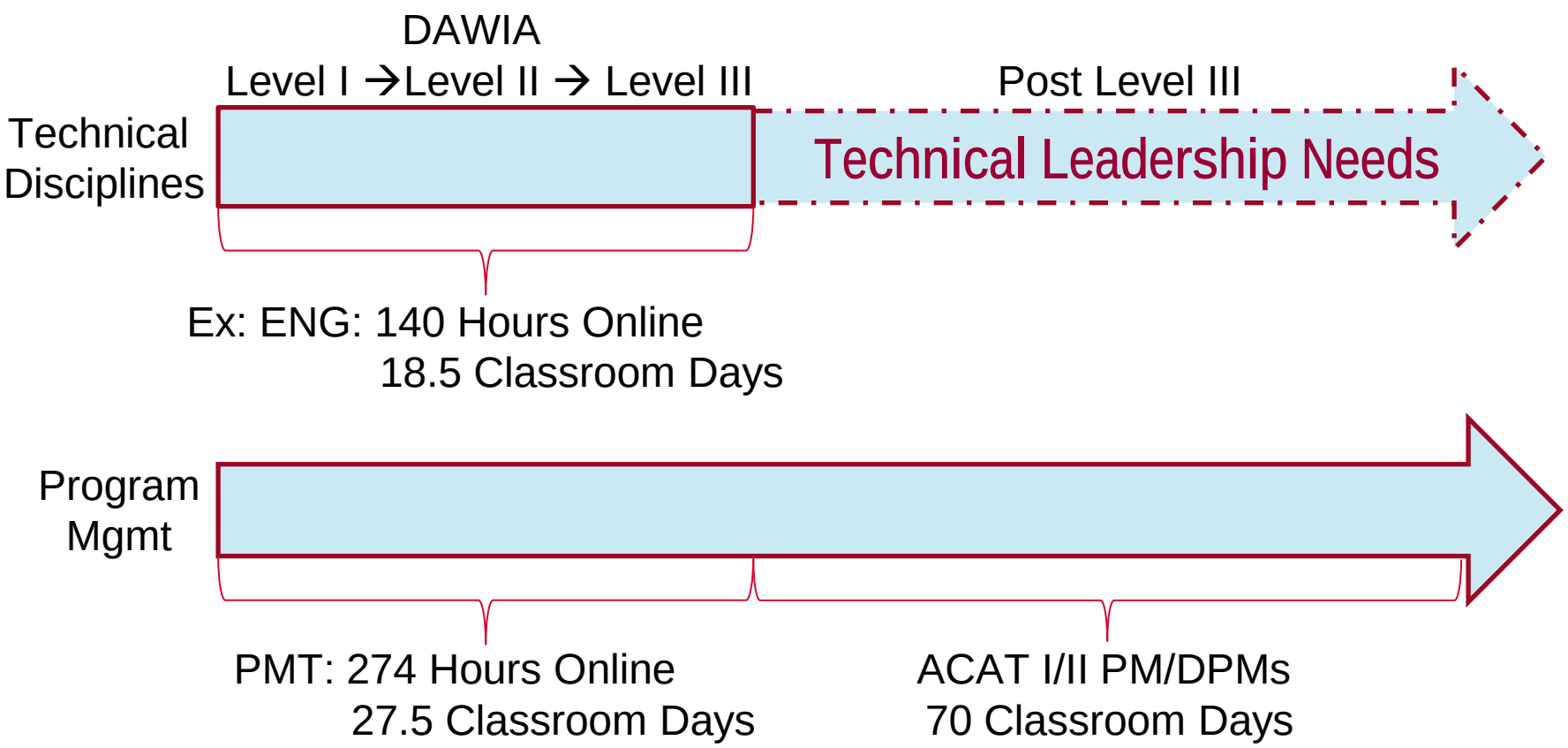


"Right now 21,000 members of our workforce are eligible for retirement, and 25,000 more soon will be. Those approaching retirement represent 50% of our workforce. Behind them – the bathtub – the mid-career workforce with low year groups – represent on 22% of our workforce – they were largely hired during the significant downsizing efforts in the 1990's. We must learn from the 1990s and be strategic now, even in a period of downsizing. Investing in our future leaders is essential for acquisition success."

Testimony of Mr. Kendall, USD(AT&L), before the SASC
April 30, 2014

Source: AT&L Defense Acquisition Workforce Data Mart

DoD Acquisition Training



Senior Technical Training is Less Extensive Than in The Program Management Career Field!!

USD(AT&L) has established a Sense of Urgency

- "I don't believe that the standards for [DAWIA Levels I, II and III] as currently defined or implemented are adequate for the key leader acquisition positions that carry our highest levels of responsibility. We are in the process of creating and implementing higher standards for these positions. That process should conclude within the next year."

Testimony of Mr. Kendall, USD(AT&L), before the SASC
April 30, 2014

- "Today the Department is not doing enough to ensure that technically qualified leaders are available and entrusted with managing our development programs."

Mr. Frank Kendall, Better Buying Power 3.0
September 19, 2014

SERC Research Hypothesis

The technical leadership capabilities of high potential, senior DoD systems engineers and technologists can be accelerated through an educational program in technical leadership.

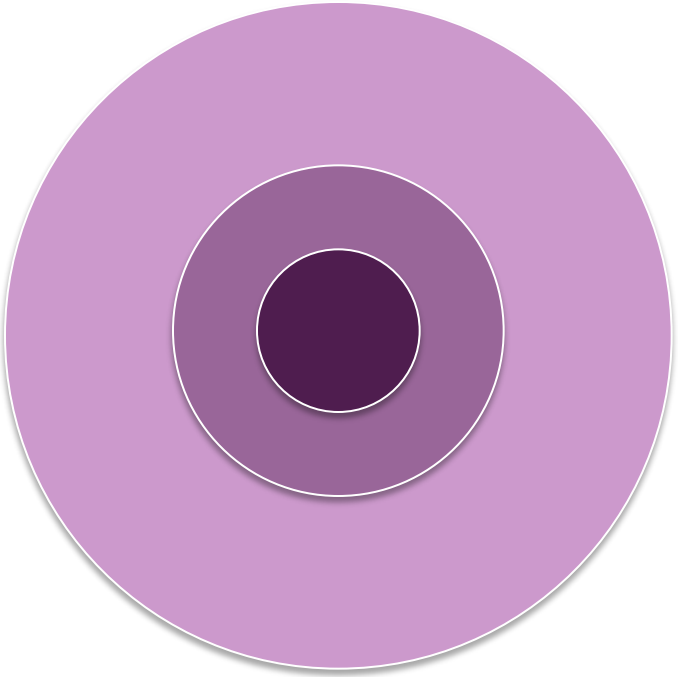
SERC Research Task 4

Objectives

Utilizing the industrial, academic and government leadership experience of the SERC collaborators:

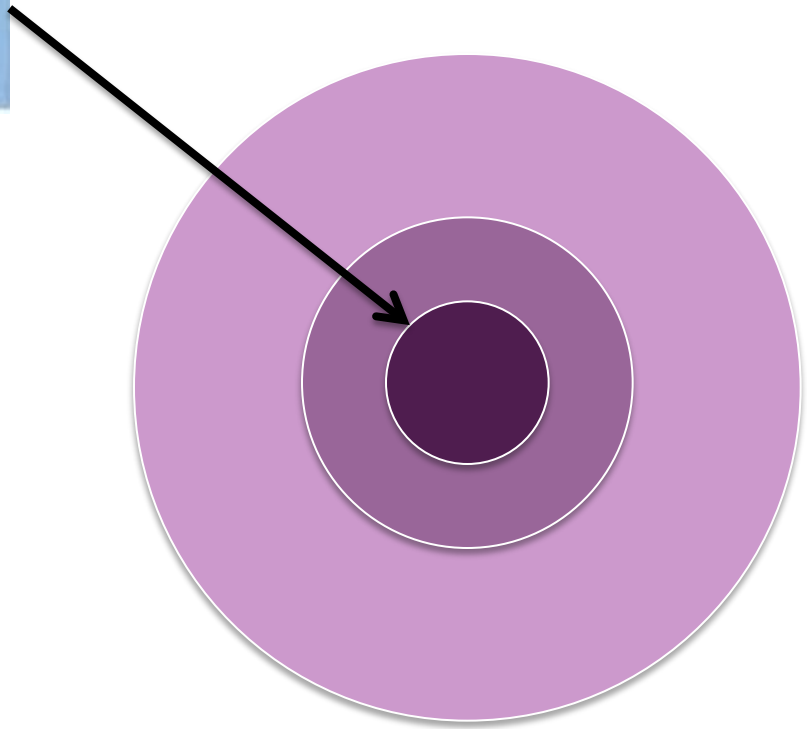
- Research state-of-the-art and best practices in technical leadership education
- Develop a technical leadership program that might serve as a capstone element to DAU's engineering courses
- Test the research hypothesis through a series of pilot courses delivered to government systems engineers, program managers, supporting functional specialists and DAU faculty

Program Architecture
Three Concentric Lenses



Program Architecture
Three Concentric Lenses

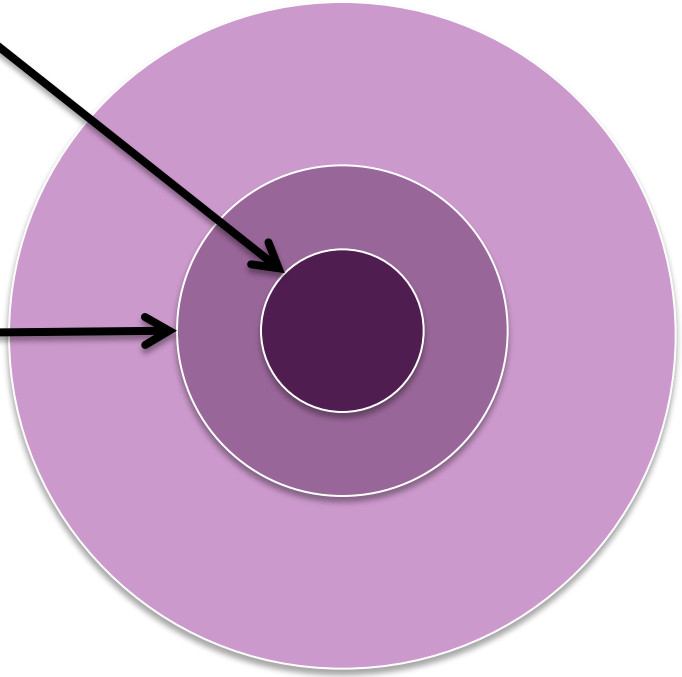
The Car



Program Architecture
Three Concentric Lenses

The Car

The Wheel



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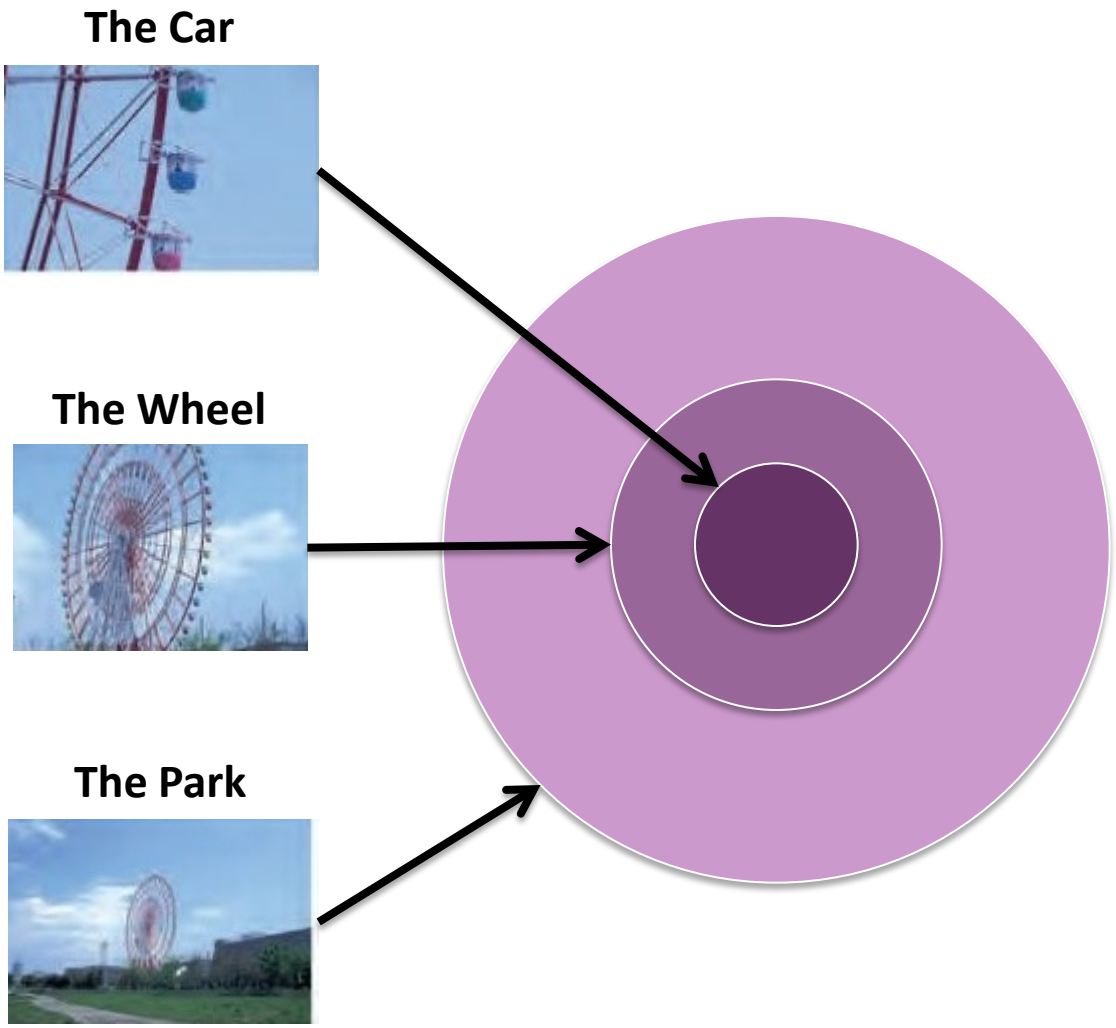
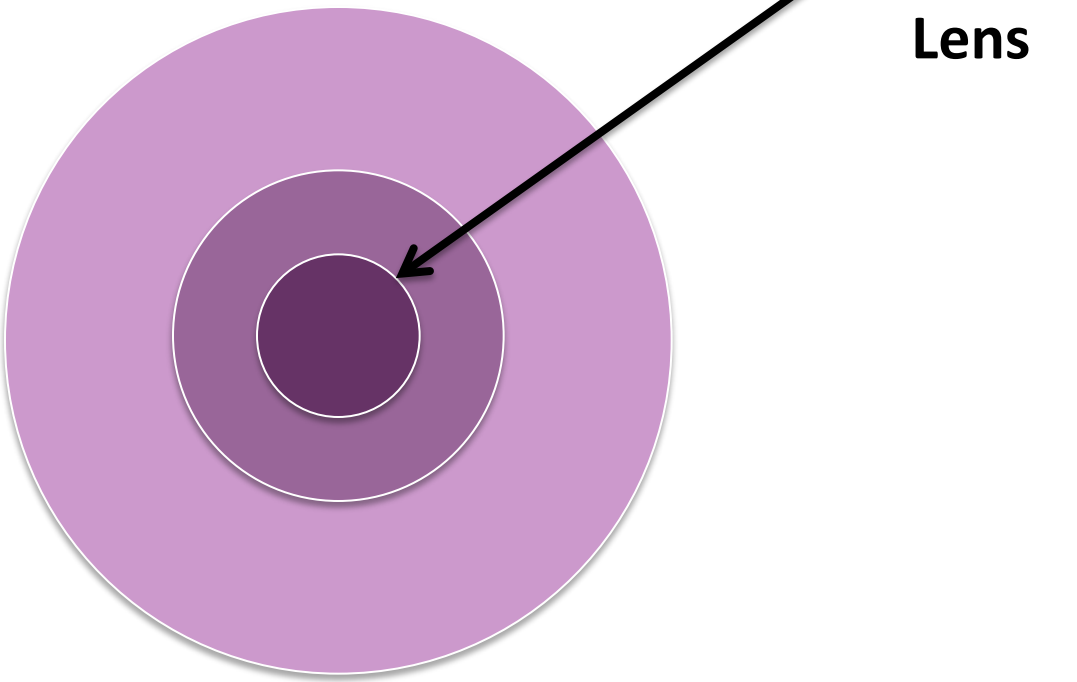


Program Architecture
Three Concentric Lenses

The Car

The Wheel

The Park



Program Architecture
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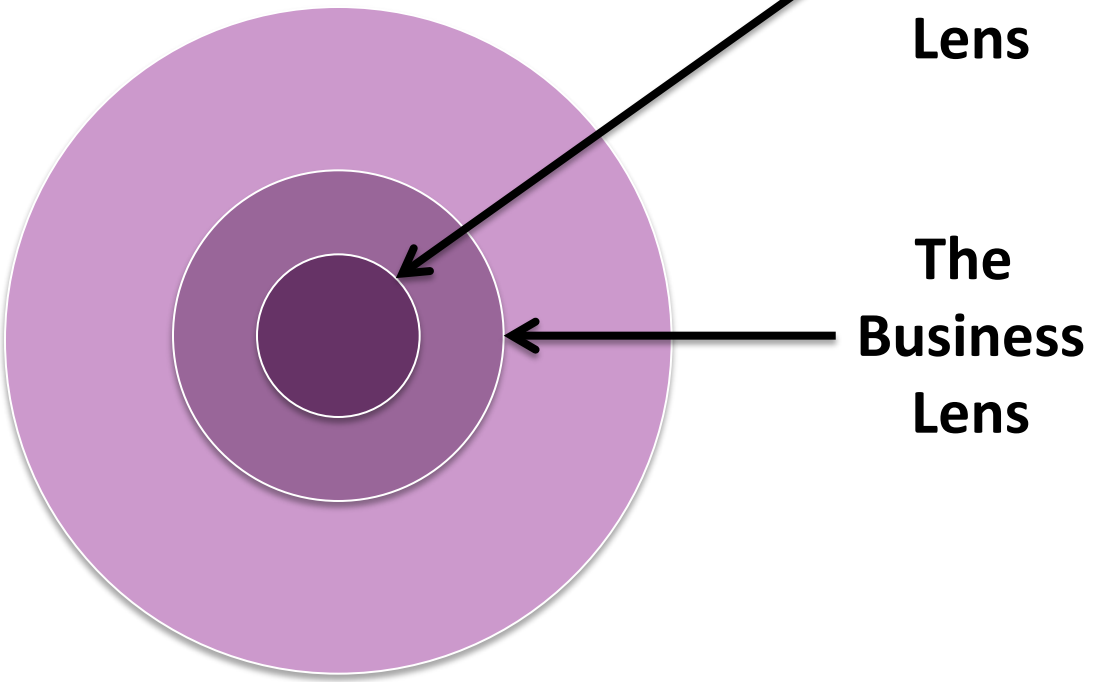
The Car

The Wheel

The Park



Program Architecture
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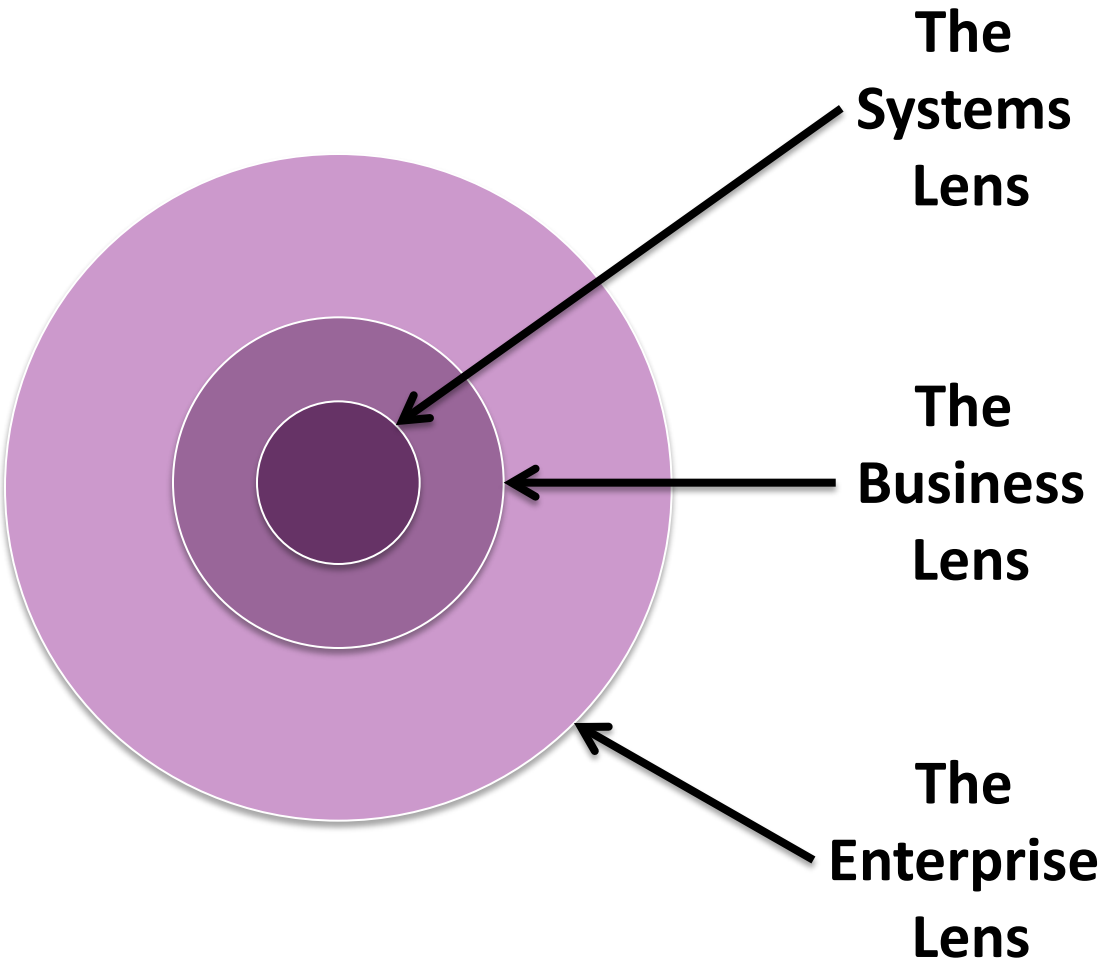
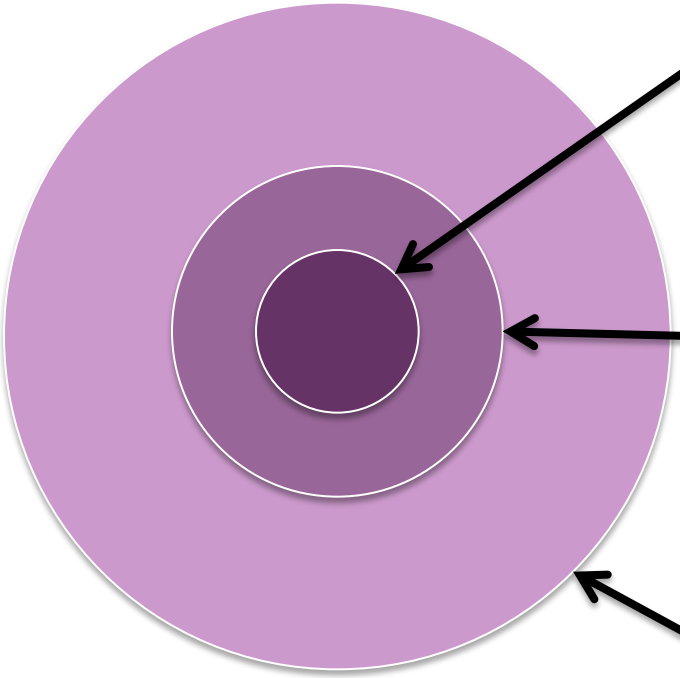


Program Architecture
Three Concentric Lenses

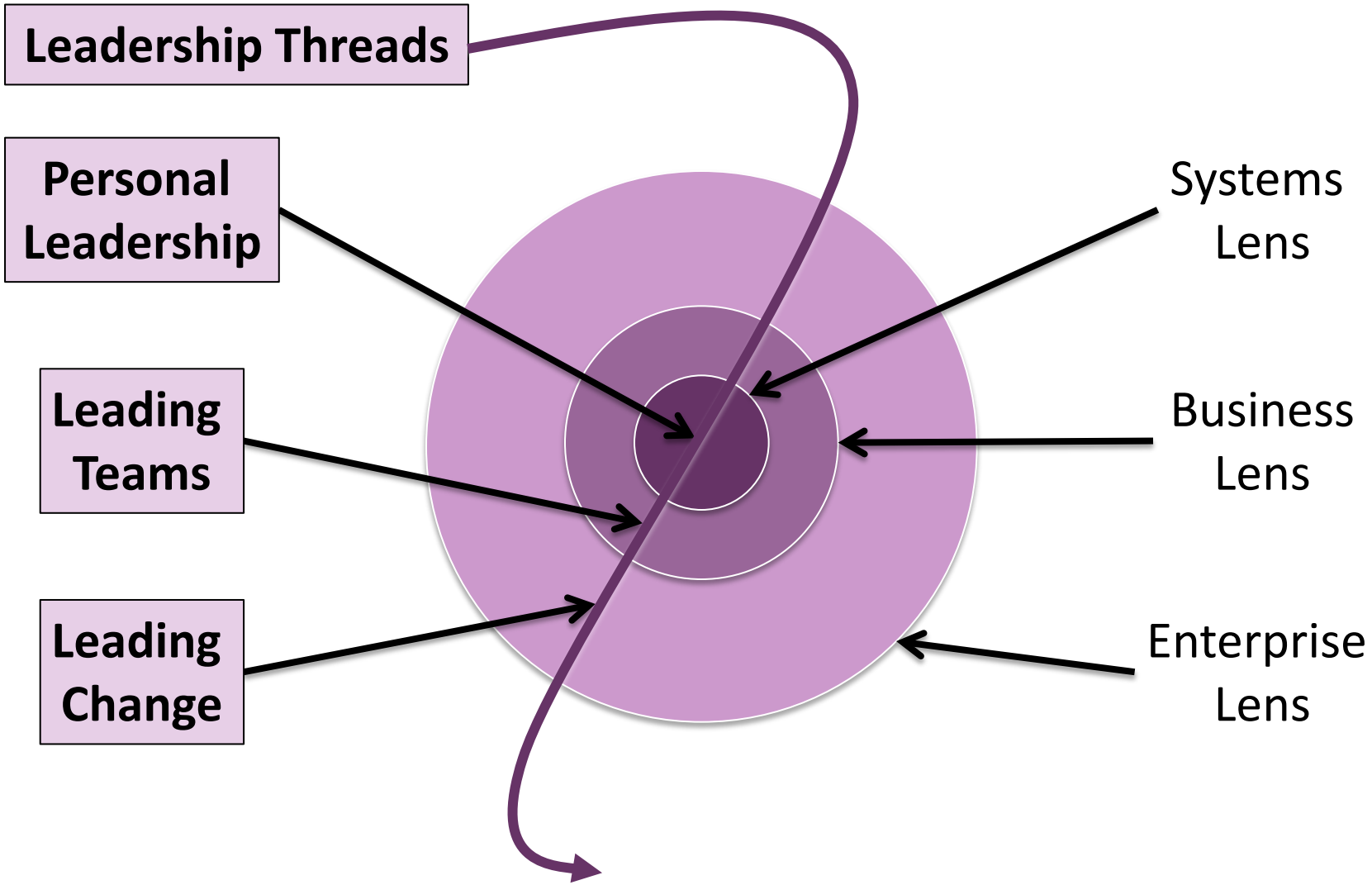


SYS 350A The Systems Lens
- Focuses on the technical product, system or system of systems
- Emphasizes the technical challenges faced by a Systems Engineering Lead

SYS 350B The Business Lens
- Focuses on the complete development project
- Emphasizes the challenges faced by an Integrated Product Team Lead

SYS 350C The Enterprise Lens
- Focuses on understanding the entire enterprise
- Emphasizes the challenges faced by a Chief Engineer

Program Architecture
Three Concentric Lenses + Threads



The Technical Leadership Program Triptych

	Systems Lens	Business Lens	Enterprise Lens
Focus	System Development	Program Disruption	Organizational Evolution
Metaphor	Win the Battle	Win the War	Preserve the Union
Image	Colonel Chamberlain	General Grant	President Lincoln
Context	Static; Fixed	Dynamic; Changing	Emergent; Adaptive
Embedded Thread	Personal Leadership	Leading Teams	Leading Change

Design Principles

- Leadership is best learned through experience and engagement, not lectures and instruction
- Experienced leaders can be counted on to “connect the dots” between disparate topics without a linear script to guide them
- Leadership threads should be interleaved with technical modules to emphasize that leadership is not a separate topic, it’s simply how leaders do their jobs
- An extended group simulation project can be used to provide a consistent story arc throughout each course

Systems Lens Curriculum

- **Technical Modules**
  - Applying **Systems Thinking** to decisions about what to build and why
  - **Agile Methods** for dealing with uncertain, changing and evolving requirements
  - Determining root causes for **Project Failures** and taking action to prevent them
  - **Managing Complexity** in large scale, multi-stakeholder projects
- **Leadership Threads**
  - The importance of **Self-Awareness** and how we can develop it as leaders
  - Techniques for leading others in **Creative Problem Solving**
  - Understanding our **Core Values** and the role they play in personal leadership
  - Formulating plans for our **Ongoing Development** as technical leaders
- **Group Project**
  - Teams review a troubled **Competitive Acquisition Project** from the customer perspective at key milestones and must decide what to do next and why

Business Lens Curriculum

- **Technical Modules**
  - What is meant by **Value Propositions** and how they differ for the government and different types of contractors that may be involved in a typical project
  - The role that **Strategy and Finance** play in framing corporate decision making
  - The speed at which **Technology** evolves and how this impacts acquisition timelines
- **Leadership Threads**
  - **Personal Value Propositions** as a measure of the value we create as leaders
  - Different **Personal Styles** and how they influence **Interpersonal Communications**
  - The role of intuitive and reasoned judgment in **Decision Making Under Uncertainty**
  - How leaders can enhance their ability to **Influence Without Authority**
- **Group Project**
  - Organized as IPTs, project teams must respond to a series of strategic, financial and technologically **Disruptive Events** that arise during the life of a development project

Enterprise Lens Curriculum

- **Technical Modules**
  - Mapping the **Defense Acquisition Enterprise** and understanding its complexity
  - Deploying **Disruptive Initiatives** as a means for inducing enterprise-level change
  - Using **Storytelling** to engage people's emotions for more effective communications
- **Leadership Threads**
  - Using **Improvisation** to support risk-taking and unlock people's creative potential
  - Assessing **Organization Culture** and building **Capacity for Change**
  - **Collaborating Across Boundaries** to effect enterprise-wide change
  - **Developing Leadership** in ourselves and others
- **Group Project**
  - Teams **Invent an Ideal Future** for the defense acquisition enterprise, work backwards from that future to **Design a Plan** for achieving it and **Formulate a Proposal** to OSD that they present succinctly in the form of a **Visual Metaphor**

Technical Leadership Pilots

	FY 11	FY 12	FY 13	FY 14
Systems Lens	DAU Capital	APG - MD DAU South		
Business Lens		DAU Capital (2X)		DAU Capital
Enterprise Lens			DAU Ft. Belvoir (2X)	DAU Capital

- Conducted nine 5-day technical leadership pilots over 4 years
- Developed and tested more than 100 lecture, case study, exercise and group project segments
- Delivered more than 5200 student-contact-hours
- Obtained valuable feedback from participants with the Army, Navy, Air Force, Marine Corps, Missile Defense Agency and Defense Acquisition University

DoD Participant Feedback

- All but one of the fifty-one **Systems Lens** participants in the final pilots agreed that the course was excellent; two-thirds of them strongly agreed
- All twenty-one of the **Business Lens** participants in the final pilot said the course was personally beneficial; seventeen of them said it was very beneficial; all of them said it would be very beneficial for the targeted students, some of whom would have less experience than the pilot participants
- All sixteen participants in the final **Enterprise Lens pilot** agreed that the course should be offered again

Instructor Observations

- Perhaps as important as the participants' feedback were observations of their leadership behaviors made by the instructors throughout the program:
  - —Participants were frequently observed connecting different topics to draw conclusions not explicitly present in the course material
  - —They were able to translate their insights into meaningful actions that they could take to foster needed change, not in some ideal future, but in the present, in spite of the constraints imposed by current policies and processes
  - —Further, when participants were asked at the beginning of the Enterprise Lens whether they had taken such actions as the result of the earlier courses, several impressive examples were provided

Conclusions and Future Plans

- All three of the technical leadership courses received strong endorsements from the acquisition community participants
- While fully validating the research hypothesis will obviously require more time and more evidence than can be obtained from a small number of pilots, the results of the research are very encouraging
- On the basis of the successful the pilots, all three courses are judged to be suitable for transition to DAU/DSMC at this time
- The Systems Lens will be transitioned during Spring 2015 under SERC Research Task 129
- An option to transition the Business and Enterprises Lenses under RT-129 over the remainder of FY 15 is awaiting additional funding

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