



SYSTEMS ENGINEERING
Research Center

Technical Leadership Development Program

Final Technical Report SERC-2014-TR-013-5

30 April 2014

Principal Investigator: Dr. Valentin Gavito - Stevens Institute of Technology

Co-Principal Investigators

Dr. Pamela Burke, Stevens Institute of Technology

Dr. Val Gavito, Stevens Institute of Technology

Dr. Michael Pennotti, Stevens Institute of Technology

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 30 APR 2014		2. REPORT TYPE Final		3. DATES COVERED	
4. TITLE AND SUBTITLE Technical Leadership Development Program			5a. CONTRACT NUMBER H98230-08-D-0171		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S) Gavito /Dr. Valentin			5d. PROJECT NUMBER RT 4-5		
			5e. TASK NUMBER TO 009		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Stevens Institute of Technology			8. PERFORMING ORGANIZATION REPORT NUMBER SERC-2014-TR-013-5		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) DASD (SE), DAU			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					
14. ABSTRACT This report summarizes the research findings, conclusions, and recommendations for the SERC Research Task 4 Year 4 (RT4 Y4) which addressed the observed short-comings of previous SYS 350B Business Lens and SYS 350C Enterprise Lens Technical Leadership pilot courses conducted in FY12 with both DAU faculty and government systems engineers. The research a) leveraged the content development lessons learned during the SYS 350A Systems Lens pilots, b) refined and enhanced the integration of the SYS 350B and SYS 350C syllabi, c) conducted highly successful SYS 350B and SYS 350C student pilots in December, 2013 and March, 2014 respectfully, and d) concluded with recommended pilot course refinements. When updated with recommended post-pilot additions and deletions, SYS 350B and SYS 350C will be ready for pilot reevaluations and subsequent transition to the DAU.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 43	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Copyright © 2014 Stevens Institute of Technology, Systems Engineering Research Center

This material is based upon work supported, in whole or in part, by the U.S. Department of Defense through the Systems Engineering Research Center (SERC) under Contract H98230-08-D-0171 (Task Order 009, RT 04). SERC is a federally funded University Affiliated Research Center managed by Stevens Institute of Technology

Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the United States Department of Defense.

NO WARRANTY

THIS STEVENS INSTITUTE OF TECHNOLOGY AND SYSTEMS ENGINEERING RESEARCH CENTER MATERIAL IS FURNISHED ON AN "AS-IS" BASIS. STEVENS INSTITUTE OF TECHNOLOGY MAKES NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, AS TO ANY MATTER INCLUDING, BUT NOT LIMITED TO, WARRANTY OF FITNESS FOR PURPOSE OR MERCHANTABILITY, EXCLUSIVITY, OR RESULTS OBTAINED FROM USE OF THE MATERIAL. STEVENS INSTITUTE OF TECHNOLOGY DOES NOT MAKE ANY WARRANTY OF ANY KIND WITH RESPECT TO FREEDOM FROM PATENT, TRADEMARK, OR COPYRIGHT INFRINGEMENT.

This material has been approved for public release and unlimited distribution.

ABSTRACT

This report summarizes the research findings, conclusions, and recommendations for the SERC Research Task 4 Year 4 (RT4 Y4) which addressed the observed short-comings of previous SYS 350B Business Lens and SYS 350C Enterprise Lens Technical Leadership pilot courses conducted in FY12 with both DAU faculty and government systems engineers. The research a) leveraged the content development lessons learned during the SYS 350A Systems Lens pilots, b) refined and enhanced the integration of the SYS 350B and SYS 350C syllabi, c) conducted highly successful SYS 350B and SYS 350C student pilots in December, 2013 and March, 2014 respectfully, and d) concluded with recommended pilot course refinements. When updated with recommended post-pilot additions and deletions, SYS 350B and SYS 350C will be ready for pilot reevaluations and subsequent transition to the DAU.

TABLE OF CONTENTS

Abstract.....	ii
Table of Contents.....	iii
Figures and Tables	iv
1 Executive Summary	1
2 Background.....	2
2.1 RT4 Y1/2/3 Overview, Findings, & Conclusions.....	2
2.2 RT4 Y4 Research Objectives	7
2.3 RT4 Y4 Program Plan	7
3 350B Refinement.....	8
3.1 Baseline 350B Pilot, Conclusions, & Recommendations	8
3.2 350B Refinement Approach	9
3.3 Refined 350B Pilot Architecture & Syllabus	12
3.4 Refined 350B Group Project Overview	15
3.5 Refined 350B Pilot Conduct, Findings & Conclusions.....	17
4 350C Refinement.....	20
4.1 Baseline 350C Pilot, Conclusions, & Recommendations	20
4.2 350C Refinement Approach	22
4.3 Refined 350C Pilot Architecture & Syllabus	24
4.4 Refined 350C Group Project Overview	28
4.5 Refined 350C Pilot Conduct, Findings & Conclusions.....	29
5 Findings, Conclusions & Recommendations.....	33
6 Appendices	35
Appendix 6.0 SYS 350B Competencies vs Segments.....	35
Appendix 6.1 SYS 350C Competencies vs Segments.....	35
Appendix 6.2 SYS 350 Alignment with USD Memo	36
Appendix 6.3 References.....	37
Glossary.....	38

FIGURES AND TABLES

Figure 2.10: RT-4 Y1-Y3 SYS 350 Series Pilots.....	3
Figure 2.11: SYS 350A Triangle Architecture	5
Figure 2.12: SYS 350A Syllabus.....	6
Figure 2.30: RT4 Year 4 Program Plan	7
Figure 3.10: SYS 350B Baseline Syllabus	8
Figure 3.20: SYS 350B Refinement Assumptions	10
Figure 3.22A: SYS 350B Technical Performance Outcome & Learning Objectives	10
Figure 3.22B: SYS 350B Technical Performance Outcome & Learning Objectives.....	11
Figure 3.23: SYS 350B Leadership Thread Performance Outcome & Learning Objectives.....	12
Figure 3.31: SYS 350B Triangle Architecture	13
Figure 3.32: SYS 350B Refined Syllabus	13
Figure 3.40: SYS 350B Group Project Overview.....	16
Figure 3.42: SYS 350B Disruptive Event Framework	16
Figure 3.50: SYS 350B Student Pilot Cohort Demographics.....	17
Figure 3.51: SYS 350B Student Pilot Feedback (DAU Survey)	18
Figure 3.52: SYS 350B Student Pilot Feedback (Keeps)	19
Figure 3.53: SYS 350B Student Pilot Feedback (Adds).....	19
Figure 3.54: SYS 350B Student Pilot Feedback (Deletes).....	20
Figure 4.10: SYS 350C Baseline Syllabus	21
Figure 4.20: SYS 350C Refinement Assumptions	23
Figure 4.21: SYS 350B to SYS 350C Curriculum Roadmap Framework	23
Figure 4.22: SYS 350C Technical Performance Outcome & Learning Objectives.....	24
Figure 4.23: SYS 350C Leadership Thread Performance Outcome & Learning Objectives.....	24
Figure 4.31: SYS 350C Triangle Architecture	25
Figure 4.32: SYS 350C Refined Syllabus	25
Figure 4.50: SYS 350C Student Pilot Cohort Demographics.....	29
Figure 4.51: Condensed SYS 350C Student Pilot.....	30
Figure 4.53: SYS 350C Student Pilot Feedback (Keeps)	31
Figure 4.54: SYS 350C Student Pilot Feedback (Adds).....	32
Figure 4.55: SYS 350C Student Pilot Feedback (Deletes).....	32
Figure 5.10: SYS 350 Curriculum Roadmap Framework	33

1 EXECUTIVE SUMMARY

The objective of the Systems Engineering Research Center (SERC) Research Task 4 (RT-4) Systems Engineering Technical Leadership is to explore ways in which education might support the acceleration of the technical leadership capabilities of senior DoD systems engineers and technologists. The task required defining the required capabilities, researching candidate curricula architectures, developing a series of pilot courses, and testing the pilots with government systems engineers, program managers, supporting functional specialists and DAU faculty.

During the first three years of the task, technical leadership capabilities were defined and an educational program architecture was developed that comprised three one-week courses, organized as nested “lenses,” through which technical leadership can be viewed: a Systems Lens, a Business Lens and an Enterprise Lens. DAU designated the overall program SYS 350 and the three courses as SYS 350A, B and C, respectively. Pilot courses were developed for each of the three lenses and seven pilots were conducted, three for 350A and two each for 350B and C. At the conclusion of the first three years of the task, based on feedback from students and DAU faculty, it was recommended and accepted by DAU that the SYS 350A approach and its associated course material were ready to be transitioned to DAU. SYS 350B and C were judged not yet suitable for DAU transition, however, and further refinement and additional pilots were recommended for each. SYS 350B/C refinement and pilot retests were the objectives of the fourth year of the task and are the subjects of this report.

The first step in the refinement process was to identify factors that were important to the success of 350A but were not part of 350B/C. In particular, 350A was more highly focused on the defense industry than the other two courses and it made use of an extended, team-based simulation project to create an integrated story arc throughout the course. These attributes were incorporated into the refined B and C courses. At the same time, 350B/C baseline pilot artifacts deemed to have been valuable, including specific topics, more class time dedicated to exercises and team engagement than to lectures and instruction, and the interleaving of technical topics and leadership threads, were retained. In addition, the refined SYS 350B/C pilot courses were more tightly integrated and topical overlaps between them removed to create a more cohesive and integrated overall 350 series.

The refined SYS 350B/C courses were then tested in pilot classes delivered to senior leaders from across the DoD, 350B in December 2013 and 350C in March 2014. Both pilots were judged to have been highly successful by both participants and the DAU sponsor. All 21 participants in the 350B pilot rated the course “personally beneficial,” 17 them “very beneficial,” and all of them rated it “very beneficial for the targeted students.” All expressed an interest in returning for the 350C pilot, and all but two who encountered scheduling conflicts, did so. In a simpler survey at the conclusion of the 350C pilot, all 16 respondents answered, “Yes” to the question, “Should DAU offer this course again?”

Beyond the student feedback, additional validation of the courses was provided by observations of participants’ responses. They were frequently observed demonstrating key leadership behaviors, such as connecting different topics to draw conclusions not present in the course material, expanding the aperture for problems that were presented, and translating their insights into meaningful actions, not only to be taken in some ideal future, but that they themselves could take in the present to foster needed change. Further, when asked at the beginning of 350C whether they had taken such actions since the 350B pilot, several provided impressive examples. While fully validating the hypothesis that an educational program can accelerate the development of technical leaders clearly requires more time and evidence, these early results are certainly encouraging.

2 BACKGROUND

2.1 RT4 Y1/2/3 OVERVIEW, FINDINGS, & CONCLUSIONS

RT-4 Year 1: In FY09, DAU contracted with the Systems Engineering Research Center (SERC) to evaluate the hypothesis that the technical leadership capabilities of high potential, senior DoD systems engineers and technologists could be accelerated through an educational program in technical leadership. The research task, designated as RT-4 (Systems Engineering Technical Leadership) included research of state-of-the-art and best practices associated with technical leadership education and then, along with the industrial, academic, and government leadership experience of SERC collaborators, development of a technical leadership program as a capstone element to DAU engineering courses. The hypothesis would then be evaluated through a series of pilot courses attended by Defense Acquisition University (DAU) faculty and DoD systems engineering professionals.

The RT-4 research team collected data from government, industry, and academia and developed technical leadership curriculum architecture to frame the ensuing pilot course research and development. The architecture views technical leadership through three apertures or lenses that represent the expanding responsibilities of an engineering leader, from developing systems as a project technical lead (Systems Lens), to the programmatic challenges of an IPT lead (Business Lens), to the responsibilities of a technical executive (Enterprise Lens). These three nested lenses framed the subsequent curriculum research. The RT-4 SE technical leadership course architecture was designated as SYS 350 by the DAU, who further established that the SYS 350 course would comprise a series of three 5-day modules designated as SYS 350A (Systems Lens), SYS 350B (Business Lens), and SYS 350C (Enterprise Lens).

Using the SYS 350 architecture, learning objectives, desired outcomes, and focus areas were identified for each of the three modules and the focus areas were populated with a draft list of topics. Available courseware was compared to the topical outline for each lens to identify areas where materials existed that could be tailored to support the DAU TLP model.

RT-4 Year 2: In the second year of the task, the RT-4 team produced a roadmap for developing, delivering, and refining course materials for the SYS 350A Systems lens. In addition, the team completed preparatory work to lay the foundation for the SYS 350B Business and SYS 350C Enterprise Lenses to be developed in Year 3. Additional research delivered a set of working definitions for technical leadership and a framework for discussing how leadership actions in a technical environment might differ from and also align with successful leadership practices from other disciplines. These research findings were presented to the DAU, refined, and leveraged to provide additional bases for the ensuing SYS 350 development work.

The SERC team continued a review of Year 1 SYS 350 architecture, validated that the three-lens approach remained an appropriate framework for development, and refined the architecture to include updated focus areas for each lens. Using the evolved SYS 350 architecture, the team then developed a series of course descriptions to outline the goals, objectives, and key activities of each of the lenses

The architecture framework and SYS 350A focus areas were then used to identify key SYS 350A syllabus segments, and then to develop Storyboards to support design reviews of the planned SYS 350A segments. The SYS 350A storyboards were reviewed during a DAU-SERC red team in August 2011 and this established the design baseline for a SYS 350A instructor pilot. The first SYS 350A instructor pilot was then conducted with sponsors from DASD(SE) and faculty/researchers from DAU Learning Capabilities Integration Center, DAU Capital and Northeast Region, DAU Mid-West Region, DAU South Region, DAU Mid-Atlantic Region, and Defense Systems Management College from 26-30 September 2011. Based on SYS 350A instructor pilot feedback, the course syllabus, teaching materials, and technical leadership learning emphasis were iterated, resulting in a SYS 350A student pilot version in preparation for the first student SYS 350A pilot. The student pilot, attended by US Army engineering professionals from Research, Development and Engineering Command, Tank Automotive Research, Development and Engineering Center, Edgewood Chemical Biological Center, Aviation Missile Research, Development and Engineering Center, Army Power, and the Chemical Material Agency, was conducted from 14-18 November 2011 at the US Army Aberdeen Proving Grounds, MD. At the conclusion of RT-4 Year 2, the SERC provided an initial approach, architecture, and materials for SYS350B to DAU on 12 December 2011.

RT-4 Year 3: During Year 3, the SERC a) conducted an additional SYS 350A Systems Lens student pilot at DAU South, Huntsville, AL, b) repeated the SYS 350A research process to develop SYS 350B and C courses, c) conducted two SYS 350B Business Lens pilots, d) conducted two SYS 350C pilots, and e) provided findings, conclusions, and recommendations resulting from the Year 3 work.

RT-4 Years 1–3 research results are documented in four SERC Technical Leadership Development Program, Technical Reports SERC TR-013—1 through TR 013-4.

Over the first three years of RT-4 research, the SERC team generated over 65 prototype technical leadership learning segments and tested them in seven individual five-day pilots, as noted in Figure 2.10 below.

FY11	FY12	FY13
SYS 350A Instructor Pilot-1 DAU Ft Belvoir, VA	SYS 350A Student Pilot-1 Aberdeen Proving Ground, MD	SYS 350C Instructor Pilot-1 DAU Ft Belvoir, VA
	SYS 350A Student Pilot-2 DAU - South, Huntsville, AL	SYS 350C Student Pilot-1 Aberdeen Proving Ground, MD
	SYS 350B Instructor Pilot-1 DAU Ft Belvoir, VA	
	SYS 350B Student Pilot-1 Aberdeen Proving Ground, MD	

Figure 2.10: RT-4 Y1-Y3 SYS 350 Series Pilots

The 65 prototype segments representing twelve technical and ten leadership thread focus areas, produced over 3,900 hours of faculty-student contact hours. Faculty and student evaluations on both course and DAU instructors were additionally obtained and, combined with faculty-student contact hour findings, represent a broad set of prototype course data for iterative refinement and a subsequent SYS 350 baseline for DAU. As a result of the observations and feedback compiled from the seven SYS 350 pilot modules, the RT-4 team developed seven recommendations to support transition of the prototype SYS 350 course to DAU.

At the end of Year 3 (2013), the final recommendations were:

- **Student Course Expectations and Cohort Size:** Student selection, learning expectations, and the syllabus should be prescribed and agreed to by the sponsoring organizations. It is additionally recommended that consideration be given to requiring candidate students submit their desired expectations and professional reasons for attendance as part of their selection process to better frame expectations. The recommended student cohort size should range from twenty to twenty-five.
- **Course Development Approach:** The use of objectives or focus areas approaches for first time course prototyping should be pursued to ensure initial alignment with the desired course objectives and to identify strengths, weaknesses, and opportunities through cohort test. The seminar or plenary approach, with its inherent robustness to changing course materials, delivery modalities, and guest speaker accommodation should be used for course refinement and sustainment.
- **Technical-Behavioral Course Content Ratio and Integration:** Technical Leadership education is, on balance, a behavioral educational experience for those students with demonstrated technical expertise and high potential for increased organizational responsibilities. A 30% Leadership Thread-Technical course content ratio is a recommended starting point for future technical leadership course development or updates.
- **Group Project:** Simulation vs. Strategy Development: It is recommended that leadership simulations requiring decision and illustrating consequence be the preferred group project approach for all three SYS 350 modules.

Transition Recommendations: SYS 350A, with minor changes to its current form, is recommended for transition to the DAU portfolio of systems engineering courses. Figure 2.11, termed the SYS 350A Triangle Architecture, graphically illustrates the overall 350A course objective at the top of the triangle supported by the technical focus areas (black circles) and the leadership focus areas or threads (red circles).

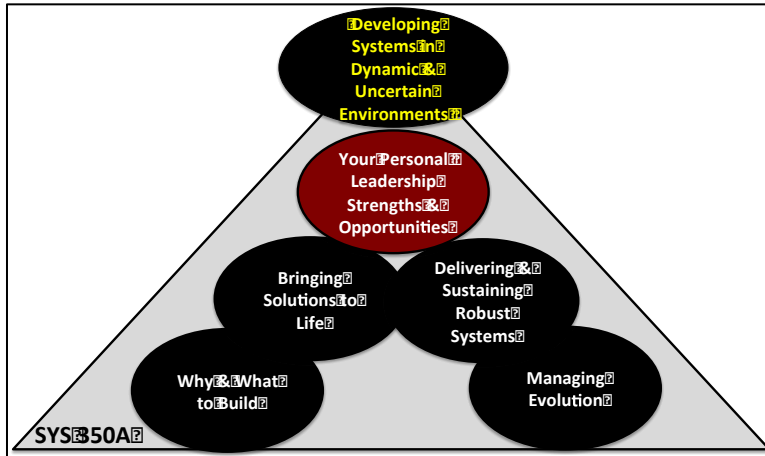


Figure 2.11: SYS 350A Triangle Architecture

Figure 2.12 below illustrates the final SYS 350A syllabus.

Day 1	Day 2	Day 3
Group Project: Acquisition Simulation		
Welcome	Thread: Being a Self-Aware Leader	Case Study: Modern Development Methods
SYS 350 Overview	Lecture: Applied Systems Thinking	Lecture: How Much is Good Enough
Introductions, Orientation, & Expectations	Case Study: DHS Container Security	Thread: Your Core Values
SYS 350A Systems Lens Overview	Thread: Leading Others in Creative Problem Solving	Case Study: Why Projects Fail
Case Study: Technical Uncertainty	Project: AR2D2: RFI	Project: AR2D2: RFP
SYS 350A Thread Overview		
Day 4	Day 5	
Case Study: Process Automation	Project: Leadership Recommendations	
Lecture: Complexity	Project: Final Presentations	
Thread: Your Plans for Developing as a Technical Leader	Feedback and Close	
Case Study: Project-Program Complexity		
Project: AR2D2: IPT Competition		

Figure 2.12: SYS 350A Syllabus

- **SYS 350B Readiness:** SYS 350B in its current state is not recommended for transition to DAU. Three SYS 350B redesign approaches are recommended for consideration; Refinement of the current 350B pilot baseline, Focus Area Modification, or Focus Area Change. Subsequent to a design iteration, it is recommended that an additional student pilot be conducted.
- **SYS 350C Readiness:** SYS 350C in its current state is not recommended for transition to DAU. Four SYS 350C redesign approaches are recommended for consideration; Refinement of the current 350C pilot baseline, Focus Area Reduction, Seminar, or Case Study. Subsequent to a design iteration, it is recommended that an additional student pilot be conducted.

In summary, the RT-4 Years 1–3 validated the overall approach of the three-lens architecture to technical leadership education and established that both the content and the pedagogy of SYS 350A pilots met the criteria for transitioning the Systems Lens pilot course to the DAU. Further, the research work demonstrated that many of the elements needed for the Business and Enterprise Lenses were in hand but revealed four significant shortcomings of SYS 350 B/C. Specifically, SYS 350 B/C:

- 1) Lacked the overall coherence of SYS 350A,
- 2) Contained more topics than could be effectively covered in the available time,
- 3) Were overly focused on the commercial domain, and therefore,
- 4) Required additional tailoring to apply the covered leadership principles to the domain of defense procurement.

DAU concurred with the RT-4 Year 3 recommendations and funded RT-4 Year 4 to refine both the SYS 350B and SYS 350C curricula and conduct additional pilot testing.

2.2 RT4 Y4 RESEARCH OBJECTIVES

The objectives of the RT4 Year 4 research were to a) address the observed short-comings of the RT4 Year 3 SYS 350B and SYS 350C pilots by leveraging content development lessons learned during the SYS 350A pilot phase and particularly the power of an embedded group project that imparts a consistent story arc throughout the 350A course, b) refine and enhance the integration of the SYS 350B and SYS 350C syllabi, and c) conduct SYS 350B and SYS 350C student pilots for evaluation of the iterated syllabi.

2.3 RT4 Y4 PROGRAM PLAN

The research initially established an overall SYS 350 series story arc; a graphical depiction of the overall SYS 350 series focus, context, and embedded threads to illustrate the leadership learning journey from course entry to course exit. In addition, the research plan called for development of specific story arcs for SYS 350B and SYS 350C that are similar to, and link with, the overall SYS 350 series story arc. Subsequent to DAU red team reviews of the refined 350B/C thematic flow, course content plan, and detailed syllabus developments, student pilots were conducted in December 2013 (SYS 350B) and March, 2014 (SYS 350C). Figure 2.30 depicts the final RT4 Year 4 Program Plan.

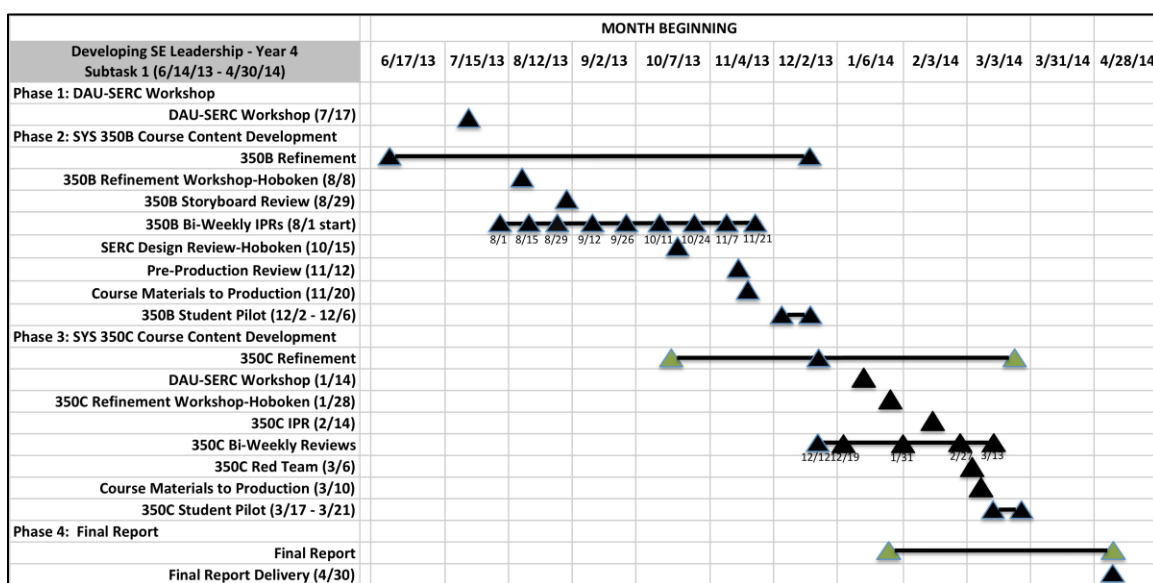


Figure 2.30: RT4 Year 4 Program Plan

3 350B REFINEMENT

3.1 BASELINE 350B PILOT, CONCLUSIONS, & RECOMMENDATIONS

Figure 3.10 below depicts the SYS 350B Baseline Syllabus tested during RT4 Year 3 and that provided the initial point of departure for the RT4 Year 4 refinement work.

Day 1	Day 2	Day 3
Group Project: Buying Power Initiative		
Welcome & Introductions	Case Discussion: Rooster Clagett	Measuring and Analyzing Business & Investment Performance
SYS 350B Overview & Student Expectations	The Concept of Competitive Strategy, Value Creation, Mission, & Vision	Risk, Return & the Time Value of Money
Enhancing Technical Buying Power	Industry Structure and Dynamics	What Can You Learn about Current & Potential Contractors from Their Financial Statements?
Leading Versus Managing	Macro Environmental Analysis	Case Discussion: Baidu.com - Valuation at IPO
Leadership Practices Inventory & Discussion	Case Discussion: Intel 1967-2002 and 2005	Influencing without Authority
SYS 350B Group Project Overview: Enhancing Buying Power	DISC Concepts: Personal Style & Interpersonal Communications	Influencing without Authority, Cont'd
Group Project: Enhancing Buying Power	Group Project: Enhancing Buying Power	Group Project: Enhancing Buying Power
Day 4	Day 5	
Technology and Innovation Management	Next Steps as a Technical Leader: Applying Principles of Coaching	
Aligning a Technology Strategy to the Business Strategy	Wrap-up & Adjourn	
Strategic Technology Road maps and the S-Curve		
Identifying, Monitoring, & Managing Emerging Technologies		
Case Discussion: DuPont Aramid Industrial Fiber		
Leading Teams & Groups; The Army Crew Case		
Group Project: Enhancing Buying Power		

Figure 3.10: SYS 350B Baseline Syllabus

The SYS 350B Baseline Syllabus testing during the RT4 Year 3 student pilot revealed that the collective impact of student pilot cohort inhomogeneity, diverse student expectations, and lack of consistent professional development needs amongst the student cohort appeared to influence the disparity between favorable instructor and less than favorable student pilot evaluations of SYS 350B. To that end, the Baseline SYS 350B was not recommended for transition to DAU. Further, the dominant industry themes resident in the baseline 350B and the learning strategy assumption of independent student connection supported the research conclusion that the readiness issue appeared to be more dependent on course content selection versus the content development approach of using learning objectives. To that end, three alternate SYS 350B redesign approaches were recommended for consideration.

Refinement: Retain the current technical focus areas and order of instruction; Retain the three leadership threads of Influencing without Authority, Communications and Coaching, and Leading Teams and Groups; expand aerospace and defense content in all lectures and exercises; replace current case studies with two aerospace and defense cases of 1) a successful business growth strategy and 2) a successful technical competency improvement or change in offered technology; and assign a specific buying power initiative to each student group in order to invoke broader aerospace and defense business considerations.

Focus Area Modification: Modify the current three technical focus areas and order of instruction to Business Planning (Strategy, Organization, Marketing, Competitive Proposals), Business Operations (Engineering, Technology, and Innovation), Technical Better Buying Power; retain the three leadership threads of Influencing without Authority, Communications and Coaching, and Leading Teams and Groups; replace current case studies with two aerospace and defense cases of 1) a successful business growth strategy and 2) a successful technical competency improvement or change, technology; and consider augmenting or replacing the current 'better buying power' group project with a technical leadership simulation focused on improving or changing a business core offering or technical competency.

Focus Area Change: Change the focus areas to span three representative aerospace and defense companies such as 1) a Tier-1 Prime Integrator, 2) a Tier-2 System Developer, and 3) a component or technology supplier; dedicate one day of instruction for each selected business and discuss Business Planning, Business Operations, Better Buying Power approaches highlighting the differences and buying power initiatives may differ amongst the three representative companies; assess the use of a technical leadership simulation exercise to replace the group project; and retest the iterative SYS 350B course using a more homogeneous (experience and expectations) student cohort before considering transition to a DAU course offering.

3.2 350B REFINEMENT APPROACH

Of the three preceding approaches, a combination of the **Refinement** and **Focus Area Change** approaches was chosen as initial guidance for the RT4 Year 4 SYS 350B work, based on a) the selection of Strategy, Finance, and Technology technical focus areas remained the best aligned and spanned the most complete set of Business Lens technical leadership environments, b) the successful use of simulations during the SYS 350A pilots, and c) the resident broad portfolio of draft SYS 350B course content materials.

In establishing the refinement approach, a set of assumptions was made, as summarized in Figure 3.20. Key among these was that participants would have taken the DAU course ACQ 315 Business Acumen or would have demonstrated equivalent knowledge. ACQ 315 is an excellent course that covers basic business strategy and finance, as well as a variety of topics directly relevant to Government acquisition. Freed from the need to cover this basic material, the 350B pilot was able to focus on how this basic information could be used rather than what it is.

 SYSTEMS ENGINEERING Research Center	Leveraging ACQ 315/450/452
• ACQ 315 Business Acumen Leverage — 350B Development Assumption: Cohort Has Completed 315 and/or Has Demonstrated Knowledge — 350B Development Approach: ○ Identify Additions: For example, are there other financial ratios used by defense business execs/street analysts? ○ Select Key 315 Data & Expand for Technical Leadership Context: For example, — Fundamentals: 315_06 Cost Estimating provides excellent fundamental discussion on four methods: Analogy/Parametric/Engineering (Bottoms-up)/Extrapolation — Expansion: 350B expands the discussion with an example/exercise centered on 'systems' issues which may not be directly addressed by one of the four estimating methods (e.g. <i>'Systems Integration Costs' are more than the unit costs of labor and/or parts. To that end, how can a Technical Leader enhance awareness (ask the right questions), assess likelihood/consequence, plan, mitigate, measure, etc.)</i> • ACQ 450/452 Leadership Course Leverage — 350B Development Assumption: Cohort has a 'mixed' 450/452 (type) Completion population — 350 Development Approach: Frame learning for holistic application of leadership fundamentals vis a vis 'Leader as Coach'/'Forging Stakeholder Relationships	
8/1/13	10

Figure 3.20: SYS 350B Refinement Assumptions

With these assumptions as background, Technical and Leadership Thread Performance Objectives, TLOs and ELOs are defined in Figures 3.22A, 3.22B, and 3.23, respectively.

	Technical Leadership	Strategy	Finance	Technology
Performance Outcome	Synthesize recommendations for improving acquisition processes.	Develop, modify, or leverage complementary DoD and industrial base engineering and technology strategies during all phases of a system acquisition life cycle.	Develop cost effective DoD Acquisition Program Engineering and Technology development approaches for all phases of the system acquisition life cycle.	Evaluate and plan equitable DoD Acquisition Program technology insertions during all phases of the system acquisition life cycle.
TLO	Evaluate ways to improve DoD technical buying power by increasing the efficiency and effectiveness of its acquisition processes.	Evaluate the elements and the associated impacts of industrial base company growth strategies on the mission and engineering and technology needs of DoD Acquisition Programs.	Evaluate the financial reporting elements of industrial base business operations and assess their impacts to acquiring and sustaining engineering and technology needs of DoD Acquisition Programs.	Evaluate the performance, maturity, applicability, and availability of improved, emerging, and potentially disruptive technologies to satisfy the engineering and technology needs of ongoing and future DoD Acquisition Programs.
ELO-1	Describe the impact of change on the process of developing and acquiring complex technical systems.	Describe the elements of industrial base company operations and growth strategies.	Describe the elements of industrial base company financial statement.	Contrast the scope and pace of today's technology evolution with that of previous generations.
ELO-2	Explain how acquisition processes impact how products and systems are developed and constrains the development process in ways that are often not obvious.	Describe the complexities associated with formulating, articulating and executing corporate growth strategy and its importance within the DoD-Industry enterprise.	Describe the complexities associated with formulating, articulating and executing corporate financial strategy, and its importance within the DoD-Industry enterprise.	Evaluate conventional acquisition processes in the current technology context.
ELO-3		Apply published frameworks for describing corporate growth strategy, along with personal experience, to analyze and compare the strategies of companies.	Apply published frameworks for describing corporate financial strategy, along with personal experience, to analyze and compare the financial strengths, weaknesses, risks, and opportunities of companies.	Describe the inevitability and unpredictability of technical innovation in a highly distributed, open innovation process.

Figure 3.22A: SYS 350B Technical Performance Outcome & Learning Objectives

	Technical Leadership	Strategy	Finance	Technology
ELO-3		Apply published frameworks for describing corporate growth strategy, along with personal experience, to analyze and compare the strategies of companies.	Apply published frameworks for describing corporate financial strategy, along with personal experience, to analyze and compare the financial strengths, weaknesses, risks, and opportunities of companies.	Describe the inevitability and unpredictability of technical innovation in a highly distributed, open innovation process.
ELO-4		Explain the strategic risks faced by defense companies and formulate potential responses they might pursue should some of the risks unfold.	Examine the financial risks faced by those companies and formulate potential responses that they might pursue should some of those risks unfold.	Identify the implications of increasing system complexity and accelerating technological change on the acquisition process.
ELO-5		Summarize how in any acquisition, whatever a customer says is always heard and interpreted within the strategic context of the supplier, and may produce unexpected and undesired results unless that strategic context is understood and taken into account.	Describe how in any acquisition, whatever a customer says is always heard and interpreted within the financial context of the supplier, and may produce unexpected and even undesired results unless that financial context is understood and taken into account.	Explain how leaders might deal with technology evolution challenges even though no established approaches may exist.
ELO-6		Explain the complexities faced by defense business leaders in making strategic decisions in a competitive environment.	Explain the complexities faced by business leaders in making financial decisions in a competitive environment.	Apply an understanding of technology road-mapping and knowledge of value propositions to synthesize a response to a disruptive technology event.
ELO-7		Analyze an industry competitive situation, characterize the strategic options, and provide a recommended course of action with supporting rationale.	Analyze an industry competitive situation, characterize the financial options and provide a recommended course of action with supporting rationale.	
ELO-8		Interpret the strategy implications of a defense business case.	Interpret the financial implications of a defense business case.	
ELO-9		Describe how engineering and development projects are not well-controlled activities that conform to the assumptions on which their program plans are based, but rather are influenced by unexpected strategic events that may occur at any time.	Describe how development projects are not well-controlled activities that conform to their agreed upon budgets, but rather are influenced by unexpected financial events that may occur at any time and impact one or more positions within the acquisition value stream.	

Figure 3.22B: SYS 350B Technical Performance Outcome & Learning Objectives

	Team & Group Leadership	Communications, Coaching, & Mentoring	Team Dynamics & Performance
Performance Outcome	Develop current and future leadership value propositions for DoD acquisition programs and organizations.	Modify personal styles of effective communication with people who have different communication styles.	Recognize and mitigate where appropriate, individual and group judgment biases.
TLO	Develop plans for growing competencies in 5 key leadership areas: Challenge the process, Model the way, Inspire a shared vision, Enable others to act, Encourage the heart.	Describe personal communication style and its effects on others. Explain influence tactics and how to use them to influence without formal authority.	Describe the leader's role in ensuring good group decision processes under uncertainty.
ELO-1	Describe your leadership value proposition. Recognize how personal leadership value propositions relate to organizational value propositions. Describe the need for understanding stakeholder perspectives and value propositions in order to make effective collaborative decisions.	Apply techniques for Influencing without authority.	Describe the role of judgment in decision making. Describe intuition/ recognition based decision making processes and when to rely on them.
ELO-2	Explain Leading versus Managing.	Apply constructive feedback skills when mentoring colleagues on leadership skills.	Apply group reflective practices to improve team decision making and relationships.
ELO-3	Interpret Multisource Feedback to set personal leadership goals. Design self awareness practices to continue development.		
ELO-4	Describe interpersonal style and communication in terms of four broad categories that comprise the DISC model.		
ELO-5	Develop a deeper appreciation for your interpersonal style - strengths and areas for development.		
ELO-6	Improve capacity to communicate with and influence others whose style and approach is different from your own.		

Figure 3.23: SYS 350B Leadership Thread Performance Outcome & Learning Objectives

3.3 REFINED 350B PILOT ARCHITECTURE & SYLLABUS

At the highest level, the refined 350B “Triangle Architecture” is shown in Figure 3.31. The course consists of technical modules shown in black and leadership “thread” modules depicted in red. The thread modules are interleaved with the technical modules to reinforce the fact that leadership is not a separate topic, it is how leaders do their jobs. The detailed syllabus is presented in Figure 3.32.



Figure 3.31: SYS 350B Triangle Architecture

Day 1		Day 2		Day 3	
M0.0	DSMC	T0.0	Check-in	W0.0	Check-in
M1.0	Welcome & Introductions	T1.0	Strategy: What Does it Really Mean?	W1.0	Finance in the Bigger Picture
M2.0	Technical Value Propositions		Break		Break
	Break	T2.0	Strategy Case Study	W2.0	Interpreting Financial Statements
M3.0	Simulation Project 1 - Perspectives & Value Propositions		Lunch		Lunch
	Lunch	T3.0	Personal Style & Interpersonal Communication (DISC)	W3.0	Simulation Project 3 - Responding to Financial Disruptions
M3.0	Simulation Project 1 - Perspectives & Value Propositions		Break		Break
	Break	T4.0	Simulation Project 2 - Responding to Strategic Disruptions	W4.0	Decision Making Under Uncertainty: Recognizing & Mitigating Biases
M4.0	Your Leadership Value Proposition		Break		Break
	Break	T5.0	Leadership Reflection	W5.0	Leadership Reflection
M5.0	Wrap-up	T6.0	Wrap-up	W6.0	Wrap-up
Day 4		Day 5			
H0.0	Check-in	F0.0	Check-in		
H1.0	Trends in Technology Evolution	F1.0	Project Presentations - Implications for the Acquisition Process		
	Break		Break/Brunch		
H2.0	Technology & the Acquisition Process	F2.0	Your Leadership Value Propositions Now & Next Steps for Growth		
	Lunch	F3.0	Student Feedback & Close		
H3.0	Simulation Project 4 - Responding to Technology Disruptions				
	Break				
H4.0	Influencing without Authority: Leaderless Group Discussion				
H5.0	Presentation Setup				

Figure 3.32: SYS 350B Refined Syllabus

Technical Modules: Following an overview of the course, the first of the technical modules focused on the meaning of a Value Proposition, defining it as the difference between the benefits offered by a product or service and the price to be paid for it. A number of familiar examples were provided to demonstrate that this is not some obscure business concept but is completely intuitive. With this as background, participants were divided into two teams and each team was asked to identify the value proposition for a government project office, a prime contractor, a principal subcontractor and a key

supplier. The similarities and differences between these perspectives were then discussed as a prelude to forming Integrated Product Teams for the ensuing Group Project.

The next technical module addressed Strategy, the first of three major themes of the Business Lens pilot. In preparation for this module, participants were asked to read Michael Porter's classic Harvard Business Review paper "What Is Strategy," in which he describes the essence of strategy as deciding what not to do and emphasizes the importance of translating strategic decisions into complex activity networks to establish a unique competitive position. A DoD-oriented Harvard Business School case, "John 'Rooster' Clagett: Visual Training Solutions Group, Inc." was used to force participants to wrestle with the complex strategic issues faced by a small government contractor deciding on a strategic direction for the next phase of its evolution.

The second major business theme, Finance, was the subject of the next technical module. Participants analyzed financial statements of well-known companies in the retail, product, software, services and defense sectors, as obtained from recent annual reports, and then discussed the similarities and differences between the business models of defense contractors and other businesses. The financial statements of five of the largest defense contractors were then analyzed to understand the common challenges they faced and the variations across companies in the same industry. This module provided a much richer understanding of the financial challenges faced by defense contractors.

The final technical module focused on Technology, the third business theme addressed by the pilot. Using numerous examples, the speed at which technology is evolving was shown to be far greater than can be matched by traditional management techniques like technology road-mapping or conventional acquisition processes. The implications of this mismatch and the need for more agile and flexible acquisition approaches were explored in-group discussion.

Leadership Thread Modules: In the first leadership module, Your Leadership Value Proposition, participants explored distinctions between leadership and management in order to define the value they add as leaders in their roles. After discussing how leaders seek and make use of feedback from others, participants reviewed their own 360 degree feedback from the Leadership Practices Inventory completed by their colleagues prior to class, and identified their strengths and areas for growth in five leadership practices - Model the way, Inspire a shared vision, Challenge the process, Enable others to act, and Encourage the heart. After sharing stories of how they had used their strengths recently, participants brainstormed specific things they could do to grow their leadership skills in their least skillful leadership practice. Peers helped each other discover ways to overcome a current leadership challenge using the leadership practice behaviors. [Kouzes, J. M. and Posner, B. Z. (2007) Leadership Challenge, 4th Edition, San Francisco, CA: John Wiley & Sons, Inc.]

The second leadership module, Personal Style and Interpersonal Communication, focused on understanding and applying a personal style tool -- "DiSC" Profile -- to increase effective communication with people who are different from oneself. Participants who scored in the "Dominance" range came forward to describe their approach to problem solving and leading and to discuss how they would like other people to treat them. This was repeated for participants in the remaining three styles. Videos of people interacting with different styles were shown requiring participants to observe and describe the attributes of the four styles. The class was divided into project teams and given time to get to know each other's preferred interpersonal styles before starting their team project work. [DiSC Profile http://www.internalchange.com/everything_disc_workplace.htm]

The third leadership module Decision Making under Uncertainty, focused on making decisions under conditions of uncertainty. Participants were briefed on the fundamentals of intuitive and reasoned judgments and decisions based on Daniel Kahneman's (2011) work, Thinking, Fast and Slow, New York, NY: Farrar, Straus and Giroux. Participants received a copy of the book for additional reading. In project teams, groups reviewed the decisions they had made earlier in the day and rated these decisions on the use of intuition and reason. They then shared examples and tips for combining intuition with formal analysis and ways to communicate intuitive decisions to create understanding and commitment.

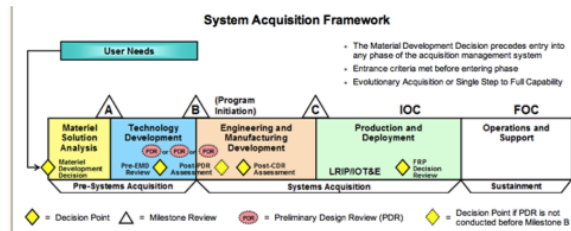
In the fourth leadership module, Influence Without Authority, participants reviewed their personal leadership value propositions and reflected on ways they could increase their influence and effectiveness, especially when influencing without formal authority. Project teams worked on a decision task and then were asked to rate each person on their use of specific interpersonal influence skills. After receiving and discussing direct feedback from teammates on their influence behaviors, each team explored one of the six principles of influence and taught the class about how to use the principle to influence Defense Acquisition partners. [Cialdini, R. (2001), "Harnessing the Science of Persuasion", Harvard Business Review, October 2001, pp 72-79.]

The final leadership module, Leadership Reflections asked participants to reflect on what they had learned about leadership, decision-making, influence, and interpersonal styles during the week and how they would apply what they had learned between then and taking SYS350C in three months.

3.4 REFINED 350B GROUP PROJECT OVERVIEW

Consistent with the Business Lens focus on change as inevitable and the need for leaders to continually be prepared to respond to unforeseen events and adapt their plans accordingly, the 350B Group Project was organized around a series of disruptive events, one for each of the business themes: strategy, finance and technology. Participants were organized into four-person Integrated Product Teams (IPTs), and one representative of each team was asked to play each of the four positions defined in the Value Proposition module described in Section 3.3: government project office, prime contractor, principal subcontractor and key supplier. The same IPT teams were used throughout the week but team members were asked to rotate roles so that each would have an opportunity to view events from the different perspectives. At the conclusion of each exercise, a large-group debrief was conducted to identify common themes and explore different points of view. At the end of the course, each team was asked to integrate their experiences into a final presentation that discussed the implications of what they had learned for defense acquisition.

An overview of the group project development concept is provided in Figure 3.40. A framework for developing potential disruptive events is shown in Figure 3.42. Within this framework, a disruptive event can originate from any program level and in any of the three cited domains of strategy, finance, and technology. The events selected for the pilot are described in the respective cells of Figure 3.42.



- Life Cycle Context: Pre-MS A to Post-MS B Strategic, Financial, & Technology Acquisition Program Dynamics
- 350B Group Project Simulation Approach:
 - 'Dynamics' Synthesized as 'Disruptive Events'
 - Two each Strategic, Financial, & Technology Events per class day distributed to 5 teams giving rise to 6 total team-event interactions => Provides portfolio for Friday out-brief
 - Disruptive Events may originate from any Level in the Govt-Industry Team 'stack'
 - Objectives are not to arrive at the 'answer' but collaboratively maximize the potential for a best value 'leadership approach' to assess, bound, or remedy the impacts of a 'disruptive' acquisition event with sensitivity to the broad goals & process of a Govt-Industry IPT

Figure 3.40: SYS 350B Group Project Overview

Program Position	Strategic Disruptions	Financial Disruptions	Technical Disruptions
Government PMO	User requires early delivery		
Prime Contractor		Delays in completing spec	
Principal Subcontractor	Discontinues product	Delays in subcontract award	Delays in needed mfg processes
Second-Tier Supplier			

Figure 3.42: SYS 350B Disruptive Event Framework

For the strategic project exercises, two disruptive events were selected and one was assigned to each team. The first involved the requirement on the part of the Government to pull up a capability in an existing program to meet an urgent operational mission need. The second involved a decision on the part of a major subcontractor to discontinue production of a critical technology in order to focus on a new product that would allow leapfrogging a competitor. Both scenarios required the IPTs to come up with a response to the disruption that would keep their programs moving forward in the best interests of both their companies and their customers.

The financial exercise also consisted of two disruptions. In the first, delays in completing subcontractor specifications resulted in program delays that are negatively impacting the revenue of all participants. In the second, changes in a commercial configuration on the part of the prime forced a subcontractor to undertake more technology development effort than had been anticipated. Both of these scenarios required the IPTs to move beyond simply "enforcing the contracts," which would have resulted in losses for everyone, to identify potential win-win alternatives for constructively responding to the disruptive events.

For the technology exercise, it was decided to have all teams respond to the same disruption. In the scenario that was chosen, a key subcontractor found that they could not develop advanced manufacturing capabilities that were essential for meeting system-level reliability, availability and

maintainability requirements in the timeframe promised. The IPTs had to recommend a course of action in response to this and provide a risk mitigation plan.

The final segment of the project asked teams to utilize insights gained from the course to address the relationship between the today's defense acquisition processes and the continuously changing, dynamically interacting strategic, financial and technological environment in which those processes operate. Each team was required to prepare and deliver a 20-minute presentation that addressed the following:

- Challenge the process: What would you change about today's defense acquisition "business?"
- What are the 2-3 most important actions you can take as a technical leader to:
 - a) Cause those changes to happen
 - b) Address the issues within the current context in the meantime
- What is the most important question we haven't asked...and how would you answer it?

3.5 REFINED 350B PILOT CONDUCT, FINDINGS & CONCLUSIONS

The revised 350B pilot was conducted at the Defense Acquisition University from 2-6 December 2013. Twenty highly experienced students from across the DoD – Army, Navy, Air Force, Marine Corps, Missile Defense Agency and Defense Systems Management College – and one from DHS participated. The full demographic profile is provided in Figure 3.50.

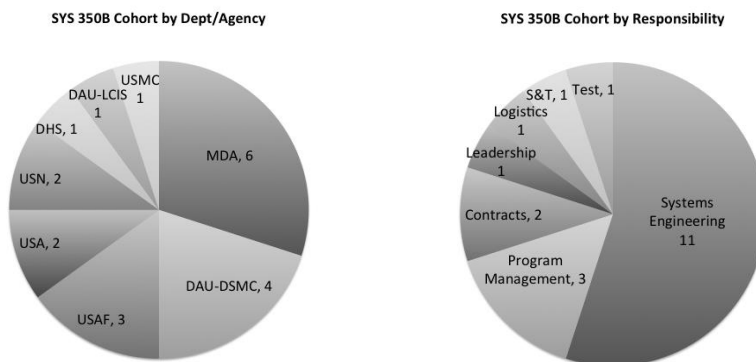


Figure 3.50: SYS 350B Student Pilot Cohort Demographics

Both the students and the instructors considered the pilot to have been a great success. One measure of that success is the extent to which the participants were able to synthesize new learning from the course and to translate that learning into meaningful actions.

Evidence of the former is reflected in their observations that oft times today's defense acquisition process does not keep synchronous pace with changes that might result from strategic, financial or technological disruptions that surround it. They saw this as especially true in the case of technology and noted that this can also inhibit keeping pace with the threat, since in many cases the threat is leveraging the same technological innovations, uninhibited by risk aversion and need for extended oversight that often characterize formal processes. In addition, participants expressed a better understanding of defense contractors and the business pressures they operate under, pressures that sometimes cause them to act in ways that eroded the trust between them and their government counterparts.

Despite the complexity of many of these issues, participants were able to identify actions they could take to address the issues they cited. In addition to being champions within their organizations, they also saw opportunities to individually build better relationships with industry and with other government agencies and Congress, to foster more open communications, to expand mentoring, and to enhance training and streamline hiring processes.

At the conclusion of the pilot, participants were asked to respond to a short DAU survey. All twenty-one rated the course “personally beneficial,” seventeen of those rating it “very beneficial,” and all twenty-one rated it “very beneficial for the targeted students” who might have somewhat less experience than some of the pilot participants. Responses to the survey are summarized in Figure 3:51.

		21 Students in SYS 350B Pilot Cohort																
Personal Benefit	Very Beneficial	2	17 of 21 students rated as personally very beneficial															
Benefit to Targeted Student			All 21 students rated as very beneficial to targeted student															
Personal Benefit	Somewhat Beneficial	1	4 rated s/what beneficial															
Benefit to Targeted Student																		
	No Benefit	0																
	Somewhat a Waste	-1																
	Complete Waste	-2																
Did 350B Meet the Learning Objectives?	Meet Many	2	11 rated as meeting many objectives															
	Meet Most	1	9 rated as met most objectives															
	Meet = Didn't Meet	0																
	Missed	-1																
	Many Missed	-2																
	Most																	

Figure 3.51: SYS 350B Student Pilot Feedback (DAU Survey)

Participants were also asked to identify elements of the pilot that should be kept, added or deleted going forward and to weight them based on importance. The rank-ordered responses are noted in Figures 3.52-3.54. Noteworthy is the degree to which the number of “adds” outweighs the number of “deletes.” All the ‘Keep’ responses apply to future SYS 350B revisions. The ‘Adds’ and ‘Deletes’ selected for consideration in future pilot revisions are annotated with a ‘Yes’ or (Y).

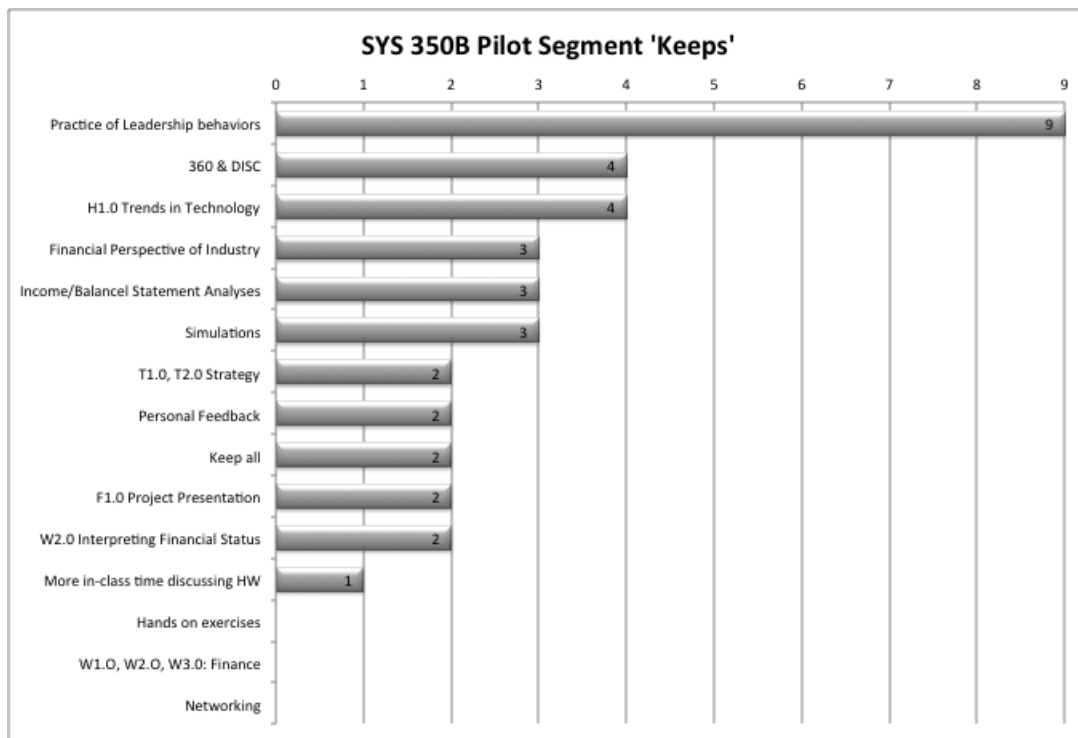


Figure 3.52: SYS 350B Student Pilot Feedback (Keeps)

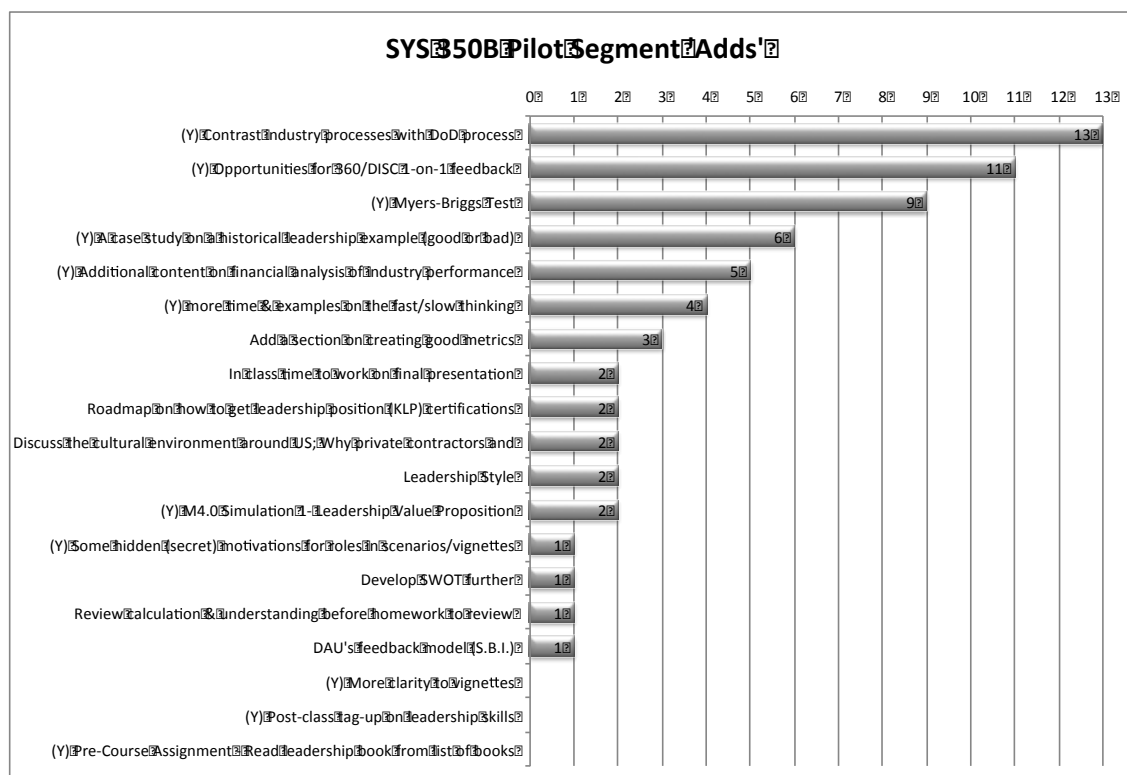


Figure 3.53: SYS 350B Student Pilot Feedback (Adds)

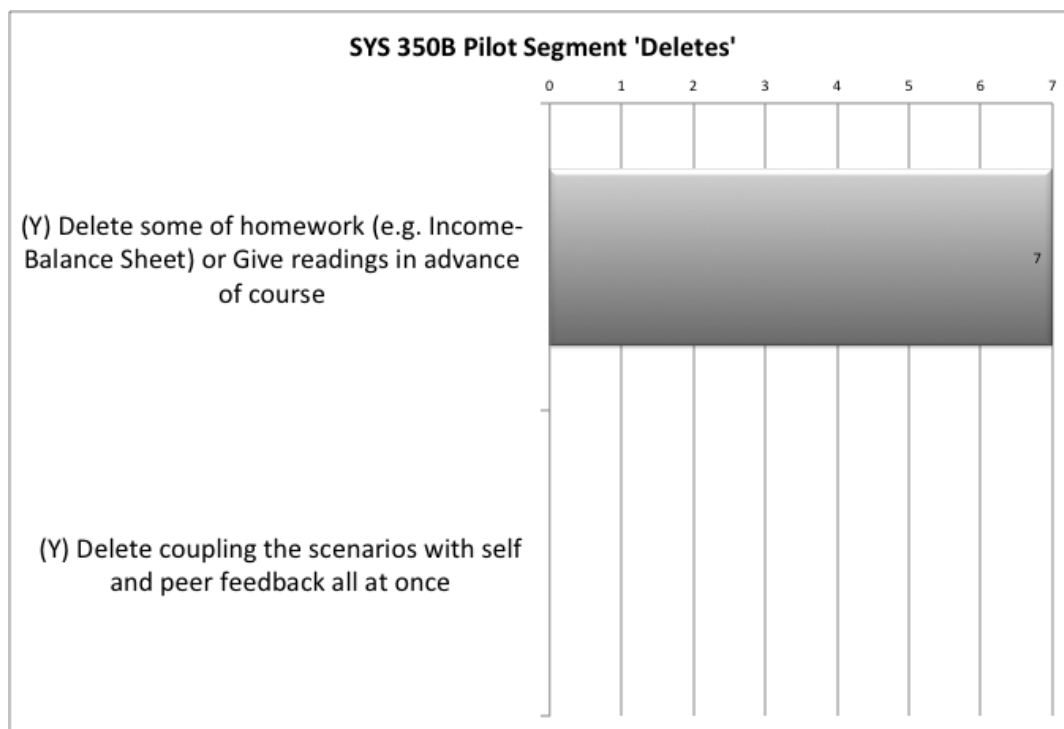


Figure 3.54: SYS 350B Student Pilot Feedback (Deletes)

4 350C REFINEMENT

4.1 BASELINE 350C PILOT, CONCLUSIONS, & RECOMMENDATIONS

Figure 4.10 below depicts the SYS 350C Baseline Syllabus tested during RT4 Year 3 and that provided the initial point of departure for the RT4 Year 4 refinement work.

Day 1	Day 2	Day 3
Group Project: Enterprise Change to Enhance Buying Power		
Welcome & Overview	Creating Value in the Multi-Business Enterprise I	Enterprise Engineering, Technology, & Process II
The Technical Enterprise - Descriptions & Interactions	Capturing Value in the Multi-Business Enterprise II	Technology Acquisition for the Enterprise
Understanding your Enterprise & that of your Stakeholders I	Danaher Corporation Case Study	CA Technologies: Bringing the Cloud to Earth Case Study
Understanding your Enterprise & that of your Stakeholders II	Enterprise Engineering, Technology, & Process I	Enterprise Leverage of Engineering & Technology
SYS 350C Group Project Overview: Enhancing Buying Power	Disruptive Innovation Case Study: UAVs	Tools for Leading Enterprise Change
Group Project Time	Building Readiness for Enterprise Change	Group Project Time
	Group Project Time	
Day 4	Day 5	
Communicating to and with the Enterprise	Group Presentations	
The Enterprise Senior Technical Leader	Feedback	
Leading Enterprise Professional Development		
You as an Enterprise Change Agent		
Group Project Time		

Figure 4.10: SYS 350C Baseline Syllabus

As was the case for SYS 350B, the impact of student pilot cohort homogeneity, expectations, and consistent professional development needs appeared to influence the disparity between favorable instructor and less than favorable student pilot evaluations of Baseline SYS 350C. The disparity was significant and therefore the Baseline SYS 350C was not recommended for transition to DAU. Further, even as the course development approach for 350C proved to be less than optimal for the one student pilot under test due to large number of focus areas, the disparate definitions and expectations of the nature of an Enterprise, syllabus integration challenges, the commercial industry themes resident in the prototype course, and the learning strategy assumption of independent student connection, SYS 350C readiness was concluded to be more dependent on clear definitions of the Enterprise of interest and course content selection versus the objective approach. To that end, the following four SYS350C redesign approaches were recommended for considered.

Refinement: Retain the current pilot focus; reduce the number and durations of lecture and exercise segments; reduce the number of pre-course readings and case studies; replace the current case studies with aerospace and defense cases that illustrate large Enterprise engineering or technology strategy, policy, and adaptation initiatives; assess the use of a case-based simulation of an Enterprise technical leadership challenge potentially sourced by a panel of current USG or industry executives; and reduce the number of in-class leadership thread exercises. In addition, ensure that there are no repeats of any 350B course material or exercises.

Focus Area Reduction: Reduce the number of technical and leadership focus areas; reduce the number and durations of segments; reduce the number of pre-course readings and case studies; replace the current case studies with aerospace and defense cases that illustrate large Enterprise engineering or

technology strategy policy, and adaptation initiatives; assess the use of a case-based simulation of an Enterprise technical leadership challenge potentially sourced by a panel of current USG or industry executives; and reduce the number of in-class leadership thread exercises. In addition, ensure that there are no repeats of any 350B course material or exercises.

Seminar: Reduce the number of technical and leadership focus areas; Define lecture and case study topics that reflect the focus areas and then solicit lecture/case study input from Enterprise executives and Academic faculty. Replace 'Enterprise Questions' with a simulation of an Enterprise technical leadership challenge potentially sourced by a panel of current USG or industry executives for the group exercise.

Case Study: Reduce the number of technical and leadership focus; select three representative case studies of Enterprise engineering or technology strategy policy, and adaptation initiatives that guide daily discussion and exercise; Replace 'Enterprise Questions' with individual Technical Leadership White Paper submissions by each student that focus on a Technical Leadership topic or issue of their choice or an Enterprise Leadership Simulation potentially sourced by a panel of current USG or industry executives; conclude on Day 5 with an invited guest speaker from government or industry.

4.2 350C REFINEMENT APPROACH

Of the three preceding approaches, the **Refinement** approach provided the dominant guidance for the initial RT4 Year 4 SYS 350C refinement work. Since the original SYS 350C pilot was judged to have had too many focus areas and been too commercially oriented, the refinement process began by taking a step back and revisiting the Technical Leadership Curriculum Roadmap Framework (Figure 4.21) developed during earlier research. Specifically, the research team concentrated on the differences between the Enterprise Lens (SYS 350C) and the Business Lens (SYS 350B) illustrated in Figure 4.21 Curriculum Roadmap Framework.

Whereas the Business Lens focused on specific initiatives designed to produce incremental change in response to externally-driven disruptions, the Enterprise Lens had to prepare technical leaders to conceive of and drive deliberately disruptive activities in order to stimulate enterprise evolution to an entirely new level. Leading this type of change requires that leaders understand both the nature of enterprises and the nature of change. They must recognize the relationships between the entities that make up an enterprise, not just the entities themselves and be able to work effectively across boundaries in order to accomplish their goals. And they must appreciate the power of an existing culture to resist enterprise-level change and what is required to overcome such cultural resistance. These became the themes around which a new Enterprise Lens was built.

Experience gained from the highly successful 350A pilots was leveraged to reduce the amount of material covered from that included in the original pilot, to stress participant engagement over information transmission, and to design an integrated Group Project that provided a continual story arch throughout the course.

A more detailed compilation of the assumptions underlying the refinement approach is provided in Figure 4.20. Technical and Leadership Thread Performance Outcomes, TLOs and ELOs, are defined in Figures 4.22 and 4.23, respectively.

- a) Enterprise assessment, modeling, future environments, etc. are the major components of the 'technical' pieces. These activities do take significant portion of an Enterprise leader's thinking but....
- b) The process and mechanics of implementing Enterprise change/adaptation across the boundaries of interest (which are more than just organizational layers but also include the leader's enablers or 'levers of change', etc.) is the more complex space, is highly dependent on the individual leader's behaviors, has higher degrees of difficulty and degrees of freedom due to the presence of multi-stakeholders, and therefore might be viewed as the dominant learning model for refinement of the SYS 350C course.
- c) In addition, the requirement for the student cohort to implement actions ('disruptions') will also surface issues not initially recognized. Enterprise change or adaptation implementations are not open loop processes. The ability to observe and react requires the technical leader to view back of progress or problems as likely expected Enterprise behaviors that resulted from their leadership as opposed to pathological problem with the leader's levers of change. In contrast to the A course where one can 'refine' requirement process' as a means to dampen the negative effects of process instability or the course where one can directly apply business levers to respond to program disruptions, the C course is about positive disruptions to increase the likelihood of high Acquisition readiness for the postulated future environment.
- d) The 350C group project concept of operations, unlike the B course, will be initially conducted in a more 'independent' fashion by the teams. i.e. initial reflection of their progress will be focused on their view of the pros/cons of the how they are going about their assigned tasks as opposed to what they are proposing. As the week progresses, group work disclosure broadens and concludes with full disclosure on Friday. The cumulative result will hopefully be a broad set of 'whats' and an equally broad set of 'hows'. One view would be that the resulting (What) & (How) space hypothetically defines the span of New Defense Acquisition Enterprise' space from the views of 20+ leaders. It will also surface those 'Whats' and 'Hows' that are independent, similar, or identical and an indirect illustration of how the cohort thinks (independent or similar).

Figure 4.20: SYS 350C Refinement Assumptions

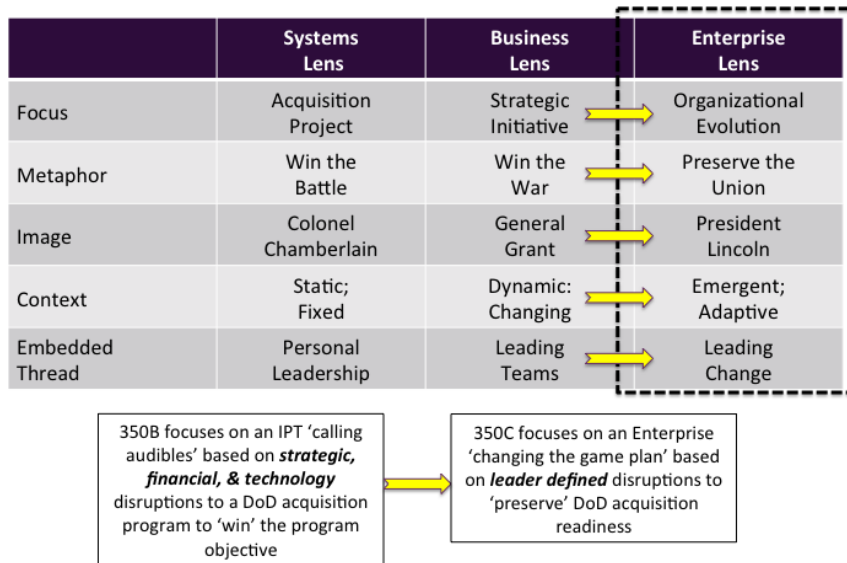


Figure 4.21: SYS 350B to SYS 350C Curriculum Roadmap Framework

	Focus Area				
	The Enterprise Technical Leader	Your Enterprise as a Dynamic System	Adapting Your Enterprise	Leveraging Your Enterprise and Systems of Enterprises	Implementing Enterprise Change Strategies
Performance Outcome	Synthesize recommendations for assuring Enterprise Acquisition Readiness.	Model, assess, and project the acquisition readiness of your Enterprise of Interest.	Identify and assess Enterprise acquisition readiness needs and develop enterprise adaptation objectives and strategies.	Identify inter and intra Enterprise initiatives that enable Enterprise acquisition readiness, adaptation or change objectives.	Implement user & workforce adaptation strategies that enable enterprise readiness, adaptation or change objectives.
TLO	Develop, measure, and improve Enterprise Acquisition Readiness in an environment of emerging user needs and workforce disruptions.	Frame and baseline mental and physical models of Enterprises of Interest for subsequent 350C learning and leadership application.	Evaluate ways to determine Enterprise acquisition readiness strengths, weaknesses, opportunities, and threats and enterprise adaptation initiatives.	Determine how and when best to leverage people, process, tools, or technology across and between multiple enterprise systems of interest.	Determine and evaluate ways to communicate and implement Enterprise adaptation strategies that assure acquisition readiness.
ELO-1	Describe working definitions of DoD Enterprise Acquisition Readiness.	Describe working definitions of a DoD Acquisition Enterprise of Interest.	Discuss how Enterprises are formed a) by design, b) by collaborative adaptation, and c) by known or unknown consequence.	Describe the elements of what comprises Enterprise and Systems of Enterprise 'leverage'.	Describe direct and indirect ways one can implement Enterprise workforce, process, tool, technology, & facility adaptations.
ELO-2	Describe working definitions of workforce and customer need disruptions that can affect DoD Enterprise Acquisition Readiness.	Describe Enterprises as dynamic systems comprised of inputs, nodes, connections, and outputs. Discuss the concept of enablers and inhibitors that can affect the extent and timeliness of desired Enterprise outputs.	Discuss the concepts of Enterprise span of control and influence from both a direct and indirect perspective.	Describe what must be considered when determining if leveraging people, process, tools, technology, or facilities across Enterprise is the best way to assure acquisition readiness.	Discuss the challenge of leading Enterprise buy-in from within your Enterprise of interest and among stakeholder Enterprises.
ELO-3	Develop and describe the structure and dynamics of your current Enterprise Acquisition model.	Describe representative DoD Acquisition Enterprise system models to include a) large DoD Acquisition program, agency, or command, b) a major Prime Contractor, and, c) a major acquisition process or initiative.	Describe how adapting an Enterprise may vary depending on the context (people, process, tool, technology), criticality, and time line of the adaptation initiative.	Describe the various ways to best leverage people, technology, process, and tools across enterprises.	Describe ways to convey technical information to decision makers and stakeholders; 2) the importance of non-verbal communication, and; 3) how story telling can become a powerful way for leaders to communicate.

Figure 4.22: SYS 350C Technical Performance Outcome & Learning Objectives

	Focus Area				
	Understanding Your Enterprise	Building Enterprise Readiness	Tools for Leading Enterprise Change	Leading Enterprise Workforce Development	You as an Enterprise Change Agent
Performance Outcome	Develop strategies for assessing and utilizing organizational strengths across cultures in an enterprise	Design a strategy for making use of current cultural strengths to introduce opportunities for change and to generate acceptance for change	Create a plan for leading an enterprise change	Design a model for enterprise leadership development that can simultaneously build capabilities, enhance the culture, and adapt to evolving needs	Produce a personal plan for increasing your enterprise leadership readiness
TLO	Assess the organization cultures of enterprise sub units to identify strengths and opportunities	Develop and articulate the external and internal drivers that make collaboration skills essential across the enterprise	Apply techniques from "the rider", "the elephant", and "shaping the path" to an enterprise change opportunity	Determine what leaders can do to build learning organizations where engineering and technology expertise is a key strategic asset	Outline the roles and behaviors required of leaders who lead complex enterprises
ELO-1	Use knowledge of cultural artifacts, espoused values, and underlying assumptions to describe the current Acquisition enterprise	Plan how you will learn what you don't know about the cultures and people involved in the change	Incorporate the six boundary spanning levers leaders use in a plan for enterprise change	Compare and contrast 3 adult learning models: competency models, identity models, and experience models	Question personal assumptions about leadership strengths and areas for growth with a peer coach
ELO-2	Depict the key relationships and cross-group activities required for successful enterprise-wide collaboration	Articulate the pros and cons of strong organizational cultures and the implications of them for how to lead change	Outline primary and secondary methods for embedding and changing culture in new, young, and mature organizations	Explain how the 5 attributes of learning agile people can be developed	Identify strengths and opportunities for personal development
ELO-3	Compare and contrast the current Acquisition Enterprise culture with the needed Acquisition culture in 2020	Experiment with techniques for increasing skills in cross-enterprise ideation, improvisation, and problem solving	Recognize instances of positive deviance and how to use them to accelerate change		Choose two methods of accelerating experience with and proficiency in enterprise leadership skills

Figure 4.23: SYS 350C Leadership Thread Performance Outcome & Learning Objectives

4.3 REFINED 350C PILOT ARCHITECTURE & SYLLABUS

At the highest level, the refined 350C "Triangle Architecture" is shown in Figure 4.31. Like 350B, the course consists of technical modules (shown in black) and leadership "thread" modules (depicted in red). As in 350A and B, the thread modules are interleaved with the technical modules to reinforce the

fact that leadership is not a separate topic, it is how leaders do their jobs. The detailed syllabus is presented in Figure 4.32

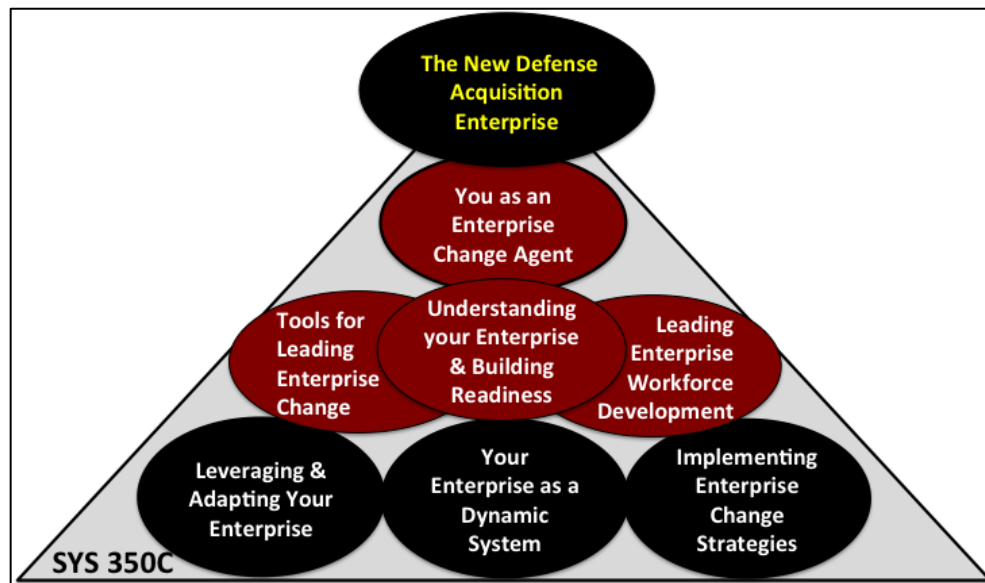


Figure 4.31: SYS 350C Triangle Architecture

Day 1: Inventing the Future		Day 2: Designing Continuous Change		Day 3: Levers & Relationships	
M0.0	Introductory Remarks	T0.0	Check-in	W0.0	Check-in
M1.0	SYS 350C Overview	T1.0	Case Study: Deliberate Disruption	W1.0	Levers of Change
M2.0	Welcome		Break		Break
M3.0	Resetting the Context	T2.0	Group Project: What Has Changed?	W2.0	People - Building Capacity for Change
	Break		Lunch	W3.0	Boundary Spanning Part One
M4.0	What is an Enterprise?	T3.0	What does Enterprise Readiness Look Like? Part One		Lunch
M5.0	Who do we have to be? Part One		Break	W3.0	Boundary Spanning Part Two
	Lunch	T3.0	What does Enterprise Readiness Look Like? Part Two	W4.0	Group Project: Designing the Change Strategy
M5.0	Who do we have to be? Part Two		Break		Break
	Break	T4.0	Reflection & Debrief	W5.0	Reflection & Debrief
M6.0	Group Project: Inventing the Future		NETWORKING	W6.0	Wrap-up
M7.0	Reflection & Debrief				
Day 4: Organizational Readiness		Day 5: The New Acquisition Enterprise			
H0.0	Check-in	F0.0	Check-in		
H1.0	Leadership Communications	F1.0	Team Presentations		
	Break		Break		
H2.0	Designing Leadership	F2.0	Group Reflection		
	Lunch		Brunch		
H3.0	Individual Reflection	F3.0	Student Feedback & Close		
	Break				
H4.0	Group Project: Develop Final				
H5.0	Presentation Setup				

Figure 4.32: SYS 350C Refined Syllabus

Introduction: Following the course overview and a welcoming exercise, the next segment of the course was designed to reestablish the context that had existed at the end of the 350B pilot in December 2013. Summary conclusions from the team presentations at the end of 350B were presented and participants were asked to comment. This allowed the majority of the 350C students, who had participated in the earlier pilot, to recall where 350B ended, and it served to enroll the new members of the 350C class in the earlier findings. Participants were also asked to discuss actions they had taken since the last class and how they had changed as leaders during the interim.

Technical Modules: The context-setting module was followed by the first of three technical modules, each designed to help participants understand the nature and complexity of an extended enterprise. Participants were divided into three groups and each group was asked to diagram one of the following enterprises: Healthcare, Education, and Food Production and Distribution. The exercise helped participants recognize the complexity of such broad enterprises, the numerous elements each contains, and the many relationships that exist among those elements. The entire group was then asked to diagram the Defense Acquisition Enterprise to help them see that it was similarly complex and to reinforce the number and importance of the many relationships involved.

The second technical module introduced participants to the notion that producing enterprise-level change requires leaders to deliberately create and deploy disruptive initiatives, in contrast to simply responding to externally-driven changes as they did in the Business Lens. A Harvard Business School case, "GE ... We bring good things to life," was used as the basis of this module and students were able to see just how many disruptive initiatives GE implemented over the 15-year period at the beginning of Jack Welch's tenure as CEO, and wrestle with the decision as to whether or not GE should initiate yet one more, a Six Sigma program.

The third technical module focused on Leadership Communication. In preparation for this module, participants were asked to read a Harvard Business Review paper written by Peter Guber entitled "The Four Truths of the Storyteller." In the paper, Guber discusses the "leader as storyteller" and defines the need for effective communication to be "true to the teller, true to the audience, true to the moment and true to the mission." With this background, Col. Joshua Chamberlain's Civil War era speech to the Maine mutineers prior to the Battle of Gettysburg was used as a case study to help participants internalize the meaning of Guber's four truths. The module concluded with a final video clip that demonstrated that effective communication requires engaging people's emotions, not just transferring information.

Leadership Thread Modules: The first leadership module asked the question, "Who do we have to be to invent the future?" In a large empty room, participants explored three principles of effective improvisation using experiential exercises that required them to hear offers and listen to learn from others, build on the contributions of others through "yes, and," and increase risk taking by doing things they didn't already know how to do. The group connected improvisation skills to leadership by articulating how they, as leaders, encourage other people to take risks and create environments where the creative potential of people is applied to complex, changing work challenges.

The second leadership module asked the question, "What does enterprise readiness look like?" The group did three exercises to understand how leaders assess an organization's culture and use that understanding to embed new cultural elements or change existing ones. First, the group viewed four videos to extract the visible artifacts, espoused values and beliefs, and basic underlying assumptions of four companies based on the model by Edgar Schein. Next, the group was divided by service or

organization and asked to list the "10 Commandments" of behavior for staff and leaders in each organization. The groups then compared and contrasted the "Thou shalls" and the "Thou shall nots" across organizations. Participants explored Schein's model for embedding and transmitting culture, applied it to their own cultures and example companies, applied the pre-reading on changing culture, and asked, "what needs to be unlearned" if they are to change their current culture? The final exercise required them to apply the culture assessment and change material to a strategic thrust they identified in their project teams that enabled success in 2020. [Schein, E. H. (2010). *Organizational culture and leadership*, 4th Edition. San Francisco, CA: John Wiley and Sons, Inc.]

The third leadership module asked, "How do you build capacity for change?" Each participant was asked to identify a leadership behavior they were personally attempting to change. As we discussed the techniques recommended by Chip and Dan Heath in their change model - direct the rider, motivate the elephant, and shape the path - participants wrote how they could use each technique to increase their capacity for changing the leadership behavior they identified and discussed with a peer what they would do next. [Heath, C. and Heath, D. (2011). *Switch: How to change things when change is hard*. New York, NY: Random House.]

The fourth leadership module asked the question, "How do we lead collaboration across boundaries to create enterprise-wide change?" People identified boundaries they need to span in order to create change in their enterprises. They discussed the Center for Creative Leadership's Boundary Spanning Model from the pre-reading. Next, the group was introduced to a boundary-spanning dialogue tool called a fishbowl discussion, which creates a place for increased inquiry and listening. The class participated in a fishbowl on the topic: "Stories, insights, and challenges - leading change by working boundaries." The post-fishbowl discussion identified personal leadership insights and places at work where both the fishbowl technique and the boundary-spanning model could be applied. [Ernst, C. & Chrobot-Mason, D. (2011). Flat world hard boundaries: how to lead across them. *Sloan Management Review*, pp. 1-8. Spring.]

The fifth leadership module asked the question, "How do leaders design leadership development?" The group examined the underlying beliefs and synergies across three approaches to leadership development: competency models, identity models, and experiential models. Participants shared their key experiences and considered what they could do as leaders to accelerate leadership development in an enterprise undergoing rapid change.

The final leadership module asked the question, "What are you committed to developing in your own leadership after this course?" Participants completed a self-paced workbook reflection segment that asked them to first identify and prioritize a list of key technical leadership attributes, abilities, skills, and experiences of a successful enterprise technical leader. Next, they applied the development pipeline model to their own top leadership development priority in order to understand where they were most challenged: insight, motivation, capability, real-world experience or accountability. Finally, they discussed their analysis with a peer and made short- and longer-term commitments for their own leadership development. [Peterson, D. B. (2006), "People Are Complex and the World Is Messy: A Behavior-Based Approach to Executive Coaching" Chapter 2, in Stober, D. R. and Grant, A. M. (Eds.). (2006; Evidence based coaching handbook: Putting best practices to work with your clients, Hoboken, NJ: Wiley.)]

4.4 REFINED 350C GROUP PROJECT OVERVIEW

As noted in Section 4.2, the 350C Group Project was redesigned around a continual story arc to provide continuity throughout the course. The project was grounded in the conclusions of the students in the 350B pilot, specifically that “there is a mismatch between current defense acquisition processes and today’s continuously changing, dynamically interacting strategic, financial and technological forces.” With that as a starting point, participants were divided into four teams and asked to design a program to remedy the shortcomings. Teams were kept separate to allow for four independent realizations of project activities.

The group project proceeded in four segments. In the first, teams were asked to imagine an ideal future state that might exist in 2020, and to capture that state in a notional Wall Street Journal article. This exercise allowed them to define the future from the future, thus freeing them from the constraints and limitations of the current state, and assumptions about what might or might not be possible to change it. This technique has been widely shown to produce more innovative ideas than more traditional approaches starting from the present.

The second segment of the project asked teams how they might determine whether or not their ideal state had been achieved by having them to define three to five measureable results that would illustrate the difference between the state of defense acquisition in 2020 and that in 2014. They were then asked to identify the key initiatives or strategic thrusts that would have been required to produce the results they described. This exercise forced participants to become more specific about their ideal state and to begin focusing on the evidence that would have to be produced if success were to be achieved. Again, teams were asked to perform these tasks standing in the future rather than the present to free their thinking from existing constraints.

The third segment of the project asked teams to move backwards from their ideal future toward the present and define specific milestones – measurable results to be achieved on specified dates – for each of their strategic thrusts. The intent was to help them begin to develop a program plan for accomplishing the goals they had previously defined. Having created these plans backwards from the future, they could now imagine executing them from the present forward.

By completing these three tasks, participants were able to experience a structured approach to designing and initiating enterprise level change. They were shown a way to overcome the constraints of the present state, and experienced first hand the cultural tug that binds people to the status quo and inhibits movement toward a desirable goal, no matter how attractive it might be.

The final segment of the project required teams to develop and present the results of their projects. Rather than simply enumerating the outputs of the tasks they had performed, teams were asked to address a more open question. They were specifically asked to present a proposal to USD(AT&L) that would initiate the transformation they described in the Wall Street Journal article written at the outset of the project. Addressing this question required the teams to synthesize their findings and recommend a specific approach to improving the defense acquisition enterprise. To further focus the teams on synthesis, creativity and evaluation, objectives at the top end of “Bloom’s Taxonomy of Educational Outcomes,” three specific constraints were imposed.

- The length of the presentations was limited to 20 minutes in order to have teams focus on a crisp recommendation without getting lost in extraneous details
- Presenters were prevented from using PowerPoint slides in order to force them to communicate directly with their audience, rather than spending time choosing the best words to put on a slide.
- They were also encouraged to create a “visual metaphor” with which to represent their recommended approach to help them further consolidate their proposals and provide their audience with a convenient way of remembering what they said.

4.5 REFINED 350C PILOT CONDUCT, FINDINGS & CONCLUSIONS

The revised 350C pilot was conducted at the Defense Acquisition University from 18-21 March 2014. Twenty-two highly experienced students from across the DoD – Army, Navy, Air Force, Marine Corps, Missile Defense Agency and Defense Systems Management College – participated. The complete demographic profile is provided in Figure 4.50.

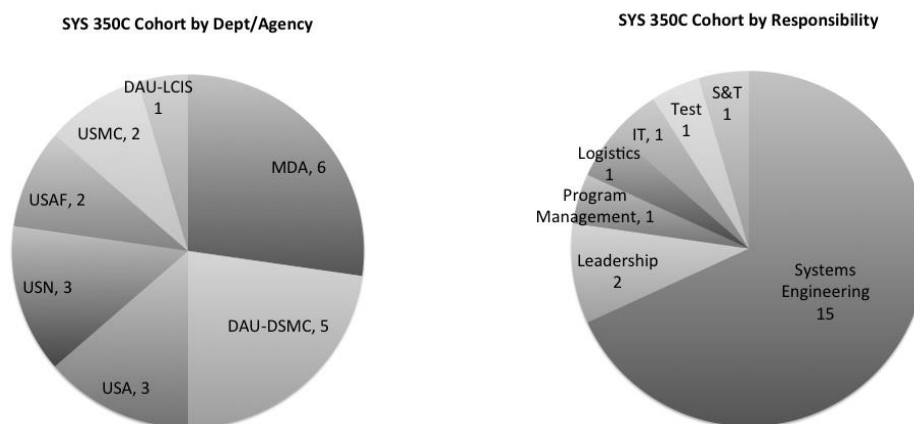


Figure 4.50: SYS 350C Student Pilot Cohort Demographics

Unfortunately, the course had to be condensed due to a snowstorm that hit the Washington, DC area on March 17. Figure 4.51 illustrates the condensed syllabus.

Tuesday: Inventing the Future & Discontinuous Change		Wednesday: Designing Continuous Change, Levers, & Relationships		Thursday: Organizational Readiness		Friday: The New Acquisition Enterprise	
T0.0	Introductory Remarks	W0.0	Check-in	H0.0	Check-in	F0.0	Check-in
M1.0	SYS 350C Overview	T3.0	What does Enterprise Readiness Look Like? Part Two	W4.0	Group Project: Designing the Change Strategy	F1.0	Team Presentations
M2.0	Welcome	T1.0	Case Study: Deliberate Disruption		Break		Break
M3.0	Resetting the Context		Break	H1.0	Leadership Communications	F2.0	Group Reflection
M4.0	What is an Enterprise? Part 1	T2.0	Group Project: What Has Changed? (Intro-W.2.0 Levers of Change)	H2.0	Designing Leadership Development Part 1		Brunch
	Lunch		Lunch		Lunch	F3.0	Student Feedback & Close
M4.0	What is an Enterprise? Part 2	T3.0	What does Enterprise Readiness Look Like? Part Two	H2.0	Designing Leadership Development Part 2		
M5.0	Who do we have to be? Part One	T3.0	What does Enterprise Readiness Look Like? Part Three	H3.0	Individual Reflection		
	Break	T4.0	Reflection		1500 - Completion Group Project: Develop Final Presentation		
M5.0	Who do we have to be? Part Two		Break				
M6.0	Group Project: Inventing the Future	W2.0	People - Building Capacity for Change				
M7.0	Reflection & Debrief	W3.0	Boundary Spanning Part One				
T3.0	What does Enterprise Readiness Look Like? Part One	W3.0	Boundary Spanning Part Two				
	NETWORKING						

Figure 4.51: Condensed SYS 350C Student Pilot

DAU faculty and the students considered the pilot to be highly successful. The measure of success was the degree to which participants demonstrated the ability to integrate different elements of the course, synthesized various concepts into original ideas, defined specific actions to forward their goals, and presented their proposals in a clear and compelling fashion. All four of the teams accomplished these objectives.

Of particular importance was the ability of participants to describe their ideas in the context of the complex enterprise that actually develops and acquires defense systems, the importance of working across traditional boundaries to alter these enterprises, and to address the cultural issues that impede enterprise-level change. Teams achieved these results to varying degrees.

Two of the four teams focused primarily on technical issues, specifically the potential for advanced manufacturing techniques, increased modularity, and common standards and interfaces to speed development and provide greater agility to respond to changing needs. The other two teams also addressed technical topics like commonality and distributed functionality, but went well beyond technology to address enterprise-level issues like increased collaboration between government and industry, joint development with international partners, greater mobility across the defense acquisition workforce, and significant reductions in the number of layers of oversight and review.

A key question that arose during the design of the 350C pilot was how far participants' understanding of cultural issues could be advanced during a one-week engagement. The decision was made to push this theme as far as possible and observe the results, rather than assuming an answer *a priori*. What was observed was that during their team presentations, participants demonstrated an understanding of the importance of these issues, and the role they would play in allowing them to achieve the changes they sought to make. None of the teams proposed specific disruptive initiatives to address these issues, however. Since the loss of a full day of the five-day class due to a snowstorm significantly reduced the time available to address cultural issues from that originally planned, the design question was not fully addressed by the pilot. This would certainly be an area for additional inquiry should the opportunity to conduct a second pilot using the refined SYS 350C syllabus be afforded.

At the conclusion of the pilot, participants were asked “Should DAU offer this course again? The cohort response was 100% (16 of 16 responses) ‘Yes’. As at the conclusion of the SYS 350B pilot, participants were again asked to identify elements of the course they thought should be kept, added and dropped. The rank-ordered responses are noted in Figures 4.53 – 4.55. All the ‘Keep’ responses apply to future SYS 350C revisions. The ‘Adds’ and ‘Deletes’ responses selected for consideration in future pilot revisions are annotated with a ‘Yes’ or (Y).

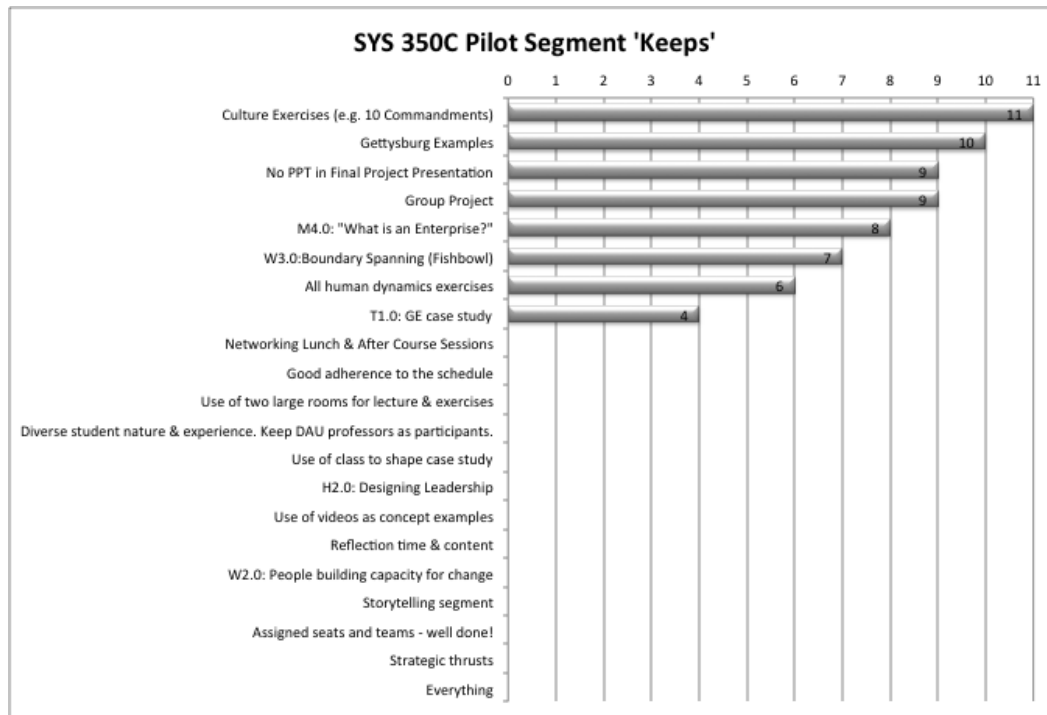


Figure 4.53: SYS 350C Student Pilot Feedback (Keeps)

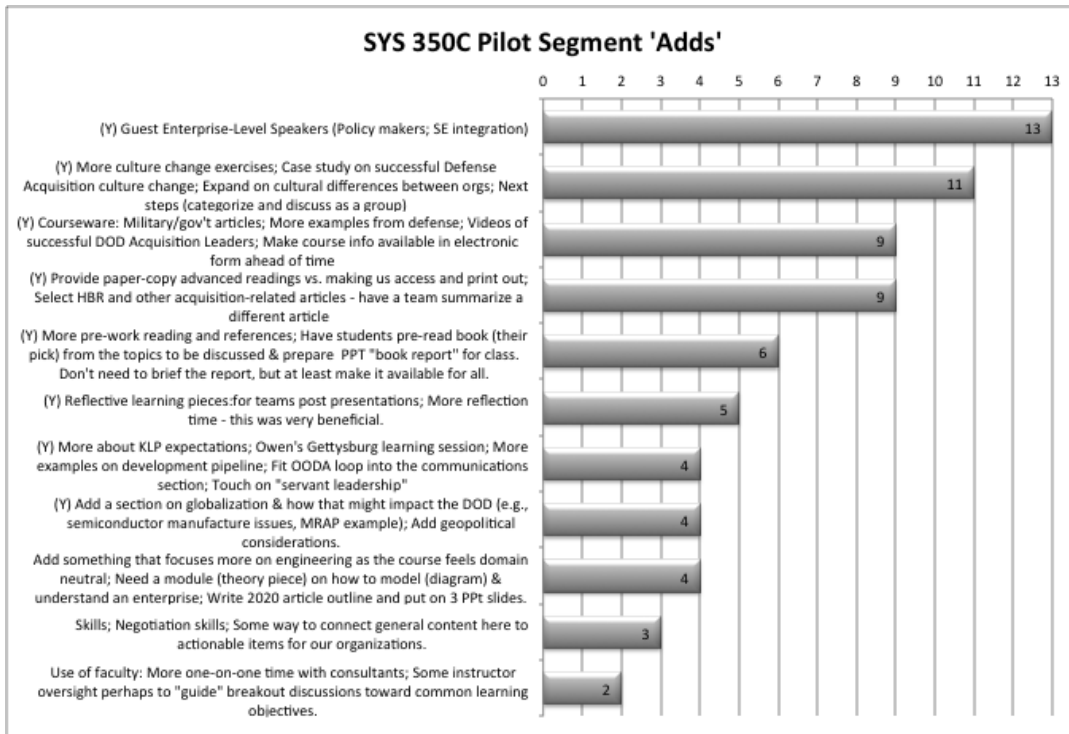


Figure 4.54: SYS 350C Student Pilot Feedback (Adds)

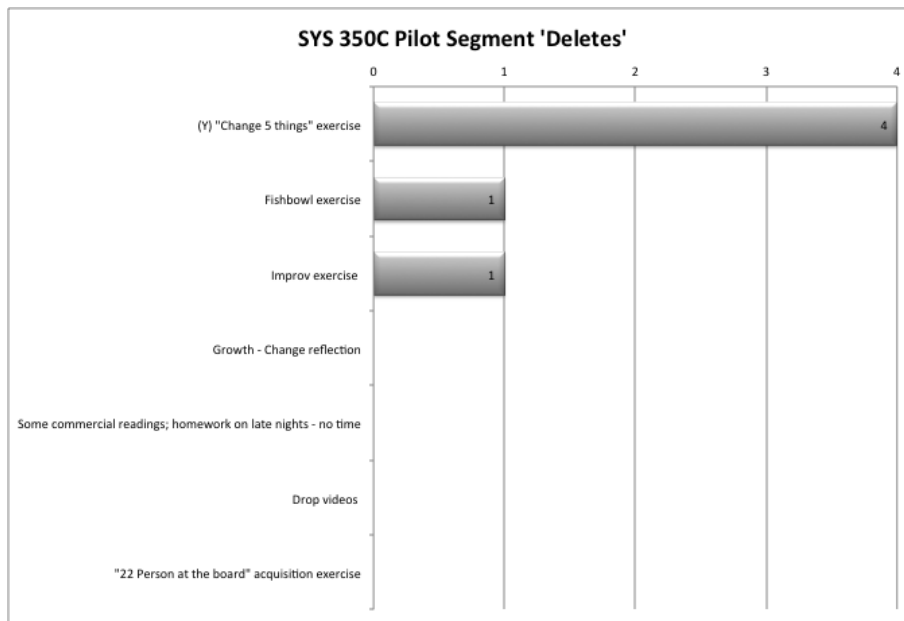


Figure 4.55: SYS 350C Student Pilot Feedback (Deletes)

5 FINDINGS, CONCLUSIONS & RECOMMENDATIONS

The objectives of the RT4 Year 4 research task were fully met:

The first objective was to address the observed short-comings of the RT4 Year 3 SYS 350B and SYS 350C pilots by leveraging content development lessons learned during the SYS 350A pilot phase and particularly the power of an embedded group project that imparted a consistent story arc throughout the 350A course. New defense-oriented projects were designed for each course. The 350B project required student IPTs to respond to a series of strategic, financial and technological disruptive event and the 350C project required participants to systematically develop and present a program to implement enterprise-level change in defense acquisition.

The second objective, to refine and enhance the integration of the SYS 350B and SYS 350C syllabi, was accomplished by linking the curricula more tightly, as illustrated in Figure 5.10.

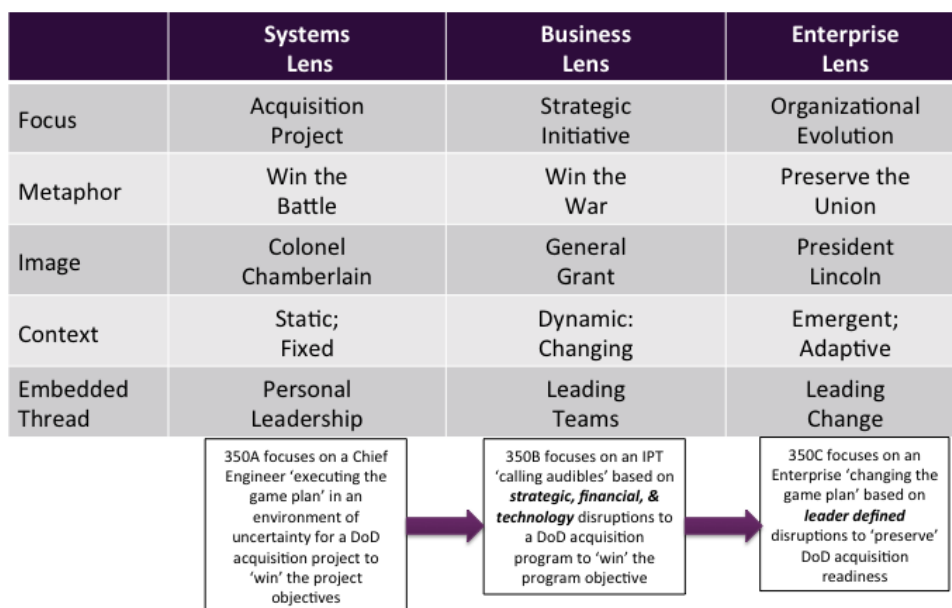


Figure 5.10: SYS 350 Curriculum Roadmap Framework

The third objective was to conduct SYS 350B and SYS 350C student pilots for evaluation of the iterated syllabi and this was accomplished with the pilots of 350B pilot from 2-6 December 2013 and 350C from 18-21 March 2014. Both were highly successful, based on participant feedback and observations made by the instructors. Participants were frequently observed connecting different topics to draw independent conclusions not contained in the course material, expanding the aperture to address the context of the problems with which they were presented, and translating insights into meaningful actions, not only to be taken but others in some ideal future state, but things they themselves could do in the present to foster needed change. Further, when asked at the beginning of 350C whether they had taken such actions since the 350B pilot, several provided impressive examples. The activities that

were observed are consistent with those of effective technical leaders and there is no doubt that they were stimulated, at least in part, by the experiences from the courses.

Ultimately, the objective of the RT-4 research is to validate the hypothesis that the technical leadership capabilities of high potential, senior DoD systems engineers and technologists could be accelerated by an educational program in technical leadership. Fully validating this hypothesis will obviously require more time and more evidence than can be obtained from two short pilots. Nevertheless, the early results from this year's research are certainly encouraging.

Despite the overall positive results, two relatively minor concerns deserve further attention. First, while basing the 350B project on disruptive events proved to be effective, there were some technical issues with the implementation of the project activities that would benefit from further refinement. In addition, the 350C pilot left one key question unanswered, the extent to which participants in a short course can be helped to understand and internalize the important role of organizational culture in resisting enterprise-level change and the need to explicitly address this in designing change strategies and plans. While it is clear that this topic is too complex to be fully addressed in a one-week course, it might have been possible to make more progress had a full day of planned activities and reflection not been lost to the snowstorm. It would be useful to conduct another 350C pilot to test the value of the deleted exercises.

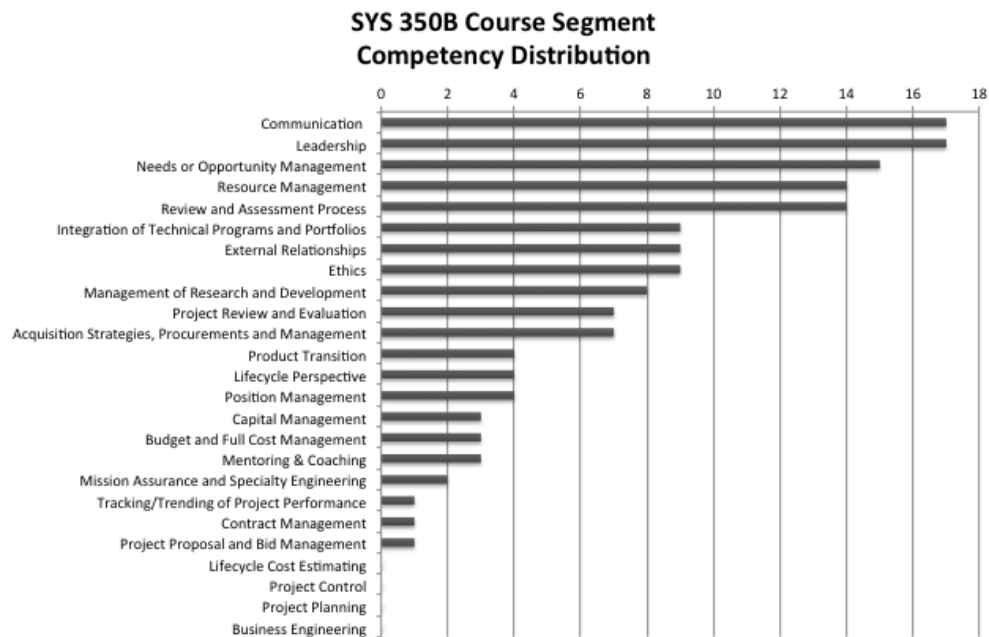
Based on the results of the RT-4 Year 4 research, the following recommendations are offered:

1. Refine the SYS 350B/C pilot syllabi as follows:
 - a. Incorporate the selected 'Adds' noted in Figure 3.53 and deletes from Figure 3.54 into SYS 350B.
 - b. Incorporate the selected 'Adds' noted in Figure 4.54 and deletes from Figure 4.55 into SYS 350C.
 - c. Further refine the SYS 350B disruptive events project to enhance the independent surprise nature and clarity of the event.
 - d. Further refine SYS 350C to ensure that the full range of cultural change material and exercises can be tested.
2. Conduct additional 350B/C pilots to test the refined syllabi.
3. Conduct follow-up Kirkpatrick Level 3 Assessment of RT4 Y4 participants to determine the extent to which technical leadership capabilities and behaviors derived from their participation in SYS 350B/C have been translated into actions and behaviors in the workplace, in accordance with the RT-4 research hypothesis.
4. Leverage the material and approaches developed for SYS 350 B and C to develop an educational program that will help fill the void in advanced leadership education/training for current and future technical leaders.

6 APPENDICES

APPENDIX 6.0 SYS 350B COMPETENCIES VS SEGMENTS

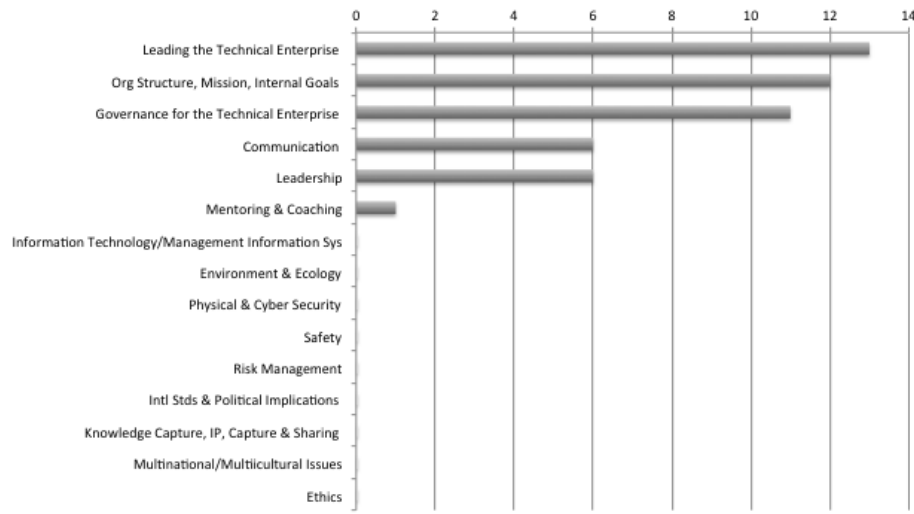
This appendix shows a subjective alignment exercise conducted by the RT-4 team. The purpose of this exercise was to provide an assessment of the frequency at which the business lens competencies were covered in the refined SYS 350B pilot.



APPENDIX 6.1 SYS 350C COMPETENCIES VS SEGMENTS

This appendix shows a subjective alignment exercise conducted by the RT-4 team. The purpose of this exercise was to provide an assessment of the frequency at which the business lens competencies were covered in the refined SYS 350C pilot.

SYS 350C Course Segment Competency Distribution



APPENDIX 6.2 SYS 350 ALIGNMENT WITH USD MEMO

This appendix maps the SYS 350A/B/C objectives and pilot course content to the competencies cited in Attachment 1: Common Cross-Functional Requirements to the USD (ATL) 'Key Leadership Positions and Qualification Criteria' Memo of 08 NOV 13. The noted mapping is one validation of the proper alignment of the SYS 350 series overall objectives with the cited needs of the DoD.

Attachment 1: Common Cross-Functional KLP Requirements								
Education	Level III Certification in respective functional area	• Bachelor's degree (required) • Relevant advanced degree (preferred) • Senior Service School (preferred)						
Training								
Experience		• Candidate or incumbent be GS 14/15 - 05/06 or senior • 2 years as a functional mentor (10 hours per year) • Cross functional and Broadening assignments/rotations • Eight years of Acquisition experience, or equivalent demonstrated proficiency						
Competencies	Executive Leadership	Fundamental Interpersonal Skills Written Communication Oral Communication Integrity/Acceptance Continual Learning Public Service Motivation 	Leading Change Creativity/Innovation Analytical Thinking External Awareness Flexibility Resilience Strategic Thinking Vision 	Leading People Conflict Management Leveraging Diversity Developing Others Teamwork 	Results Driven Accountability Customer Service Dedication Enterprise Buy-in Technical Credibility Problem Solving 	Business Acumen Financial Management Human Capital Management Technology Management Computer Literacy 	Building Coalitions Partnering Political Savvy Influencing/Negotiating 	Enterprise-Wide Perspective Joint Perspective Mission Orientation DoD Mission and Culture DoD Corporate Perspective National Defense Integration Global Perspective National Security Foundation 
	Program Execution	Program Scheduling; Risk Management and Mitigation; Program Health Metrics/Assessment/Reporting/Contractor Performance Assessment; Systems Perspective/Strategic Thinking; Requirements / Acquisition Planning; Sustainment Strategy Planning & Execution; Integration of Acquisition and Life Cycle Sustainment Requirements						
	Technical Management	Systems Engineering; Design for Optimized Product Performance; Technical Acumen; Risk Identification and Management; Configuration Management; Technical Reviews and Audits (such as: SRR, SFR, POR, CDR, SVR/FCA, PRR, PCA, and ISR) Logistics & Product Support; Support & Sustainment; Supportability Analysis; Product Support Planning; Technical or Product Data Management; Enterprise Architecture; Cyber Security; Agile IT development; Broad knowledge of IT Governing Policies and emerging technologies; T&E Strategy (TES); T&E Master Plan (TEMP); T&E Infrastructure; DT&E Assessments						
	Business Management	Contract Type/Structure; Intellectual Property; Source Selection; Protests; Contract Administration; E-Biz/Automated Tools; Life Cycle Sustainment Funding; Operating & Support (O&S) Cost Estimating-as identified in contracting input; Business Case Analysis; Budget Exhibits; Life Cycle Cost Estimating; Cost Consciousness						
	Currency	Minimum total of 80 Continuous Learning Points for DAWIA two year cycle consisting of the following components: 1) At least 30 hours of Functional Specific training (Exception: Program Management Career Field requires 50 hours of functional specific training); 2) At least 10 hours of leadership/professional training; 3) At least 10 hours of cross-functional training (career field dependent)						

APPENDIX 6.3 REFERENCES

1. SERC Technical Leadership Development Program, Technical Reports SERC TR-013—1 through TR 013-4.
2. Porter, Michael, “What is Strategy”, Harvard Business Review.
3. Darden Business Publishing, University of Virginia, John "Rooster" Clagett: Visual Training Solutions Group, Inc. (A), Product# UV2010-PDF-ENG.
4. Kouzes, J. M. and Posner, B. Z. (2007), Leadership Challenge, 4th Edition. San Francisco, CA: John Wiley & Sons, Inc.
5. Kahneman, Daniel (2011), "Thinking, fast and slow," New York, NY: Farrar, Straus and Giroux.
6. Cialdini, R. (2001), Harnessing the Science of Persuasion. Harvard Business Review, October 2001, pp 72-79.
7. Systems Acquisition Framework: <https://dap.dau.mil/aphome/das/Pages/Default.aspx>
8. Harvard Business School case, “GE ... We bring good things to life”
9. Guber, Peter, “The Four Truths of the Storyteller”, Harvard Business Review.
10. Schein, E. H. (2010). Organizational culture and leadership, 4th Edition. San Francisco, CA: John Wiley and Sons, Inc.
11. Heath, C. and Heath, D. (2011). Switch: How to change things when change is hard. New York, NY: Random House.
12. Ernst. C. & Chrobot-Mason, D. (2011). Flat world hard boundaries: how to lead across them. Sloan Management Review, pp. 1-8. Spring.
13. Peterson, D. B. (2006). People Are Complex and the World Is Messy
14. Stober, D. R. and Grant, A. M. (Eds.). (2006). Evidence based coaching handbook: Putting best practices to work with your clients. Hoboken, NJ: Wiley, A Behavior-Based Approach to Executive Coaching, Chapter 2.

GLOSSARY

DASD(SE) – Deputy Assistant Secretary of Defense for Systems Engineering
DAU – Defense Acquisition University
DHS – Department of Homeland Security
DoD – Department of Defense
DSMC – Defense Systems Management College
ELO – Enabling Learning Objective
IPT – Integrated Product Team
RT-4 – Research Task 4
SERC – Systems Engineering Research Center
TLO – Terminal Learning Objective
TLP – Technical Leadership Program
USD(AT&L) – Undersecretary of Defense for Acquisition, Technology, and Logistics
USG – United States Government