



Marshall Space Flight Center Systems Engineering Leadership Development

Advancing Systems Engineering Excellence

Project Management Challenge

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Program Management

- ❑ **Engineering Directorate is owning/sponsoring organization**
- ❑ **Office of Human Capital will support via joint Program Management with Engineering Directorate**
- ❑ **Level I acceptance and Level II selection process (to include pre- and post- entry activities) administered jointly by Engineering and Human Capital**
- ❑ **Program Management Team:**
 - Senior Advisor: Scott Croomes/EE01
 - Co-Program Manager ED: Phil Hall/ED10
 - Co-Program Manager HS: Susan Whitfield/HS40
 - Program Support ED: Stefanie Justice/ED10/Jacobs ESTS
 - APPEL Training Support HS: Shelley Miller/HS40/WILL

What is an SE Leadership Development program, and why did MSFC need one?



Systems Engineering Leadership Development Program:

A formal approach to establishing and recognizing:

1. Competency-holders in systems engineering (SE)
2. Candidates for leadership in SE-driven jobs

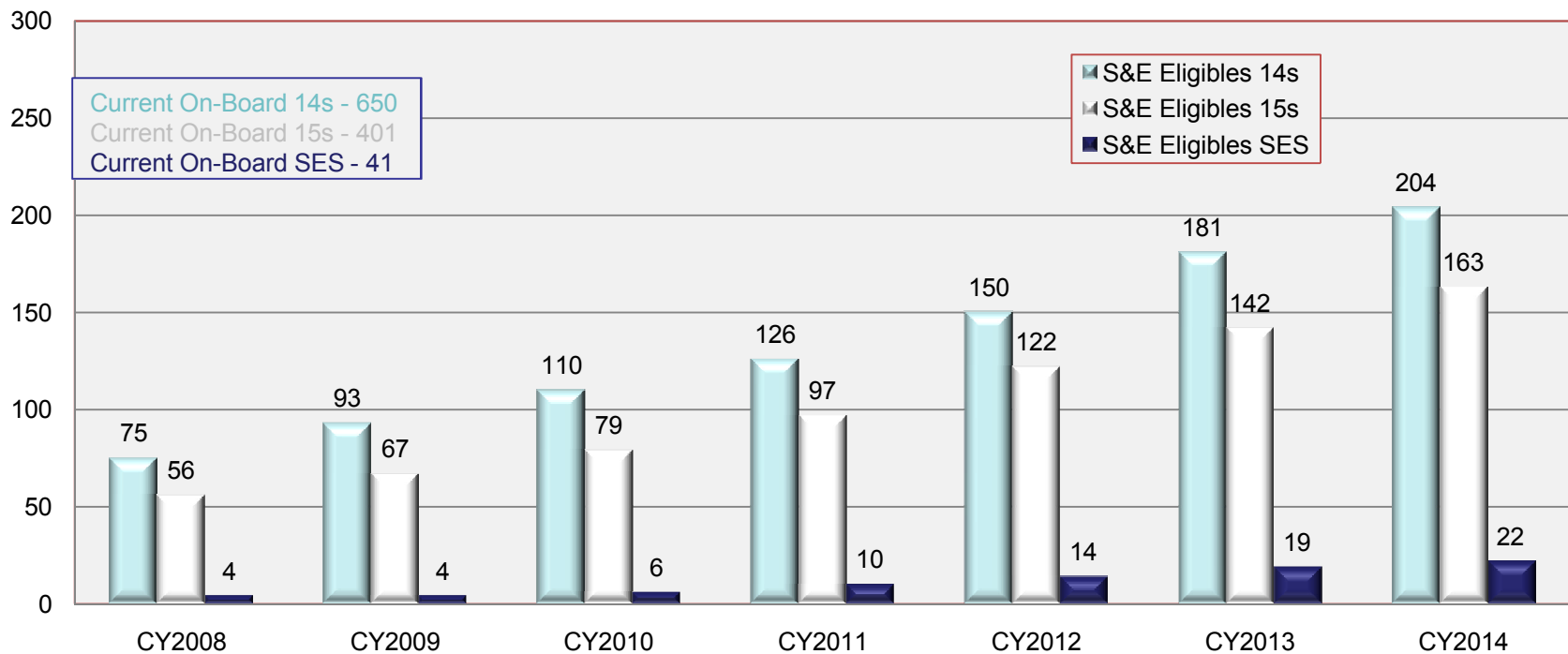
Why Needed:

1. MSFC projects require a steady supply of capable SE practitioners and leaders
2. An opportunity to shape our own destiny in the face of an Agency push towards increased SE formality

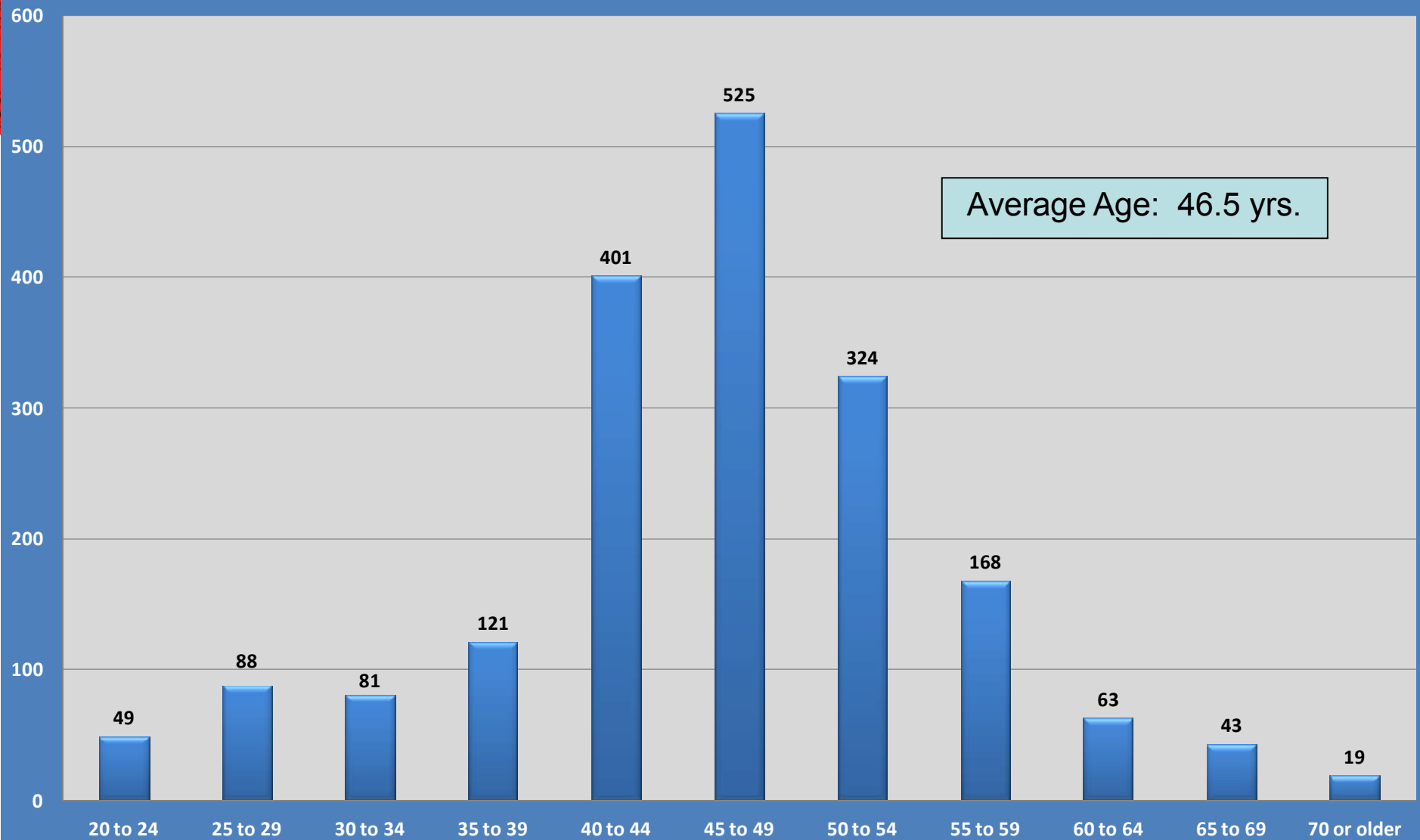


What Issue Are We Trying to Solve at MSFC?

Systems Engineering Deficiency: While almost all Center vacancies have been filled, there remains a lack of individuals with ***systems engineering expertise***, in particular those with ***strong leadership capabilities***, to meet the needs of the Agency's exploration agenda.

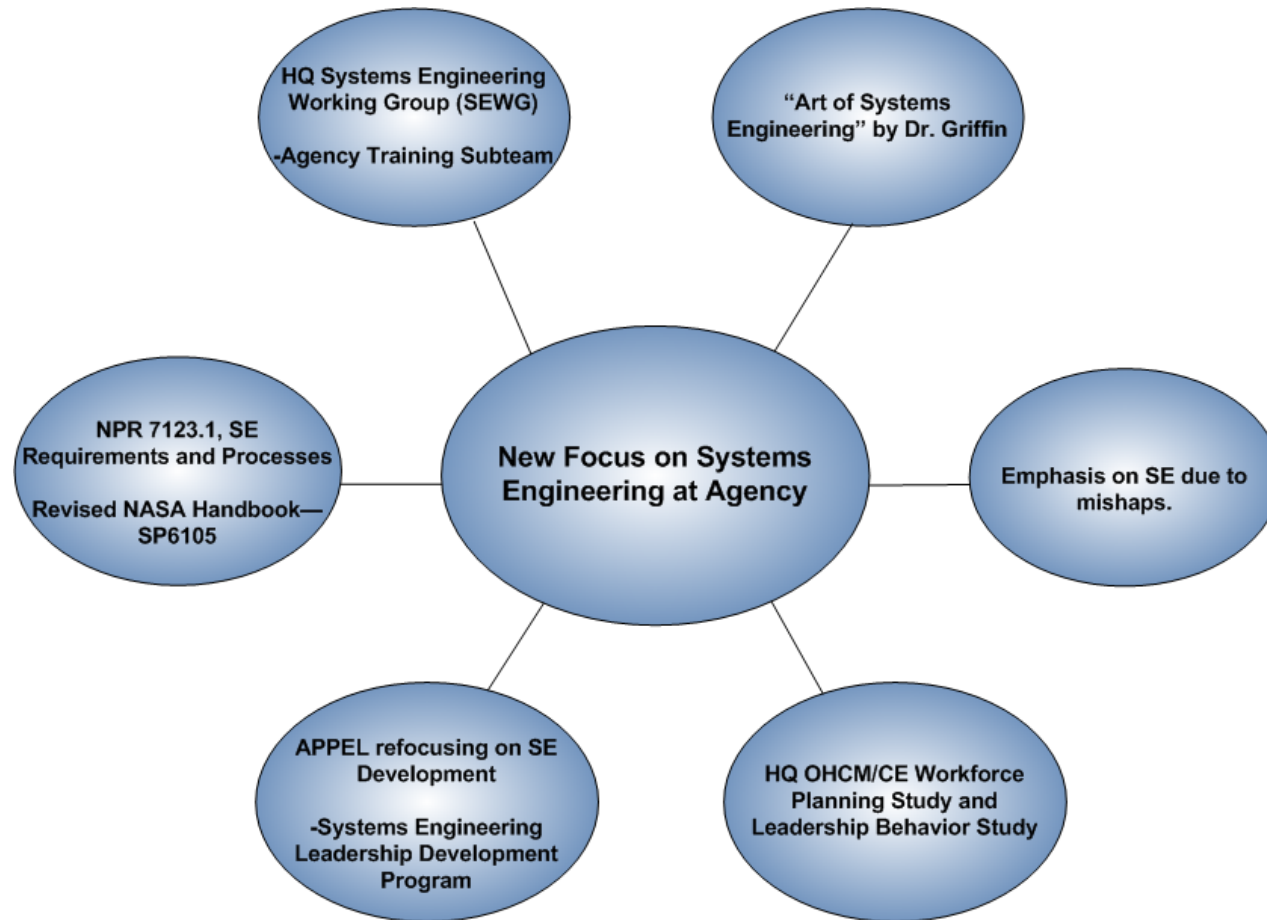


MSFC CS Scientific and Engineering Workforce by Age (Total = 1882)



With a shrinking civil service workforce as time goes by, the need for SE leaders will become more pronounced

Agency Focus on SE Development Issue



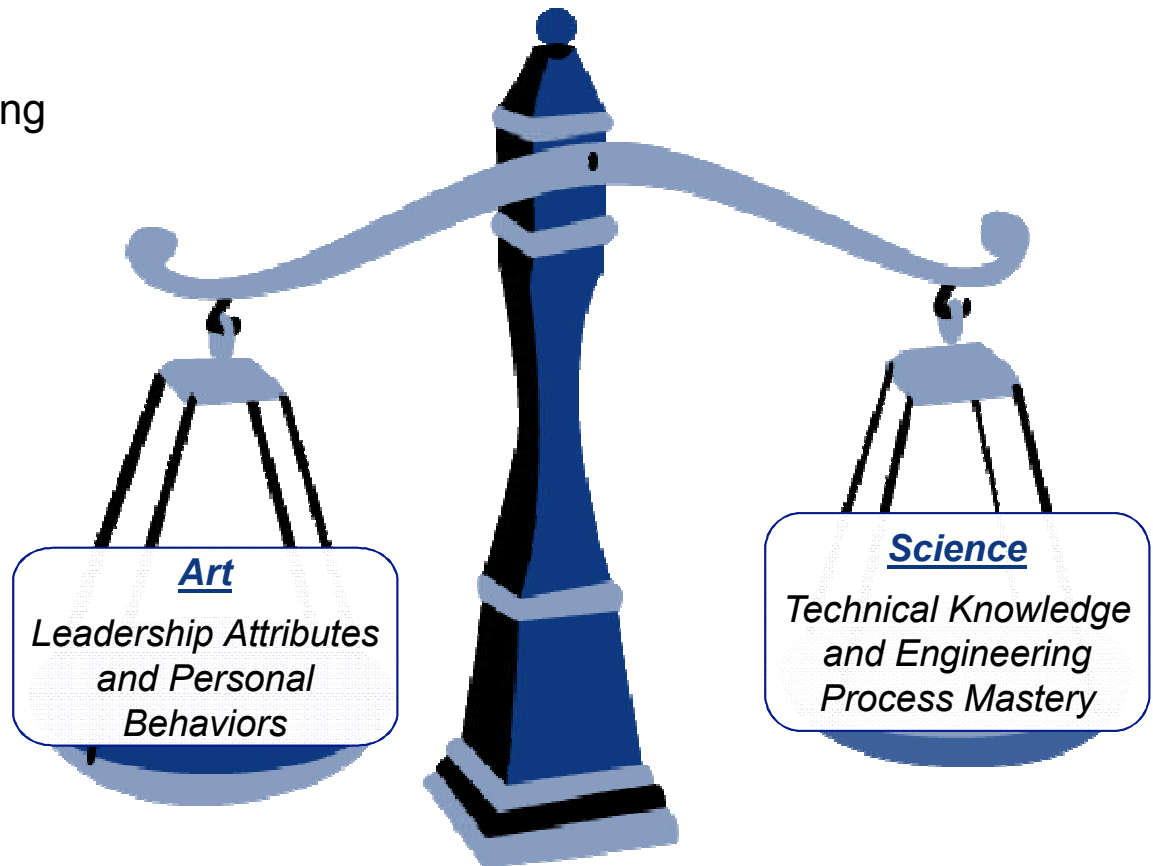
Agency recognizes the need for additional systems engineers at journeyman and lead levels to meet future requirements

Developing SE Leadership Skills

Systems Engineering is:

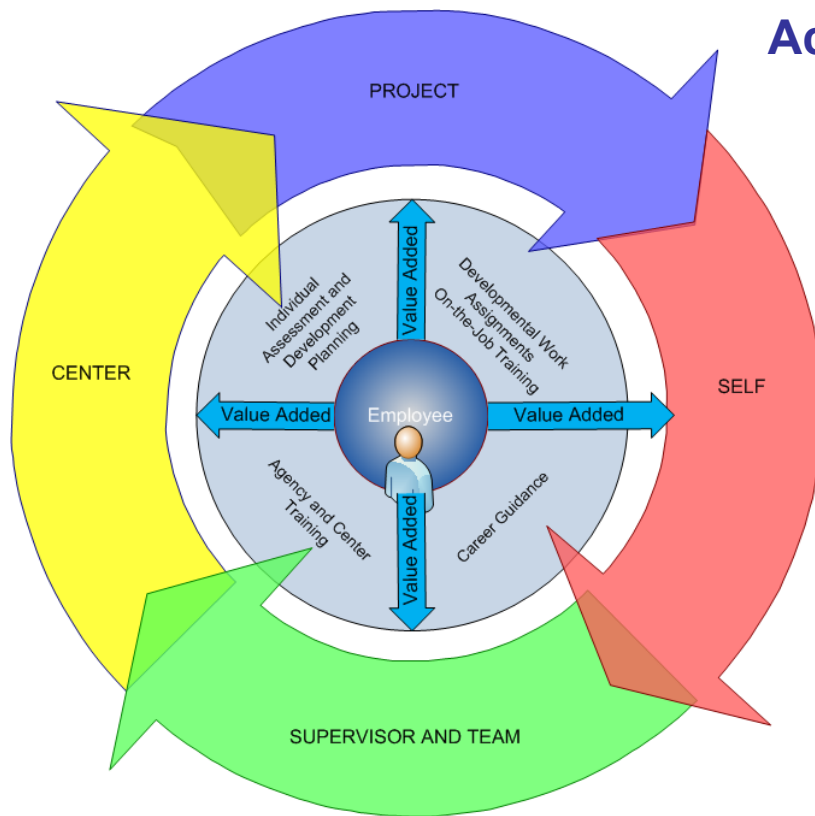
“The art and science of developing an operable system capable of meeting requirements within imposed constraints.”

–Mike Griffin



To develop strong leaders, programs must help participants develop both skill sets

Program Tenets



**Individual
Accountability**

Successful participants must be highly motivated

**Cost
Efficiency**

Use of existing training resources is maximized

**Relevant
Rotations**

Rotational assignments/ on-the-job training in-line with core Center work

**Convenient
Training**

Required courses available locally and/or on-line

**Supervisor
Involvement**

Makes use of normal supervisor/ employee relationship for individual development planning and career guidance

Basics of Proposed MSFC Program



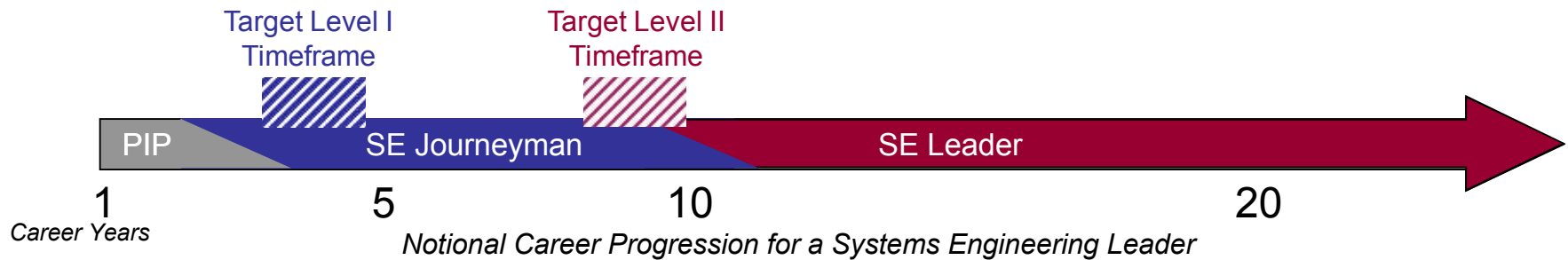
- ❑ Consists of two levels – Journeyman and Leader
- ❑ Completion of **each level** requires:
 - ✓ Training:
 - Four (4) courses for Level I (Journeyman)
 - Four (4) courses for Level II (Leader)
 - ✓ MSFC Developmental Assignment:
 - Minimum 6 months for Level I (Journeyman)
 - Minimum 6 months for Level II (Leader)
- ❑ Timeframe for completion of each level: 2 years

***Program is open to the Engineering Population at the Center
(Engineering and Safety and Mission Assurance Directorates, Program/Project Offices)***

Program Features

- ❑ Level I:
 - Participants self-declare with supervisory approval
 - Targets early career employees
 - Rotation/training aimed at enhancing basic SE competency
 - Professional Development Workshops

- ❑ Level II:
 - Participants are identified via formal call/program selection
 - Targets early/mid career employees
 - Rotation/training aimed at enhancing leadership skills
 - Professional Development Workshops



Program not formal certification, but career/competency enhancement



Developmental Assignments

Hands-On, Real-World Experience at MSFC

- ❑ 6-month detail, one for each Level
- ❑ Target assignment for Level I
 - ✓ Organizations with Strong SE functions
- ❑ Target assignment for Level II
 - ❑ *Leadership Experience in SE Role:*
 - ✓ Product Lead
 - ✓ Assistant Chief Engineer
 - ✓ Deputy Lead System Engineer
 - ✓ Anomaly Investigation Lead
 - ✓ Assistant Chief Safety Officer

**Examples
Only**

Backfills for rotations will be worked on a case-by-case basis

Level I Core Training



	Core		Alternate	
Focus Area	APPEL* Courses	Length	Other Courses	Length
Overview	Fundamentals of Systems Engineering	5 days	**UAHuntsville Systems Engineering Overview	2 days
Foundational Application	Lifecycle, Processes, and Systems Engineering	3 days	APPEL Understanding NPR 7123.1	2 days
Advanced Application	Project Management and Systems Engineering	10 days	Integrated Project and Systems Management (UAHuntsville)	5 days
SE Leadership	Team Leadership	2.5 days	APPEL Communicating Technical Issues	2 days

***Academy of Program/Project and Engineering Leadership**

****Encourage participation in UAHuntsville Systems Engineering Certificate program. Completion of this certificate program may substitute for the Overview and Foundational Application courses.**



Level II Entrance

- ❑ All candidates for Level II (including grandfathered Level I systems engineers) are subject to a formal selection process
- ❑ Level II selection process to be administered jointly by Engineering and Human Capital, utilizing the Center Personnel Management Advisory Committee (PMAC) for final selection decisions



Level II Core Training

Advanced Systems Engineering and Leadership	Core		Alternate	
	APPEL Courses	Length	Other Courses	Length
	Advanced Project Management and Advanced Systems Engineering	5 days	In discussions with UAH to determine alternate possibilities.	TBD
	Leading Complex Projects	3 days	TBD	TBD
Project Management Leadership Lab	4.5 days	Assessing Project Performance	2 days	

- **CORE:** Minimum of 1 additional leadership oriented course is required. Course selection will be determined based on participant's individual needs assessment, and in alignment with the NASA Leadership Model.
- Distance Learning Options may be worked for some required coursework.
- Expected timeframe for completion: 2 year period

Benefits of Program to the Participant



- ❑ Completion of developmental experiences outlined in program enhances participant skill level and marketability
- ❑ Assumes high interest and accountability on part of employees
- ❑ Exposes participant to how Marshall does business at multiple levels (Up and Out/ Down and In)
- ❑ Professional development workshops enhances participant skills in a variety of areas related to systems engineering, communication, and leadership skills
- ❑ Expands participant network to others interested in systems engineering across the Center



Benefits of Participation to the Center

- ❑ Completion of developmental experiences outlined in program enhances skill level of employees
- ❑ Helps foster a steady supply of capable systems engineering practitioners and leaders at the Center
- ❑ Increases the qualified candidate pool for systems engineering jobs, as well as Agency SE developmental programs
- ❑ Creates a network of informed advocates at MSFC for systems engineering
- ❑ Assumes high interest and accountability on part of employees



Level I Status

- ❑ **Level I Participants: 42**

- ❑ **Gender**

 - 29 Male 69%

 - 13 Female 31%

- ❑ **Completion of Training Requirements**

 - 100% of course work 21%

 - 75% of course work 34%

 - 50% of course work 24%

 - 25% or less of course work 21%

- ❑ Based on current course enrollment, 20 participants (or 47.6%) will have completed the Level I training requirements by March 2011

- ❑ Approximately 30% of participants have completed or are currently completing their developmental rotations



Level I Status (continued)

Organization Breakdown

Engineering Directorate	34
Safety & Mission Assurance Directorate	3
Shuttle Propulsion Office	2
Ares Projects Office	1
Science & Mission Systems Office	1
Office of the Chief Information Officer	1

Formal SE Development Programs at other NASA Centers



Center	Program	Point of Contact
ARC	Ames Project Excellence Development Program	Claire Smith Tina Panontin
DSFC	Systems Engineering Leadership Development Program	Brad Flick
GRC	Space Mission and Leadership Program	Marton Forkosh
GSFC	Systems Engineering Development	Edward Amatucci
KSC	Systems Engineering and Leadership	Rachel Lumpkin Greg Clements
LaRC	Systems Engineering and Development Program	Junilla Applin
JPL	Systems Engineering On-the-job Training	Roger Diehl