A Few Words First

Courtesy – Please mute your phone (*6 toggle).

Upcoming Chapter Meetings:

- **May 19 Tutorial, Agile Risk Management**
  Rick Dove, Paradigm Shift International
- **Jun 14, Defining "System" – a Comprehensive Approach**
  Regina Griego, Sandia National Labs, Distinguished R&D Systems Engineer
- **Jul 6, Summer Social, Chama River Brewing Company,**
  Robert Taylor will give a virtual tour of Friedman Recycling

Aug 21-25, International Systems Safety Conference, Albuquerque, NM
http://issc2017.system-safety.org

Oct 06-07, 2017 Socorro Systems Summit at NM Tech.

New Americas Sector Director is Tony Williams, former Texas Gulf Coast Chapter President.

CSEP Courses by *Certification Training International:*
Course details | Course brochure
2017 Course Schedule (close by, but many more locations and dates):
Aug 7-11 | Austin, TX
Oct 30-Nov 3 | Las Vegas, NV

First slide, not recorded but retained in pdf presentation.

And Now - Introductions

Enchantment Chapter Monthly Meeting

10 May 2017 – 4:45-6:00 pm:

The Art and Science of Systems Engineering – Developing the Next Generation of Systems Engineering Leaders

Dawn Schaible, Deputy Chief Systems Engineer, NASA, dawn.schaible-1@nasa.gov

Abstract: The successful development of complex systems, such as aircraft, spacecraft, power plants, or computer networks, requires both the art and science of systems engineering. Technical Leadership, the art of systems engineering, balances broad technical domain knowledge, engineering instinct, problem solving, creativity, leadership, and communication to develop new missions and systems. Systems Management, the science of systems engineering, focuses on rigorously and efficiently managing the development and operation of complex systems. Developing systems engineering leaders who are highly competent in both technical leadership and systems management can be a challenge for all organizations. This presentation will discuss how NASA is addressing the challenge through its Systems Engineering Leadership Development Program.

Download slides today-only from GlobalMeetSeven file library or anytime from the Library at www.incose.org/enchantment

NOTE: This meeting will be recorded

Today's Presentation

Things to Think About

How can this be applied in your work environment?

What did you hear that will influence your thinking?

What is your take away from this presentation?

Speaker Bio

Ms. Schaible was appointed as the NASA Deputy Chief Engineer in July 2014 where she helps to lead the Office of the Chief Engineer in providing policy direction, oversight, and assessment for the NASA engineering and program management communities.

She previously served as the Manager of the Systems Engineering Office for the NASA Engineering and Safety Center (NESC) at the Langley Research Center, providing systems engineering expertise to the independent NESC assessments of critical, high-risk issues.

Prior to joining Langley in 2005, Ms. Schaible spent 18 years at the Kennedy Space Center where she held a number of lead engineering positions for the Space Shuttle and International Space Station Programs.

Ms. Schaible earned a B.S. in Mechanical Engineering from Bradley University and M.S. degrees from the Florida Institute of Technology and the Massachusetts Institute of Technology.

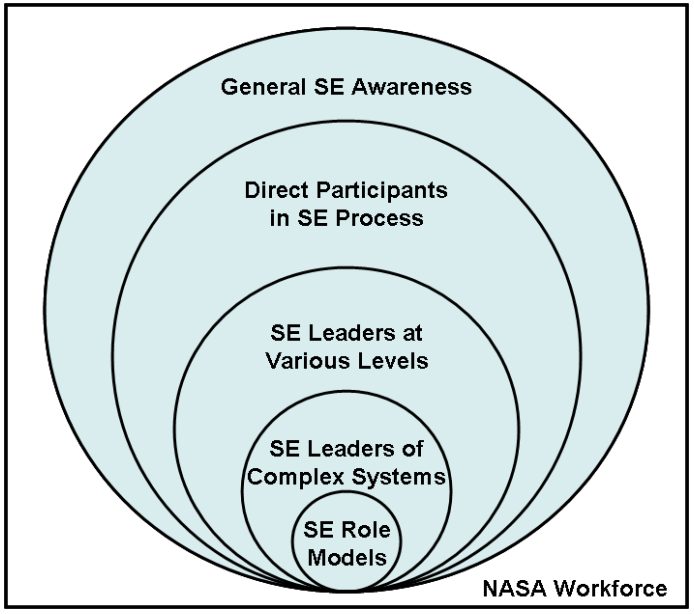
Developing Systems Engineering Leaders

The Art and Science of Systems Engineering

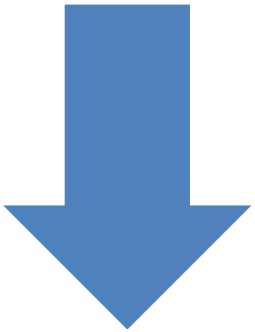
Dawn Schaible
May 10, 2017

Workforce Development and Communication of Systems Engineering

- How can we best capture a description of Systems Engineering?
- How do we best communicate it to the workforce?
  - People who are (or will be) working systems engineers
  - People who need to understand what good systems engineering is in order to use it effectively
  - People who will execute or support part of the SE activities
  - People who must play a role in identifying and growing future systems engineers
- How do we educate/develop the workforce?



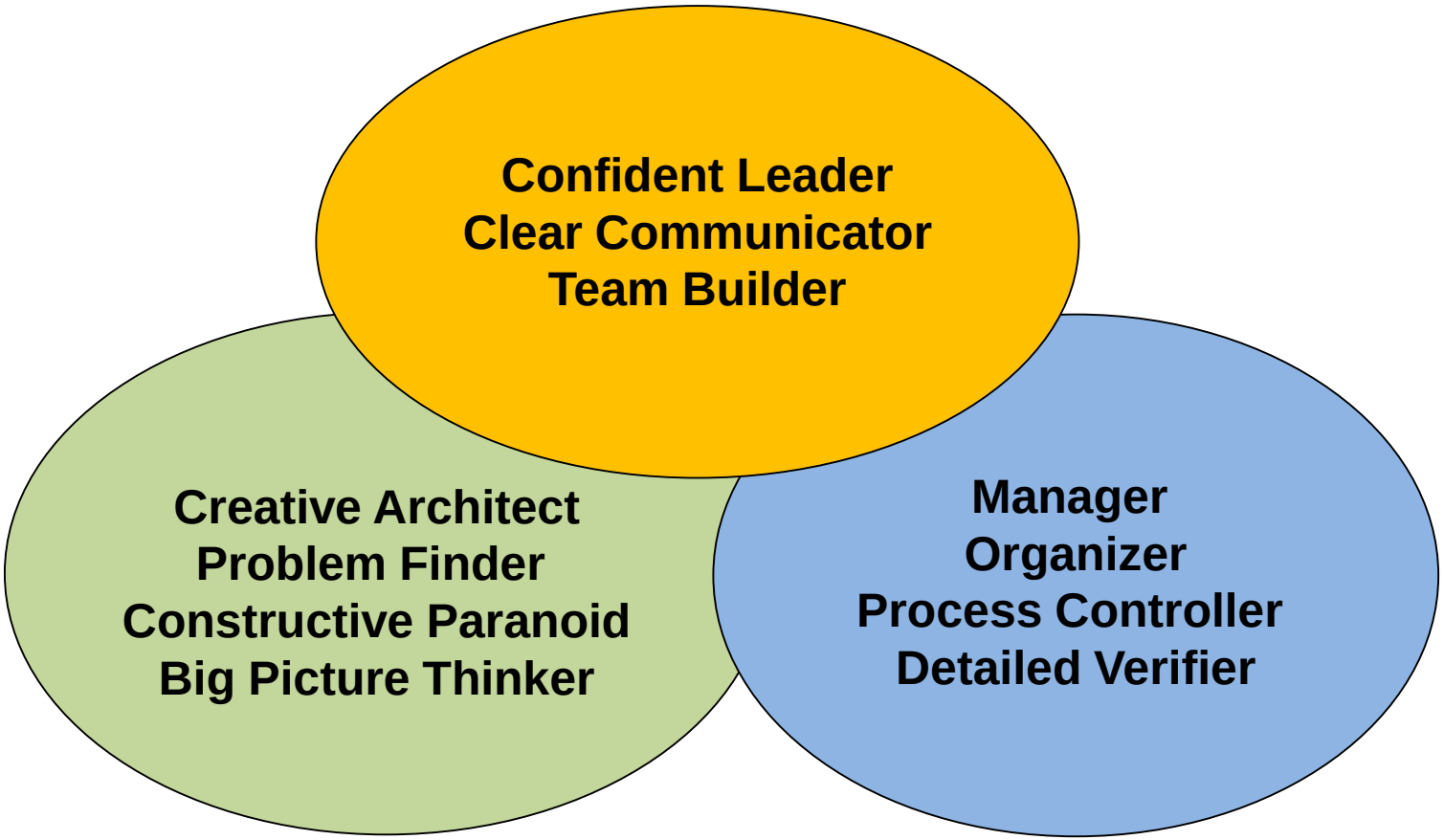
Balancing the Art and Science of Systems Engineering



Technical leadership - *the art* - focuses on a system's technical design and technical integrity throughout its lifecycle

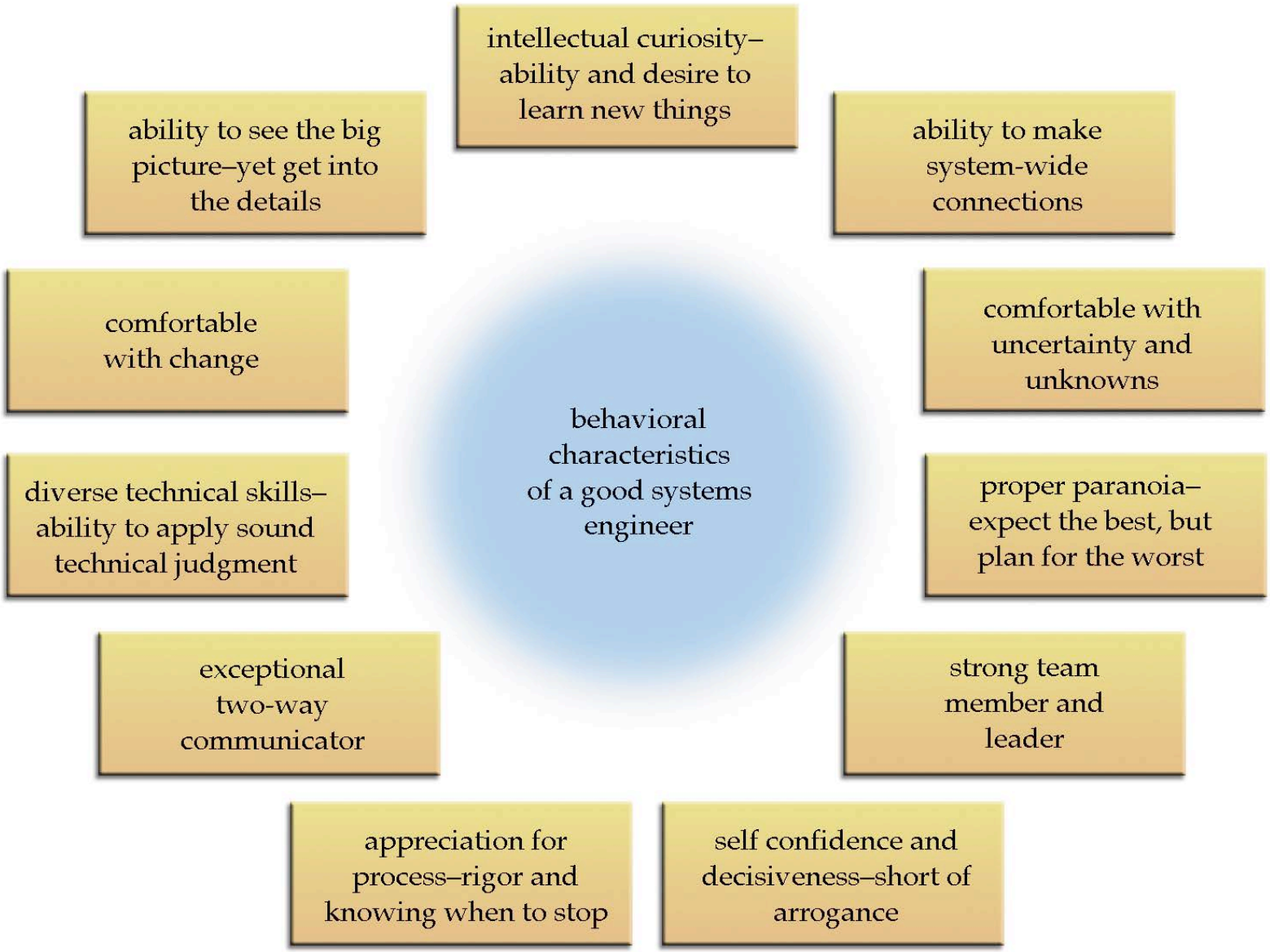
Systems management - *the science* - focuses on managing the complexity associated with having many technical disciplines, multiple organizations, and hundreds or thousands of people engaged in a highly technical activity

Scope of Systems Engineering Leaders



Three dimensions of the SE competency model – process knowledge, technical knowledge, and personal behaviors

Personal Characteristics of a Good Systems Engineer



NASA SE Behavioral Competency Model

Leadership	Attitude & Attributes
Appreciates/ Recognizes Others	Remains Inquisitive and Curious
Build Team Cohesion	Seeks Information and Uses the Art of Questioning
Understands the Human Dynamics of a Team	Gains Respect Credibility, and Trust
Creates Vision and Direction	Advances Ideas
Ensures System Integrity	Possesses Self-Confidence
Possesses Influencing Skills	Has a Comprehensive View
Sees Situation Objectively	Possesses a Positive Attitude and Dedication to Mission Success
Coaches and Mentors	Is Aware of Personal Limitations
Delegates	Adapts to Change and Uncertainty
Ensures Resources are Available	Uses Intuition/Sensing
	Is Able to Deal with deal with Politics, Financial Issues, and Customer Needs

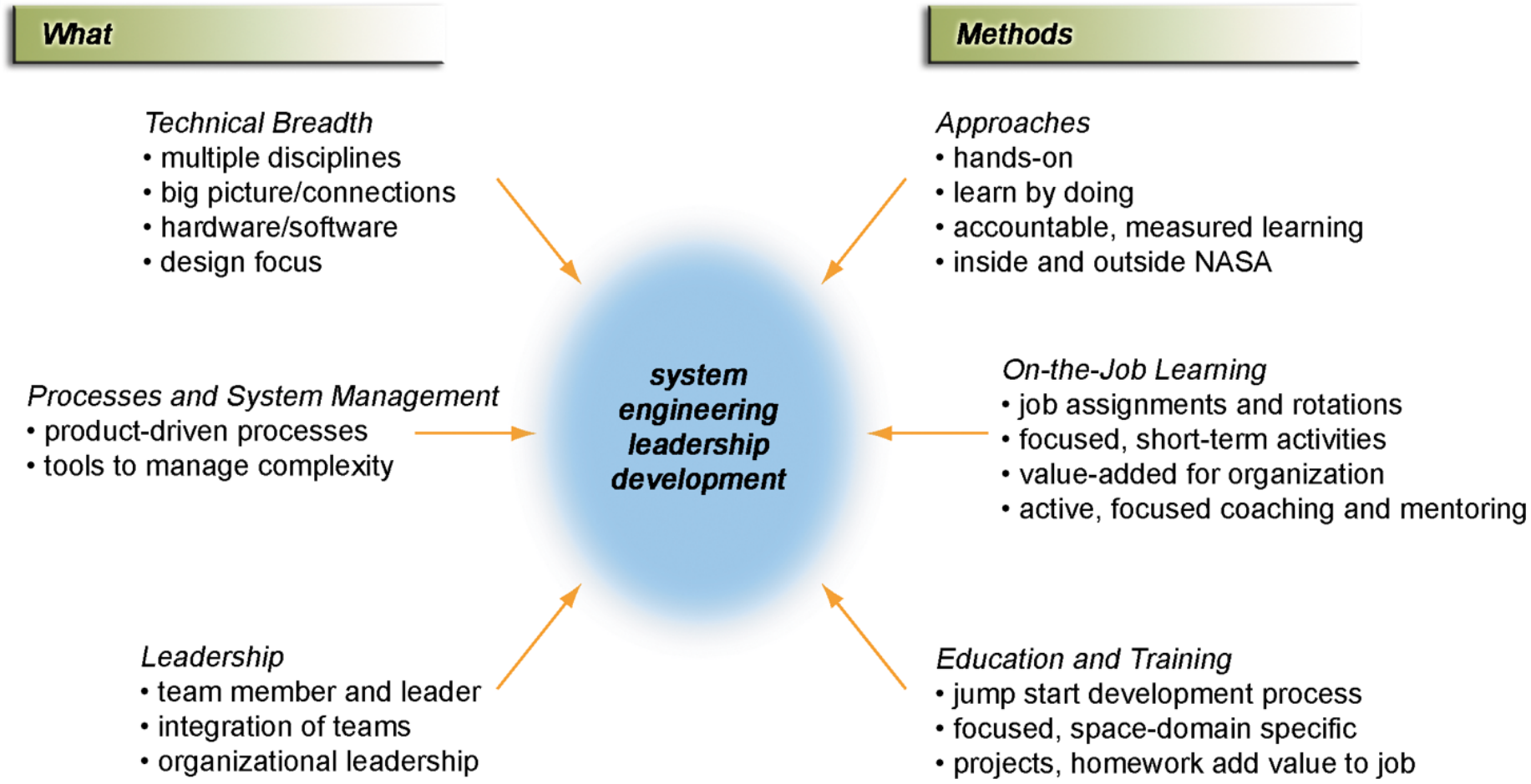
From: NASA Systems Engineering Behavior Study by Christine Williams, NASA HQ and Mary-Ellen Derro, JPL, Oct. 2008

NASA SE Behavioral Competency Model

Communication	Problem Solving and Systems Thinking
Listens Effectively and Translates Information	Identifies the Real Problem
Communicates Effectively Through Personal Interaction	Assimilates, Analyzes, and Synthesizes Data
Facilitates and Environment of Open and Honest Communication	Thinks Systemically
Uses Visuals to Communicate Complex Interactions	Has the Ability to Find Connections and Patterns Across the System
Communicates Through Story Telling and Analogies	Sets Priorities
Is Comfortable with Making Decisions	Keeps the Focus on Mission Requirements
Technical Acumen	Possesses Creativity and Problem Solving Abilities
Possesses Technical Competence and Has Comprehensive Previous Experience	Validates Facts, Information & Assumptions
Learns from Successes and Failures	Remains Open Minded & Objective
	Draws on Past Experiences
	Manages Risk

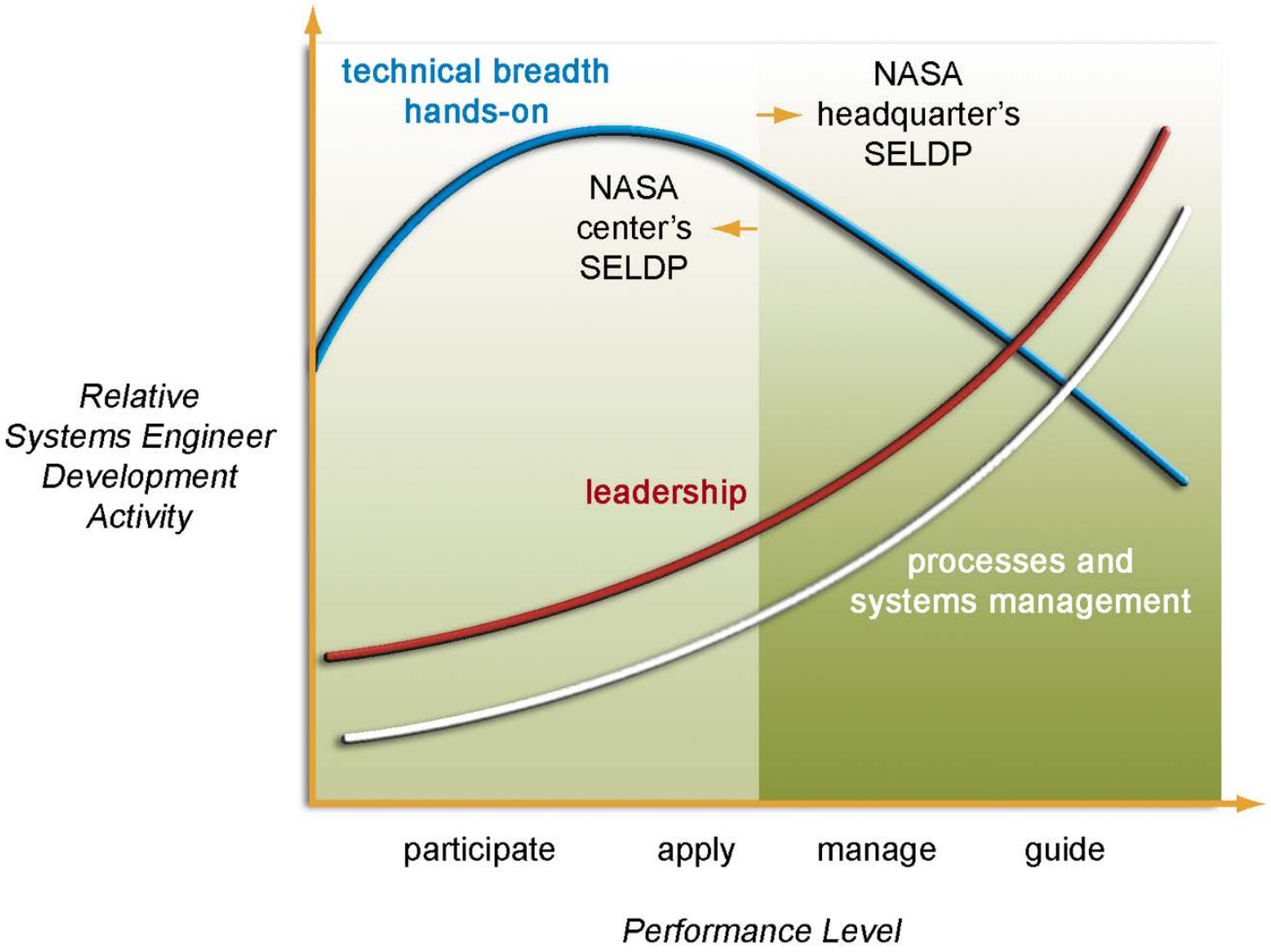
From: NASA Systems Engineering Behavior Study by Christine Williams, NASA HQ and Mary-Ellen Derro, JPL, Oct. 2008

How to Improve Systems Engineering Skills



- Systems management can be learned in class and enhanced with practice
- *Technical leadership is best learned by doing*

Systems Engineering Performance Levels



NASA Systems Engineering Leadership Development Program (SELDP)

- **SELDP Overview**
  - A comprehensive SE development program spread over two years that provides, leadership development and technical training, benchmarking, mentoring and coaching
  - Founded on the Art & Science of Systems Engineering, the NASA Systems Engineering Behavior Study, and Behavior Competency Model

- **Agency Wide, Hands-on Developmental Experience**
  - SELDP provides hands-on developmental assignments that go beyond what can be learned and experienced at home Center systems engineering programs
    - Cross-Agency experience
    - Advanced leadership skills development
    - Exposure to innovative government and industry-wide systems engineering concepts

SELDP Learning Elements

- **Developmental Assignments:** Hands-on assignments are a core requirement of SELDP
- **Center Visits and Outside Benchmarking:** Benchmarking with other NASA Centers and outside organizations to expand participants understanding/awareness of effective systems engineering
- **Mentoring and Job Shadowing:** Participants are assigned a mentor
- **Personal Leadership:** Focus on personal behaviors through assessments and coaching
- **Technical Training (Limited):** Participants expected to have pre-requisite or equivalent courses upon entering SELDP

SELDP Leadership Development

- **Assessments:** Assessment instruments are used to help participants gain a greater understanding of their strengths and areas for development

- **Coaching**: The participant's 360 Degree Assessment results are used to form the basis for their leadership development strategy and coaching goals throughout the SELDP year

- **Leadership Training Workshops:** Workshops focus on leadership, attitudes and attributes, communication, political savvy, problem solving, and systems and strategic thinking

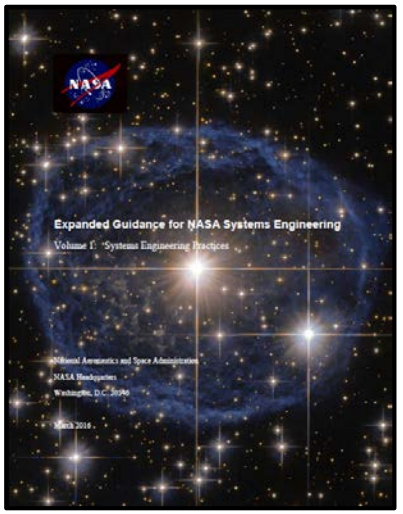
The curriculum journey begins with the individual and emanates outward to peers, the organization and the society / industry. Participants enhance their self-awareness and abilities to speak from their values and vision. They explore ways to collaborate as a leader with a focus on results. They take on the challenges of change and consider how to navigate dynamic and uncertain environments with power and confidence.

Example Workshops

Workshop	Content
1. Leading from the Inside Out (Orientation)	• Building a Learning Community • Valuing Differences (MBTI) • Leading with Alignment to Mission and Purpose
2. Leading for Results	• Engaging NASA leaders – Seeing the Bigger Picture • Leading to Achieve High Impact – Results Focus • Building Shared Vision
3. Leading Through Powerful Dialogue and Collaboration	• Crucial Conversations® • Leading with Strengths (Strengths Finders)
4. Leading through Powerful Communication	• Mastering the Art of Storytelling • Giving Effective Presentations • Engaging Stakeholders
5. Leading in a Dynamic Environment	• Navigating Change • Leading Change • Innovation and Entrepreneurship
6. Leading with Presence (Re-entry)	• Developing Personal Re-entry Strategies • Leading with Presence • Leading with Clarity • Galvanizing SE Insights
7. Using Your Leadership Voice (Graduation)	• Speaking Powerfully • Leadership Dialogue with NASA SE Leaders • Gettysburg Leadership Experience

Future of NASA Systems Engineering Handbook for the Workforce

- Develop a web-based next generation SE Handbook to simplify access and content by infusing text with links
  - Lessons Learned directly related to the content
    - First-hand experience of numerous NASA SE leaders
  - Best practices across the Agency
    - Showcase and share Center-level SE resources
    - Real world explanations
  - Expanded content through a “click here for more” approach
    - User selects how deep to dive



Summary

- Systems engineering is first and foremost about getting the right design - and then about maintaining and enhancing its technical integrity and processes to get the design right
- While important and necessary, process is only one part of systems engineering - it must be appropriately balanced with:
  - Strong understanding of the technical design and implementation
  - Sound engineering judgment
  - Critical systems thinking
  - Appropriate skills and attitudes
- Developing our systems engineering leaders in all these areas is critical to future success

Questions?

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Please

The link for the online survey for this meeting is

www.surveymonkey.com/r/2017_05_MeetingEval

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Look in GlobalMeet chat box for cut & paste link.

Slide presentation can be downloaded now/anytime from:

The library page at: www.incose.org/enchantment.

Recording will be there in the library tomorrow.