

# **NASA Systems Engineering Leadership Development Program (SELDP)**

## **Program Plan**

**Rev 1.0: October 8, 2009**

**NASA Office of the Chief Engineer**



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## 1.0 Background

NASA's vision and mission necessitate that its workforce is ready and able to lead the world in space exploration, scientific discovery, technology development, and managerial excellence. Systems engineering has been identified by NASA Leadership as a critical core competency in enabling current and future mission success. The NASA Office of the Chief Engineer (OCE) has responsibility for implementing an effective systems engineering program and strategy across NASA. The OCE is aligning and integrating the following three aspects of the NASA systems engineering framework:

- Common Technical Processes,
- Tools and Methods, and
- Workforce, Knowledge and Skills

Current activities to realign governing documents includes:

- Revision of NPD 7120.5D NID Program/Project Management Policy Directive to ensure the Agency has a focused and shared systems engineering policy
- Revision of NASA/SP-2007 – 6105 R1 Systems Engineering Handbook to create a bridge from typical guidance back to the NASA Systems Engineering Processes and Requirements (NPR 7123.1A)
- Development of implementation plans to show how NPR 7123.1A is being flowed down to the Centers
- Development of an Agency-wide Systems Engineering Leadership Development Program (SELDP)

The OCE has very robust Program and Project Management and Systems Engineering training programs within the Academy of Program/Project and Systems Engineering Leadership (APPEL) <<http://appel.nasa.gov>>. With over 60 in-depth courses, they provide an excellent foundation for NASA employees to acquire the knowledge and skills needed to improve their program/project and systems engineering capabilities. In addition to these courses, the OCE has determined that there is a greater need for hands-on systems engineering experience. The SELDP is closing this learning gap.

Several NASA Centers have hands-on systems engineering development programs. Other Centers are also developing programs. In addition to these Center programs, the OCE has identified the need for an Agency-wide leadership development program that will help identify high potential System Engineers and provide a NASA perspective and focus on developing an/or improving specific leadership behaviors and technical capabilities. The OCE implemented the Systems Engineering Leadership Development Program (SELDP) in 2008 with a pilot program. A core requirement of this program is hands-on developmental assignments at other Centers. These assignments enable participants to gain a greater understanding of NASA and to expand the application of their systems engineering knowledge and skills.

## 2.0 Program Requirements

The Systems Engineering Leadership Development Program (SELDP) provides leadership development and technical training in systems engineering. Requirements for this program include:

- Design and conduct a comprehensive systems engineering development program that provides for technical development in the form of assignments outside the home Center, technical and leadership training, and leadership development including coaching and mentoring.
- Provide opportunities for employees from across NASA to participate in a 12-month developmental program. Participants are to be GS-13 or GS-15 engineers or AST equivalents. Participants from the Jet Propulsion Laboratory (JPL) must be Senior Systems Engineers.
- Provide a process that ensures the selection of high potential participants. Participant selection focuses on identifying individuals who have proven technical/discipline capability, and who have demonstrated key leadership capabilities and behaviors. Selection also focuses on choosing individuals who are expected to lead higher level or more complex efforts in the next two to three years, versus employees who are merely available. These individuals must be nominated by their Center Director and Center Engineering Director for this program. The SELDP competitive process ensures that:
  - Selected participants have demonstrated the leadership behaviors and aptitude that NASA identifies as critical to becoming an expert Systems Engineer (See Table 1: NASA 's Systems Engineering Leadership Behavior Model) along with demonstrated technical/discipline capabilities (See Table 2: APPEL SE Technical/Discipline Competency Model and Appendix C: NASA SE Training).
  - The most qualified nominees are selected for this opportunity at the right time in their career, when this learning will have the greatest impact.
  - Participants have the experience and attitude to be successful in the program.
  - There is an appropriate assignment available to meet the participant's developmental needs.
  - Participants have the top level Center engineering leadership support needed to be successful in the program, and to be placed in a position that quickly applies this learning upon return to the Center to ensure maximum transfer of learning and return on investment.
- Ensure that the program offered provides an integrated learning approach that allows participants to:
  - Gain hands-on developmental experience outside the participant's home Center that will broaden and improve their discipline knowledge, skills and abilities to lead complex Agency-wide programs and projects;
  - Obtain development and coaching needed to enhance key leadership skills and abilities and improve or adopt behaviors that NASA has identified as critical to becoming a highly effective Systems Engineer;

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- Obtain critical thinking, systems thinking, judgment, and decision making skills, through training and case studies necessary to make system trade-offs to optimize program and project effectiveness;
  - Create an Agency-wide learning community and network of Systems Engineers across NASA;
  - Obtain mentoring by both top NASA systems engineers at their home Centers and at their developmental assignments;
  - Obtain coaching and feedback to improve leadership effectiveness;
  - Provide interactions and learning from key NASA and outside leaders;
  - Provide technical training, as needed, through APPEL and other course work where critical discipline and/or technical skills are needed by the individual;
  - Benchmark with other NASA Centers and world-class outside Systems Engineering organizations.
- Provide for individualized learning plans for each participant. Identified experienced Center systems engineering advocates (described later in this document) will perform gap analysis for each participant and match participants with the appropriate developmental assignment.

Actual learning activities will be determined by the individual participant's needs within the following ranges:

- |                                       |            |
|---------------------------------------|------------|
| ● Hands-On/Experiential               | 65% to 77% |
| ● Technical Training                  | Up to 10%  |
| ● Leadership Development/Benchmarking | Up to 15%  |
| ● Mentoring/Coaching                  | Up to 15%  |

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**Table 1. SE Behavior Model/Competencies**

<b>Top Level Themes</b>	<b>Middle Competencies</b>
<b>Leadership</b>	Appreciates/Recognizes Others
	Builds Team Cohesion
	Understands the Human Dynamics of a Team
	Creates Vision and Direction
	Ensures System Integrity
	Possesses Influencing Skills
	Sees Situations Objectively
	Coaches and Mentors
	Delegates
	Ensures Resources are Available
<b>Attitudes &amp; Attributes</b>	Remains Inquisitive and Curious
	Seeks Information and Uses the Art of Questioning
	Advances Ideas
	Gains Respect Credibility, and Trust
	Possesses Self-Confidence
	Has a Comprehensive View
	Possesses a Positive Attitude and Dedication to Mission Success
	Is Aware of Personal Limitations
	Adapts to Change and Uncertainty
	Uses Intuition/ Sensing
Is Able to Deal with Politics, Financial Issues, and Customer Needs	
<b>Communication</b>	Listens Effectively and Translates Information
	Communicates Effectively Through Personal Interaction
	Facilitates an Environment of Open and Honest Communication
	Uses Visuals to Communicate Complex Interactions
	Communicates Through Story Telling and Analogies
	Is Comfortable with Making Decisions
<b>Problem Solving &amp; Systems Thinking</b>	Identifies the Real Problem
	Assimilates, Analyzes, and Synthesizes Data
	Thinks Systemically
	Has the Ability to Find Connections and Patterns Across the System
	Sets Priorities
	Keeps the Focus on Mission Requirements
	Possesses Creativity and Problem Solving Abilities
	Validates Facts, Information and Assumptions
	Remains Open Minded and Objective
	Draws on Past Experiences
Manages Risk	
<b>Technical Acumen</b>	Possesses Technical Competence and Has Comprehensive Previous Experience
	Learns from Successes and Failures

**Table 2. Systems Engineering Competencies**

<b>Systems Engineering Competencies</b>
<b>Competency Area SE1.0: System Design</b>
SE1.1 Stakeholder Expectation Definition & Management
SE1.2 Technical Requirements Definition
SE1.3 Logical Decomposition
SE1.4 Design Solution Definition
<b>Competency Area SE 2.0: Product Realization</b>
SE 2.1 Product Implementation
SE 2.2 Product Integration
SE 2.3 Product Verification
SE 2.4 Product Validation
SE 2.5 Product Transition
<b>Competency Area SE3.0: Technical Management</b>
SE3.1 Technical Planning
SE3.2 Requirements Management
SE3.3 Interface Management
SE3.4 Technical Risk Management
<b>Competencies Common to PM&amp;SE</b>
<b>Competency Area C1.0: Internal &amp; External Environments</b>
C1.1 Agency Structure, Mission, and Internal Goals
C1.2 NASA Procedures and Guidelines
C1.3 External Relationships
<b>Competency Area C2.0: Human Capital Management</b>
C2.1 Staffing and Performance
C2.2 Team Dynamics and Management
<b>Competency Area C3.0: Security, Safety and Mission Assurance</b>
C3.1 Security
C3.2 Workplace Safety
C3.3 Safety and Mission Assurance
<b>Competency C4.0: Professional and Leadership Development</b>
C4.1 Mentoring and Coaching
C4.2 Communication
C4.3 Leadership
C4.4 Ethics
<b>Competency 5.0 Knowledge Management</b>
C5.1 Knowledge Capture and Transfer
C5.2 Knowledge Sharing



### 3.0 Roles and Responsibilities

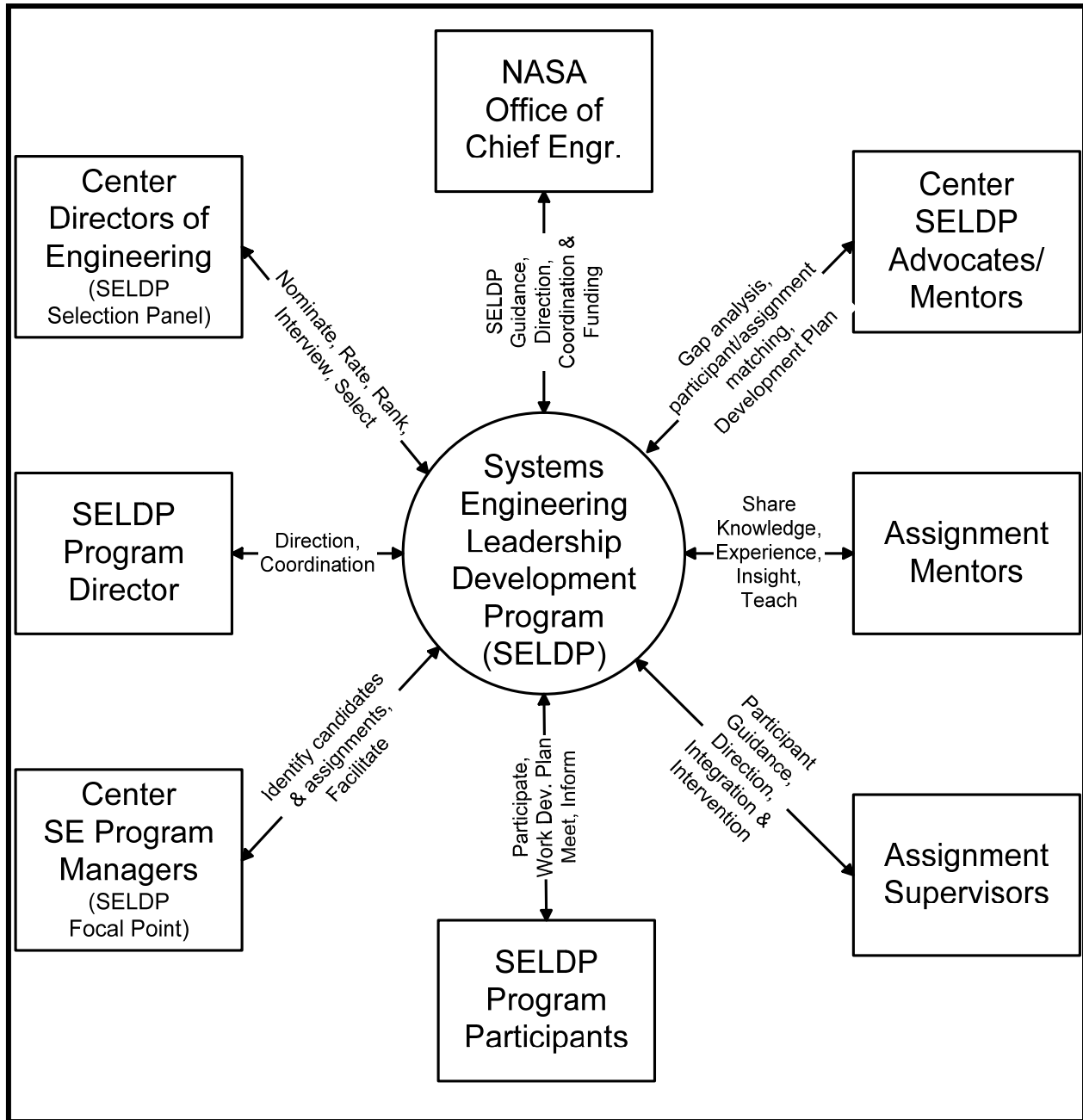
Roles and responsibilities are defined below for the following nine (9) roles (See Table 3 and Figure 1):

1. NASA Office of the Chief Engineer (OCE)
2. Center Directors of Engineering
3. SELDP Program Director
4. Center SELDP Advocate/Mentor
5. Assignment Mentors
6. Assignment Supervisors
7. SELDP Program Participants
8. Center SE Training Program Managers
9. Coaches

**Table 2, SELDP Roles and Responsibilities**

<b>Role</b>	<b>Responsibilities</b>
1. NASA Office of the Chief Engineer	Serve as the NASA Official responsible for guiding and directing the design, development, and implementation of the SELDP; chair the SELDP Selection Panel; coordinate with key stakeholders; fund participant’s travel and training.
2. Center Directors of Engineering	Nominate high potential candidates for the SELDP; serve on the Agency-wide SELDP Selection Panel which rates, ranks, interviews and selects participants; maintain accountability and ownership of program to ensure its success.
3. SELDP Director	Coordinate and manage the SELDP Program and measure participant and program effectiveness.
4. Center SELDP Advocate/Mentor	Serve as the Home Center Mentor for program participants; perform an individual gap analysis on each participant, match participants to the appropriate developmental assignment, and create a developmental plan for each participant; provide feedback to participants and stay engaged with them on an on-going basis throughout their SELDP year.
5. Assignment Mentors	Share knowledge, experience, insight and advice; teach technical and leadership skills and abilities.
6. Assignment Supervisors	Provide guidance and direction on the work to be performed; ensure that the SELDP participant is fully integrated into the organization and is included in meetings and discussions; intervene as necessary and provide additional guidance and support.
7. SELDP Program Participants	Participate in all SELDP mandatory requirements; accomplish the objectives defined in their developmental plan; meet with their Advocates, mentors and program managers on an agreed upon basis; keep Program Managers aware of activities, progress and issues.
8. Center SE Training Program Managers	Serve as the SELDP focal point for their Centers; provide advice and guidance to potential candidates; work with the SELDP Director and other Training Program Managers to recommend policies, procedures, and processes across Center and Agency SE programs.
9. Coaches	Provide ongoing leadership development support including the identification and development SE behaviors; provide continuity and transition support to participant’s upon return to their home center.

Figure 1. SELDP Context Diagram



NASA Office of the Chief Engineer

The NASA Chief Engineer serves as the NASA Official responsible for guiding and directing the design, development, and implementation of the SELDP. The NASA Chief Engineer also Chair's the SELDP Selection Panel and makes final decisions regarding the number and selection of participants based on available dollars and overall Agency needs.

SELDP Director

The SELDP Director is responsible for coordinating with key stakeholders in designing and implementing the SELDP, including all experiential, leadership and technical components of the

program. The SELDP Director is also responsible for scheduling program activities and managing the approved budget of the SELDP and measuring participant and program success. The Office of the Chief Engineer is responsible for funding participant's travel and training required for successful SELDP implementation.

#### Center Directors of Engineering

Center Directors of Engineering are responsible for nominating high potential candidates for the SELDP and for serving on the Agency-wide SELDP Selection Panel which rates, ranks, interviews and selects participants. Center Directors of Engineering are also be responsible for identifying senior level system engineers to mentor program participants selected from their Center, and for ensuring that the participants are placed in appropriate next level system engineering roles upon returning to their Centers. Center Directors of Engineering are also responsible for providing advice and counsel on the matching of selected participants with available developmental assignments and for appointing a senior systems engineer to serve as the Center's Advocate/Mentor. Engineering Directors also maintain accountability and ownership of the program to ensure its success.

#### Center SELDP Advocate/Mentor

The Center Director for Engineering identifies an SELDP Advocate who is responsible for serving as the Home Center Mentor for program participants. Once high potential participants are selected by the Center Director's of Engineering, advocates serve on an Agency-wide team responsible for performing an individual gap analysis on each participant, matching participants to the appropriate developmental assignment, and creating a developmental plan for each participant for their SELDP year. This work is performed at an Advocate Meeting organized and scheduled by the OCE. After participants begin their assignment, Advocates are responsible for staying engaged with the participants on an on-going basis throughout their SELDP year to ensure their developmental plan is being effectively implemented. Center Advocates are responsible for assuring that local infrastructural services, such as IT and security, are fully provided and work together in the best interest of the participant. Advocates also provide advice and mentoring to participants, and keep the Center Director of Engineering apprised of the progress of their Center participants.

Characteristics of Mentor/Advocates include:

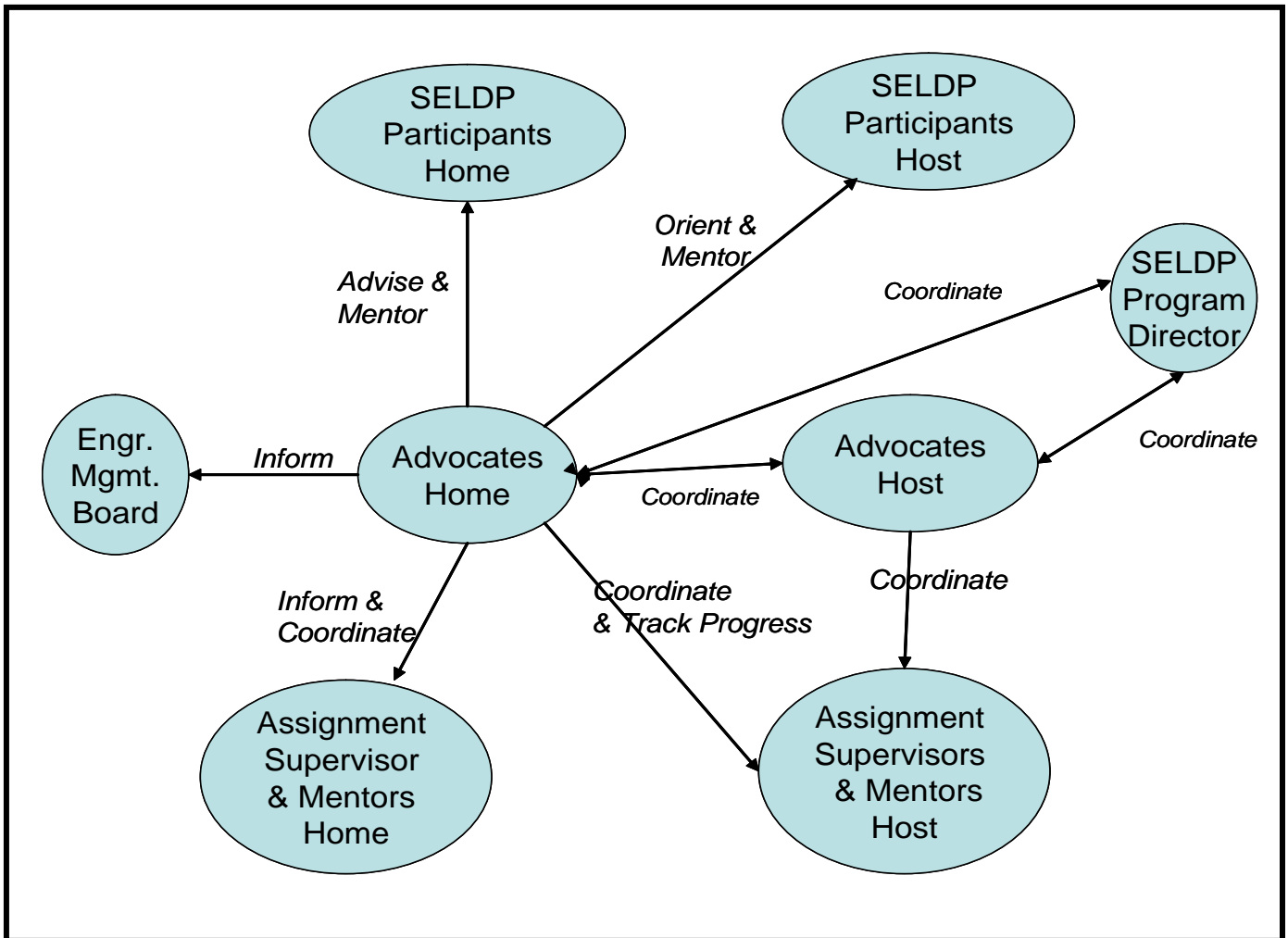
- Chief Engineer or Engineering Directorate or Senior Systems Engineer
- Experience and ability to practice Systems Engineering on a project
- Passion for development
- Good people/communication skills
- Extensive knowledge of the Center nominees and the Center's proposed developmental assignments

#### Assignment Mentors

Individuals who thoroughly understand and have had hands-on experience with the technical and leadership development aspects of the developmental assignment are appointed as SELDP Assignment Mentors. Optimally, Assignment Mentors are individuals who have been successful in this position in the past. Mentors share knowledge, experience, and insight and have the ability to effectively teach the technical and leadership skills and abilities needed to ensure the participant's success. An effective mentor combines competence, experience, and the ability to communicate and listen. He or she provides knowledge, information and advice on his/her experience in that job. The Assignment Mentor may, or may not, be the same person as the

SELDP Assignment Supervisor or Center Advocate. Figure 2 below depicts the coordination of activities by the SELDP advocate.

**Figure 2. SELDP Advocate Coordination Diagram**



Assignment Supervisors

Assignment Supervisors provide guidance and direction on the work to be performed, including program goals, schedules, and administrative processes and procedures. The Assignment Supervisor ensures that the SELDP participant is fully integrated into the organization and is included in meetings and discussions that provide a full understanding of the organizations culture and function, as well as the program or project performed by the SELDP Participant. The Assignment Supervisor challenges the participant and ensures that he/she is given every opportunity to learn and succeed. The Assignment Supervisor quickly intervenes to ensure that the participant learns from his/her mistakes, and to provide additional support and guidance to succeed in the future.

SELDP Program Participants

Participants are responsible for:

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- Participating in all SELDP mandatory requirements, including participation in developmental assignments away from their home Center for 6 to 12 months, leadership workshops, and other program activities.
- Accomplishing the objectives defined in their developmental plan.
- Meeting with their advocates, mentors, coaches, Engineering Directors and Program Managers on an agreed upon basis, and
- Keeping Program Managers aware of what is going on to make sure assignments and mentoring relationships are supporting their development.

### Center System Engineering Training Program Managers (if one exists)

It is recommended that Managers of Center Systems Engineering Development programs serve as the SELDP focal point for their Centers. Program Managers should be responsible for helping their Engineering Management Board (EMB) member identify high potential. Program Managers should also be responsible for supporting the other Center participants placed in assignments at their Center, including arranging for space and equipment prior to the participant's arrival. Once a participant is placed at the Center, the Program Manager should provide on-going support and guidance to the participants by ensuring that their assignment continues to meet their developmental needs and that the developmental and training goals established by the NASA SELDP Advocate/Mentor continue to be accomplished. Program Managers should ensure that participant's assignments, training, mentoring, and development build and enhance the participant's understanding, knowledge and ability to become a more competent and capable systems engineer.

In addition to the responsibilities above, Program Managers should work with the SELDP Program Director to ensure continuity between the Center and Agency programs. Center Managers are encouraged to participate in the design of SELDP and provide advice and assistance in establishing policies, procedures, and processes across Center and Agency SE programs.

### Coaches

A cadre of professional coaches is selected by the Program Director to support the ongoing leadership development needs of each participant. Coaching is initiated in the development year and continued through successful transition to the participant's new assignment upon return to their home center. The focus of coaching is to support participants in improving or developing the SE behaviors identified in the SE Behavior Study. Coaches follow NASA guidelines for establishing and managing coaching engagements.

## 4.0 Participant Nomination and Selection

### 4.1 The SELDP Call Letter

An annual call letter will be released by the NASA Chief Engineer requesting nominations from the Center Director. The Center Director will be asked to appoint a single point of contact (POC) for coordinating Center nominees. This POC will be asked to coordinate with the Center's Director of:

- Engineering
- Safety and Mission Assurance
- Program/Project Management, and
- Human Capital

OCE will send each of these Directors copies of this call. Regardless of the organization of the nominee, all nominees must be endorsed by the Center Engineering Director. The current call and all application materials can be found on the NASA Systems Engineering Community of Practice (SE CoP) both on the NASA Engineering Network (NEN) at <http://nen.nasa.gov> and on the official NASA APPEL program website at <http://www.nasa.gov/offices/oce/appel/seldp/index.html>.

### 4.2 Agency Selection Process

Participants are chosen for this program using an Agency-wide competitive selection process. This process is conducted in four parts:

1. Nomination and endorsement of nominees by Center Leadership/Engineering Director
2. Rating and ranking of nominee applications by SELDP Selection Panel. Applications should focus on ensuring the nominee has met the program requirements and has the appropriate background and experience to be successful in the program.
3. Interview of qualified nominees by SELDP Selection Panel. The interview process will focus on ensuring the nominees have demonstrated the leadership behaviors and aptitudes of highly successful NASA System Engineering Leaders.
4. Matching of highly qualified, selected individuals to available developmental assignment Center Advocates with Center Engineering Director advice.

If an appropriate developmental assignment is not available for a selected participant, Centers will be requested to identify additional assignments that will meet that participant's need. If an assignment is still not currently available, the selected participant will enter the program once an assignment becomes available. This individual will not need to re-compete. Center Directors of Engineering, or their Deputies, and members of the Safety and Mission Assurance community, will serve as the SELDP Selection Panel for SELDP participants. This panel will rate, rank and interview nominees.

### **4.3 Selection Criteria**

Candidates for the SELDP must meet the following minimum criteria:

- GS- 13 to GS 15 NASA Employee or a Senior Systems Engineer at JPL
- Engineering Bachelors Degree or AST Equivalent
- Be willing and available to leave their home Center and take on an assignment at another NASA Center for 6 to 12 months.

### **4.4 Nominee Experience**

Nominees should have the following experience:

- Be an employee who understands and has exposure to a breadth of SE competencies as defined by APPEL (Refer back to Table 2 on page 8).
- Has experience applying SE principles on one or more projects or programs.
- Is at least APPEL Level 2 – Subsystem Lead (See Table 8 on page 36).
- Has taken recommended SE APPEL Training including: Foundations of Aerospace at NASA, Project Management and Systems Engineering, and Fundamentals of Systems Engineering or equivalent courses.

### **4.5 Nominee Considerations**

Nominees for the SELDP must be individuals who have the experience and opportunity to take advantage of a developmental assignment away from their home Center for 6 to 12 months. Family obligations and current assignment requirements and timing should be taken into account to also determine the optimal timing for participation in this program. Participants in SELDP engage in very demanding assignments and development activities. It is impossible for an individual to be successful in this program unless they are released completely from their home Center obligations. There is a significant amount of preparation necessary for the participants to transition to their developmental assignments. Home supervisors can best ensure project continuity and support participant assignment transition by arranging early for the transfer of responsibilities from these participants to the individuals who will be acting for them while they are away. A minimum of two weeks is recommended.

### **4.6 Rating and Ranking Criteria**

The rating and ranking criteria shown in Table 4 on the next page will be used by the SELDP Selection Panel to rate and rank nominee applications:

**Table 3. SELDP Rating and Ranking Criteria**

Rating Factor	Maximum Points Awarded	Description
Experience  (Application Question 11)	25	<ul style="list-style-type: none"> <li>• Has the nominee had the requisite experience in complexity and number of years to adequately prepare him/her to be successful in the SELDP?</li> <li>• Has the nominee proven to be able to effectively translate the opportunities he/she has been provided into measurable results for the Agency?</li> <li>• Nominees will be rated on:                             <ul style="list-style-type: none"> <li>○ Relevant Past Experience: Type &amp; Number of Years of demonstrated SE discipline knowledge and practical experience within area of expertise.</li> <li>○ Participated in, or has an understanding and exposure to, phases of project life cycle development</li> <li>○ Discipline and/or Competency</li> <li>○ Major Accomplishments (results achieved) including Awards Received</li> </ul> </li> </ul>
Developmental Preparation  (Application Question 12)	20	<ul style="list-style-type: none"> <li>• How well is the candidate prepared to make maximum use of the SELDP developmental opportunity?</li> <li>• Does he/she have the requisite training and development necessary to be successful in the SELDP?</li> <li>• Is this the right program for this nominee at this time in his/her career?</li> <li>• Nominees will be rated on:                             <ul style="list-style-type: none"> <li>○ Degree(s) and certificate(s) obtained</li> <li>○ APPEL and other relevant SE training completed – must be noted in application</li> <li>○ Other professional development</li> <li>○ Leadership development including Agency-wide courses as applicable</li> </ul> </li> </ul>
Senior Management Endorsement and Statement of Need  (Application Questions 13 and 16)	25	<ul style="list-style-type: none"> <li>• Does this Center consider this nominee an individual who will be considered to lead programs and/or projects within the next two to three years in a lead role?</li> <li>• Does the Center have a clear strategy for this individual that will effectively use the knowledge, skills and abilities gained in the SELDP to support the achievement of the Center goals?</li> <li>• Is there a good plan to enhance NASA's return on investment?</li> <li>• Nominees will be rated on:                             <ul style="list-style-type: none"> <li>○ Center's overall endorsement and assessment of the nominee's SE leadership capabilities</li> <li>○ Alignment of individual development needs with Agency/Center program needs</li> <li>○ Reentry strategy (How quickly will learning be applied?)</li> </ul> </li> </ul>



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<p>Maturity, Judgment and Attitude</p> <p>(Application Question 14. Further Assessed in Interview Process)</p>	<p>25</p>	<p>To what level does the candidate meet the Core System Engineering Leadership competencies established by APPEL? These competencies include:</p> <ul style="list-style-type: none"> <li>• Mentoring and coaching</li> <li>• Communications: technical communications, reporting results and interpersonal communications</li> <li>• Leadership: delegating, influencing, decision making and problem solving</li> </ul> <p>Also included is the:</p> <ul style="list-style-type: none"> <li>• Ability to use critical and systems thinking and judgment to make effective decisions</li> <li>• Potential for large, complex system and out-of-the-box thinking</li> <li>• Understanding of NASA's strategic vision</li> </ul>
<p>Discretionary</p>	<p>5</p>	<p>At the discretion of the SELDP Selection Panel member, up to 5 points can be added to the above factors, based on the information provided. This allows the panel member the latitude to recognize any exceptional strength, and/or to express a clear preference for one candidate over the others, despite the fact that the numerical weighting to that point may have been more or less equal.</p>
<p><b>Maximum Points Awarded</b></p>	<p><b>100</b></p>	

### 4.7 Interviewing Candidates

Nominees who are highly ranked are interviewed to determine if they exhibit the SE leadership behaviors and aptitudes necessary to becoming an expert in their field. Interview questions are designed to identify the nominee's abilities and aptitudes in some or all of the following behavioral areas. These areas may be expanded depending on the preference of the SELDP Selection Panel. The criteria in Table 4, which mirrors the SE Behavior Model in Table 1, will be used by the SELDP Selection Panel to assess nominees during the interview process.

Actual questions shall be approved by the SELDP Selection Panel prior to the interview date. Questions will remain confidential and are not to be shared with nominees prior to the interview to ensure that no candidate has an advantage over another. Interviews are conducted at NASA Headquarters. Whenever possible, interviews are conducted in person with a sub-panel of the SELDP Selection Panel members. Nominees who are not available to interview in person may elect to be interviewed by phone.

Centers are responsible for funding nominee's travel to NASA Headquarters to interview for the SELDP. Centers are also responsible for informing nominees of the interview date and procedures. Centers are encouraged to prepare nominees for the competitive process by ensuring they have logistics information and support, and that they understand the goals and priorities of the SELDP. Centers may not use actual interview questions as part of this preparation.

**Table 4. SELDP Assessment Criteria**

Rating Factor	Description
Leadership Skills	Nominee: <ul style="list-style-type: none"> <li>• Appreciates/Recognizes Others</li> <li>• Is Able to Build Team Cohesion</li> <li>• Understands the Human Dynamics of a Team</li> <li>• Can Create Vision and Direction and Ensure System Integrity</li> <li>• Possess Influencing Skills</li> <li>• Sees Situations Objectively</li> <li>• Coaches and Mentors</li> <li>• Delegates</li> <li>• Ensures Resources are Available</li> </ul>
Attitudes and Attributes	Nominee: <ul style="list-style-type: none"> <li>• Remains Inquisitive and Curious</li> <li>• Seeks Information and Uses the Art of Questioning</li> <li>• Advances Ideas</li> <li>• Gains Respect Credibility, and Trust</li> <li>• Possesses Self-Confidence</li> <li>• Has a Comprehensive View</li> <li>• Possesses a Positive Attitude and Dedication to Mission Success</li> <li>• Is Aware of Personal Limitations</li> <li>• Adapts to Change and Uncertainty</li> <li>• Uses Intuition/ Sensing</li> <li>• Is Able to Deal with Politics, Financial Issues, and Customer Needs</li> </ul>
Communication	Nominee Has the Ability to: <ul style="list-style-type: none"> <li>• Listens Effectively and Translates Information</li> <li>• Communicates Effectively Through Personal Interaction</li> <li>• Facilitates an Environment of Open and Honest Communication</li> <li>• Uses Visuals to Communicate Complex Interactions</li> <li>• Communicates Through Story Telling and Analogies</li> <li>• Is Comfortable with Making Decisions</li> </ul>
Problem Solving and Systems Thinking	Nominee: <ul style="list-style-type: none"> <li>• Identifies the Real Problem, Assimilates</li> <li>• Analyzes, and Synthesizes Data</li> <li>• Thinks Systemically</li> <li>• Has the Ability to Find Connections and Patterns Across the System</li> <li>• Sets Priorities</li> <li>• Keeps the Focus on Mission Requirements</li> <li>• Possesses Creativity and Problem Solving Abilities</li> <li>• Validates Facts, Information and Assumptions</li> <li>• Remains Open Minded and Objective</li> <li>• Draws on Past Experiences</li> <li>• Manages Risk</li> </ul>

## 4.8 Proposed Selection Schedule

The proposed schedule for selection is shown in Table 6 below. Actual dates for each activity below will be published annually as part of the SELDP Call Letter.

**Table 5. SELDP Proposed Selection Schedule**

Target Date	Activity
December	Obtain EMB Approval for SELDP Design – Planning Call for EMB Candidate Selection Process
	Program Call Letter Released
February	Nominations/Applications Due to OCE from Centers
	Applications Sent to Selection Panel for Rating and Ranking
	Developmental Assignments Due to OCE from Centers
March	Ratings and Rankings Due to HQ from Selection Panel
	Data on Ratings and Ranking Compiled & Sent to Selection Panel
	Panel Teleconference to Identify Candidates to Interview
	Top Candidates Invited to Interview
	Interview Held at Headquarters
	Selection Panel Decision Meeting Held
	Selected Participants Notified
	Top Candidates Matched to Available Assignments, Mentor/Advocate Meeting. GAP Analysis Performed Using Agency DACUM and IDP's Updated
April	Additional/Modified Assignments Requested from Centers
	Additional/Modified Assignments Due to OCE from Centers

## 5.0 Program Elements

The NASA SELDP consists of the following 13 parts which are described in more detail in the sections below:

1. Assessments
2. Developmental Assignments
3. Technical Training
4. Leadership Development
5. Leadership Training
6. Benchmarking
7. Mentoring
8. Coaching
9. Job Shadowing
10. Center Visits
11. Gap Analysis
12. Quarterly Home Visits
13. Agency and Center SE Leadership Participation

## **5.1 Assessments**

Assessment instruments will be used to identify strengths and areas of development needed for program participants. These assessments will target leadership skills and abilities and will be used to help coach the participants during the development year to improve their effectiveness. Assessments may include:

1. A Systems Engineering 360° Instrument Based on the NASA SE Behavior Study
2. Emotional Intelligence Instrument
3. The Myers-Briggs Type Indicator (MBTI)
4. A Critical Thinking Instrument (TBD)

## **5.2 Developmental Assignments**

Participants engage in developmental work assignments designed to challenge them and increase their understanding of systems engineering and NASA. Participants are matched to one or more developmental assignments that will expand their scope of experience and understanding about how systems engineering works and its impact on achieving successful program and project goals. Each participant is required to undertake developmental work assignment(s) for a minimum of six months up to one year at a location other than their home Center. Developmental assignments are posted on the SELDP Community page of the SE Community of Practice on NEN. Participants from JPL engaging in assignments at NASA Centers and participants from NASA engaging in assignments from JPL should refer to Appendix A for additional guidance.

### **5.2.1 Safety and Mission Assurance Component**

An understanding of the role of safety and mission assurance (S&MA) in a program or project is critical to effective SE Leadership. If the Advocates determine from their gap analysis of the participant that additional exposure to S&MA is needed, an appropriate S&MA component will be added to the participants SELDP training plan. It is possible for this component to take place at the participant's home Center, either before or after their assignment or during their assignment at their host Center.

## **5.3 Technical Training**

As part of the learning at their developmental assignment locations, participants engage in technical training critical to their understanding of systems thinking. Training includes coursework determined necessary and recommended by the Center Advocates and recorded in the participant's IDP, Course work normally includes APPEL and may include other training options. See Appendix B for available APPEL SE Training.

## **5.4 Leadership Development**

Leadership development experiences such as executive forums, learning and using leadership models and theories, and/or experiential learning exercises are identified and provided to program participants during Leadership Workshops. These leadership elements are reviewed and redesigned annually to meet the changing needs of NASA and the unique needs of each class.

## **5.5 Leadership Training**

Systems engineering leadership training is identified to meet the needs of program participants. Key leadership learning areas such as team building, communications, negotiation, and other training courses are provided, based on the needs of individual class participants.

## 5.6 Benchmarking

Participants attend benchmarking opportunities at NASA and at leading system engineering industry and/or the Federal government locations. These benchmarking site visits are focused on helping participants learn from other world-class systems engineering organizations.

## 5.7 Mentoring

Once a participant is accepted into the SELDP, they are assigned a senior systems engineer mentor from their home Center. (Note this may or may not be the Center Advocate.) This mentor helps the participant prepare for the program and provide guidance on developing his or her learning needs and strategy for the year. Participants are also assigned a developmental assignment program mentor at their assignment location who helps guide and direct their learning while on assignment.

## 5.8 Coaching

At each SELDP workshop, as well as in individual sessions during the year, participants have access to leadership coaching and feedback from program leaders and coaches supporting the program. Along with the assessment process above, leadership coaching is used to assess gaps in systems engineering leadership aptitudes and behaviors and to develop strategies and learning to close those gaps. This gap analysis focuses on the SE behaviors identified in the *NASA Systems Engineering Behavior Study* and the personal attributes identified in *The Art and Science of Systems Engineering*. This resource is intended to allow highly individualized input on assessing leadership strengths and areas needing development. Coaching continues to support the successful transition of the participant back to their home Center or next assignment after the conclusion of the SELDP.

## 5.9 Job Shadowing

Job shadowing is an activity that allows an individual to spend time observing a top Systems Engineer on the job. It allows a participant to better understand how his or her textbook learning can effectively be applied in the real world of NASA programs and projects. Participants are encouraged to shadow leading Agency System Engineers to observe their actions and interactions and the behaviors they exhibit which make them effective. These shadowing opportunities also serve as an opportunity to gain additional mentoring and advice from these Agency leaders.

## 5.10 Center Visits

When practical, SELDP Workshops are held near NASA Centers to allow for participants to visit various System Engineering offices and programs and gain a greater understanding of NASA's complex systems engineering activities through observation and briefings by Center and Engineering Directors.

## 5.11 Gap Analysis

Each participant is evaluated against the Agency DACUM to identify gaps in their technical skills. This gap analysis focuses on the Science of systems engineering leadership and the technical policies, procedures and processes defined by the OCE.

### **5.12 Quarterly Home Visits**

Visits will be individually scheduled to provide each participant an on-going opportunity to visit with their Center Leadership and/or Supervisors to discuss progress and gain advice on next steps.

### **5.13 Agency & Center Systems Engineering Leadership Participation**

Opportunities are designed throughout the SELDP year to ensure ongoing communication between SELDP participants and Agency and Center Engineering Directors.

## **6.0 Leadership Assessment and Workshop Design Elements**

Actual program workshop designs will be re-evaluated annually and be designed to accommodate the need of the majority of program participants in that years' class and the opportunities available.

### **6.1 Pre-Program Participant Assessments**

Participants may complete assessment instruments prior to starting their developmental assignments, including:

1. Systems Engineering 360 Degree Feedback
2. Emotional Intelligence
3. Myers Briggs Type Instrument
4. Critical Thinking

### **6.2 Workshop Design Elements**

#### **6.2.1 Session I — Program Orientation Workshop**

Activities and Outcomes

1. Program Overview: Set course for year-long development program. Provide detailed program information including travel and program requirements. Clarify program expectations.
2. Understanding of NASA's System's Engineering Goals: Dialogue with the NASA Engineering Leadership. Obtain first hand understanding of Agency goals from leaders and gain insight into how participants can align their development year to most effectively meet these goals.
3. Assessment Feedback and Coaching Initiated:  
Explore personal leadership styles and effectiveness.  
Systems Engineering 360: Provide individual coaching on SE 360 and develop coaching goals for the year aligned with NASA's systems engineering leadership behaviors.
4. Myers Briggs Team Building Activity: Designed to build understanding and trust among the participants, learn each others strengths and development goals and build a strategy of peer coaching and supporting each other in attaining stretch goals.
5. cLife Cycle Model in which participants learn how to effectively handle transitions through the five major phases of life: start up, growth, maturity, productivity and endings. Through this learning supports participants in effectively moving out of their previous jobs and more powerfully engaging in their developmental assignments.
6. Training in Systems Thinking: Participants learn to understand problems in the context of the larger system in order to create sustainable, long-term solutions and limit negative untended consequences. Learning includes understanding the parts of the system, their interrelationships and the system that is created as a result of these interrelationships.
7. Benchmarking: If the Orientation is held on or near a NASA Center the participants will be provided with the opportunity to visit and learn about the Center's systems engineering environment and engage in discussions with Center systems engineering professionals.

## **6.2.2 Session II - SE Leadership Workshop**

### Activities and Outcomes

1. Center Benchmarking and Masters Forum Held with Top Agency Systems Engineers. Panel, briefings and small group dialogues will enable participants to learn for NASA's leading Systems Engineers. Center Engineering Directors are encouraged to attend. Center benchmarking tour will be part of this workshop when scheduled near or at a Center.
1. Speaking Powerfully as a SE Leader: Participants focus on what it takes to produce powerful, measurable results through others. Participants learn to refocus participants highly refined technical skills and talents towards producing powerful, measurable results through others. Through this model participants learn to create a shared vision and alignment; identify tangible, valuable results to achieve Agency goals; and create actions that produce these results.
2. Leading with the Brain in Mind: Participants learn how individuals and organizations use brain science to understand how to enable individuals and organizations to perform their best.
3. Leadership Choices Model: Further exploration into learning how to speak powerfully as a leader and getting into action around vision..

## **6.2.3 Session III - PM Challenge and Communications Workshop**

### Activities and Outcomes

1. PM Challenge: Participants attend the NASA PM Challenge to gain insight and understanding of the larger program, project and systems engineering arenas inside and outside NASA.
2. Communications Training Conducted: Communications training conducted in Crucial and Confrontational Communications or Coaching for Supervisors and Managers to improve participant's ability to deal with difficult conversations and to motivate and support employees improved performance.

## **6.2.4 Session IV – Reentry Workshop**

### Activities and Outcomes

1. Executive Presence – Executive presence skills developed. Builds on skills obtained in Workshop II on Speaking Powerfully as a Leader.
2. Center Benchmarking – Center systems engineering tour and briefings by Center and Engineering Directors.
3. Develop individual re-entry strategies to facilitate return to Centers
4. Create Professional Profile – Create individual written resume of experiences, accomplishments and qualifications.
5. Leadership Coaching: Face-to face coaching provided to continue to support participants in reaching their coaching goals.

## **6.2.5 Session V – Closing Workshop and Graduation**

### Activities and Outcomes

1. Celebrate SELDP Accomplishments. SELDP participants brief and dialogue with EMB about their learning experience and accomplishments.
2. Close out the learning community experience and build ongoing communication and networking strategy



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3. Graduation exercise and Acknowledgement.
4. Outside Leadership Benchmarking: Site visits will be conducted with organizations who are leaders in systems engineering. These site visits may be at industry or other Federal Agency locations. Top leaders in these organizations will brief participants on their process and key learning.

## 7.0 SELDP Program Schedule

The schedule for the SELDP Program is shown in Table 7 below.

**Table 6. SELDP Program Schedule**

Date	Leadership Workshop Activity Summary
June	<ul style="list-style-type: none"> <li>• Home Center and Assignment Mentor's Assigned. and Mentoring Initiated</li> <li>• Participant Planning Teleconference</li> <li>• Session I – Orientation Held – Program Initiation</li> </ul>
August - October	<ul style="list-style-type: none"> <li>• Developmental Assignments Begin</li> <li>• Individual and Group Technical Training Begins</li> </ul>
October/November	<ul style="list-style-type: none"> <li>• Session II – SE Leadership Workshop</li> </ul>
February	<ul style="list-style-type: none"> <li>• Session III – PM Challenge, Communications Workshop</li> <li>• Mid-Program Assessments Conducted</li> <li>• Mid-Term Reports Due from Participants</li> </ul>
May	<ul style="list-style-type: none"> <li>• Session IV – Re-Entry Workshop</li> </ul>
July	<ul style="list-style-type: none"> <li>• Closing Workshop and Graduation</li> </ul>
August	<ul style="list-style-type: none"> <li>• Developmental Assignments End – 12 months after initiation</li> <li>• Individual and Group Technical Training Completed</li> <li>• Assignment Mentoring Engagements Closed</li> <li>• Final Reports and Program Evaluations Due from Participants</li> <li>• Leadership Coaching Engagements Transitioned to Home centers</li> </ul>

## **8.0 Appendices**

### **8.1 Appendix A SELDP Assignments to the Jet Propulsion Laboratory**

The NASA JPL is a Federally Funded Research and Development Center (FFRDC) operated for NASA by the California Institute of Technology (Caltech). Because of its special status, the JPL may have access to proprietary information to which NASA has no right of access. The JPL has privacy rights similar to those of any contractor. Because of the possible ethics issues that might arise in the course of an assignment of a NASA civil servant to the JPL, special arrangements have been made by the SELDP program. These arrangements were created through the work of the NASA office of the General Counsel at NASA headquarters, the chief counsel of the NASA management office (NMO), and attorneys for Caltech. While the nature of the ethical issues themselves is beyond the scope of this paragraph, it forms the basis of a special written agreement between NASA and Caltech and of a special ethics briefing that each SELDP participant who is detailed to the NASA JPL must obtain. Questions about specific ethical issues should be brought to an ethics officer (attorney) at any of the NASA centers, the JPL NMO, or the office of the General Counsel at NASA Headquarters. Specific procedures for SELDP participants assigned to the NASA JPL are outlined below. There are no special requirements, except for the normal SELDP program requirements, for JPL employees who are assigned by the SELDP to NASA centers.

NASA civil servants who are assigned to the JPL by the SELDP must prepare two documents in addition to the documentation that is required of all participants: (1) The SELDP participants assigned to JPL, must complete the document entitled "Memorandum of Understanding for Temporary Assignment at the Jet Propulsion Laboratory of NASA Employee Under NASA's Systems Engineering Leadership Development Program." Completion of this document entails filling in the blanks labeled in all-caps according to the specific details of the temporary assignment. After this document is returned to the SELDP staff, the document will be signed by officials from NASA and Caltech. The participant does not sign this document. While the preparation of the document is very straightforward, please refer to the "frequently asked questions" (FAQ) maintained on the SELDP website to see questions that have been raised by previous participants. (2) The second document is entitled "NASA SELDP Ethics Statement," and must be signed by the participant. The ethics statement is a promise by the participant to obtain an ethics briefing from an ethics officer at the participant's home Center with participation from the Chief Counsel's office at the JPL NMO. Both documents should be returned to SELDP staff when complete.

#### **8.1.1 Instructions for Completing the JPL MOU**

Instructions for completing the form entitled "Memorandum of Understanding for Temporary Assignment at the Jet Propulsion Laboratory of NASA Employee Under NASA's Systems Engineering Leadership Development Program" are given below. The MOU form has been designed to allow you to "fill in the blanks" in a simple, intuitive manner. Questions that were asked by previous SELDP program participants were recorded as a set of Frequently Asked Questions (FAQs) and are listed below. The FAQs are expected to be updated each year as a result of new inputs.

## Frequently Asked Questions (FAQs)

- 1 **Q.** Does “**LENGTH OF ASSIGNMENT**” include the time needed for travel and transportation of personal belongings and family members to and from the duty station?  
**A.** Yes. The length of assignment should be designed to encompass all SELDP program activities that are directly related to the new work assignment.
- 2 **Q.** Does “**LOCATION WHERE THE NASA EMPLOYEE WILL WORK**” always mean “NASA JPL, Pasadena, CA?”  
**A.** No. In cases where the job assignment requires one or more duty stations instead of, or in addition to, the JPL, list each of the duty stations.
- 3 **Q.** What level of detail is expected for “**NAME OF INTERNAL ORGANIZATION WITHIN JPL WHERE THE NASA EMPLOYEE WILL WORK AND A DETAILED DESCRIPTION OF THE NASA EMPLOYEE’S JOB ASSIGNMENT**”? **A.** You should write a paragraph that includes the name of the project, the name of the JPL project organization, the job title(s), and a reference to any known products.
- 4 **Q.** What are the “important” parts of this MOU, or to what should I give the most attention?  
**A.** These questions will be answered during an ethics briefing that you will schedule with the ethics official from your home center. That ethics officer, in cooperation with the JPL NMO Chief Counsel, will explain the agreement and answer all your questions prior to your beginning the assignment at JPL.
- 5 **Q.** Is there anyone that I need to contact when I arrive at JPL to begin the assignment?  
**A.** In addition to meeting with the JPL SELDP Advocate, you should visit the NMO Chief Counsel’s office and meet the staff. You should ask the staff how to obtain your copy of the “rules and policies that govern the internal operations and management of Caltech/JPL” that is referenced in the MOU.
- 6 **Q.** What if I have other questions?  
**A.** Feel free to contact the SELDP staff with any questions.

## 8.1.2 Copy of JPL Memorandum of Understanding

### Memorandum of Understanding for Temporary Assignment at the Jet Propulsion Laboratory of NASA Employee Under NASA's Systems Engineering Leadership Development Program

#### I. Purpose

This Memorandum of Understanding ("MOU") is entered into by the National Aeronautics and Space Administration ("NASA") and the California Institute of Technology ("Caltech"). The MOU establishes the terms and conditions for the temporary assignment of NASA employee (**NAME OF NASA EMPLOYEE**) to the Jet Propulsion Laboratory ("JPL") for a period of (**LENGTH OF ASSIGNMENT**). Actual work experience will not exceed (**LENGTH OF ASSIGNMENT**). The authority for this MOU is 5 U.S.C. § 4101 et seq., the Government Employees Training Act of 1958, as amended and 42 U.S.C. § 2473 et seq., the National Aeronautics and Space Act of 1958, as amended.

The Jet Propulsion Laboratory, run by a division of Caltech, is located at 4800 Oak Grove Drive, Pasadena, CA 91109. National Aeronautics and Space Administration Headquarters is located at 300 E Street, S.W., Washington, DC, 20546.

#### II. Background

As part of NASA's Systems Engineering Leadership Development Program ("SELDP"), participants engage in outside temporary work assignments in order to broaden their knowledge and increase their leadership skills. A temporary assignment to Caltech/JPL has been identified as a valuable developmental opportunity for (**NAME OF NASA EMPLOYEE**). This position will enable the participant to gain new perspectives in the field of systems engineering and, at the same time, will benefit NASA by building and retaining a skilled and effective workforce. (**See NPD 3410.1 for benefits to NASA**).

The scope of JPL's work is defined in section C of Contract NAS7-03001 between NASA and Caltech (the "Prime Contract"). Caltech operates JPL as a NASA Federally Funded Research and Development Center to meet Government research and development needs which cannot be met as effectively by existing Government resources or normal contractor relationships. JPL has a dual character; it is a NASA-owned facility as well as an operating division of Caltech staffed with Caltech employees. JPL as an institution encompasses a full spectrum of activities from basic research through the conduct and management of space flight missions.

The NASA employee will work at Caltech/JPL at (**LOCATION WHERE THE NASA EMPLOYEE WILL WORK**) where he/she will (**NAME OF INTERNAL ORGANIZATION WITHIN JPL WHERE THE NASA EMPLOYEE WILL WORK AND A DETAILED DESCRIPTION OF THE NASA EMPLOYEE'S JOB ASSIGNMENT**). This assignment will serve as a broadening experience to enhance the employee's perspective and meet his/her developmental needs.

Caltech/JPL will serve as the sponsor for (**NAME OF NASA EMPLOYEE**) for the duration of the assignment. The sponsor will assign daily tasks to (**NAME OF NASA EMPLOYEE**) to ensure that (**NAME OF NASA EMPLOYEE**) has the opportunity to work on projects related to program goals and his/her developmental needs.

**(NAME OF NASA EMPLOYEE)** will interact with Caltech/JPL organizational staff at all levels. At the conclusion of the assignment, **(NAME OF NASA EMPLOYEE)** will prepare an SELDP Final Program Report.

### III. Responsibilities

Nothing in this MOU is intended to affect, alter, or change any terms or conditions of the Prime Contract between the parties nor is this MOU intended to, in any way, affect the respective rights and obligations between the parties as set forth in the Prime Contract. To the extent there is any inconsistency between this MOU and the Prime Contract, the terms of the Prime Contract shall govern. Any effort performed by Caltech/JPL in connection with this MOU shall be performed under the Prime Contract.

It is the intent of the parties in entering into this MOU that the following efforts will be undertaken, consistent with the Prime Contract:

NASA will use reasonable efforts to accomplish the following:

1. Assign **(NAME OF NASA EMPLOYEE)** to Caltech/JPL. While assigned to Caltech/JPL and performing services pursuant to this agreement **(NAME OF NASA EMPLOYEE)**, will remain an employee of NASA.
2. Retain sole responsibility for the payment of all salary, allowances, and benefits under applicable Federal law and regulations. **(NAME OF NASA EMPLOYEE)** is prohibited from receiving any payment or other compensation from Caltech/JPL, including (but not limited to) such forms of compensation as meals, housing, personal laundry, time off, etc.
3. Retain responsibility for **(NAME OF NASA EMPLOYEE)** workers' compensation benefits available for injuries arising out of the performance of his duties within the scope of this assignment. Caltech/JPL will not include **(NAME OF NASA EMPLOYEE)** under its workers' compensation program.

Caltech/JPL will use reasonable efforts to accomplish the following:

1. Provide on-the-job training to **(NAME OF NASA EMPLOYEE)** during the term of this agreement.
2. Assign **(NAME OF NASA EMPLOYEE)** to various projects, as described in the Background Section above, during the assignment.
3. Provide **(NAME OF NASA EMPLOYEE)** with a sponsor for the duration of the assignment. The sponsor will work with **(NAME OF NASA EMPLOYEE)** to develop a general plan for the duration of the assignment which will ensure that **(NAME OF NASA EMPLOYEE)** has the opportunity to work on projects related to SELDP goals and that meet his/her developmental needs.
4. Comply with the attached "Time-Keeping, Administration and Evaluation Procedures."
5. Provide appropriate office space, administrative, and logistical support for **(NAME OF NASA EMPLOYEE)**, including communications access, normal and proprietary materials, storage, clerical support, office equipment, and supplies.

Both parties will be responsible for avoiding any conflicts of interest situations and to so instruct their respective employees.

### IV. Schedule and Milestones

Caltech/JPL understands that **(NAME OF NASA EMPLOYEE)** is unavailable for work assignments on the certain days due to required developmental program activities that will be specified by the SELDP Director.

#### V. Financial Obligations

Financial obligations are governed by the Prime Contract.

#### VI. Liability and Risk of Loss

Liability and Risk of Loss are governed by the Prime Contract.

#### VII. Intellectual Property and Export-Controlled Data

The parties do not intend that the activities performed under this MOU will result in inventions or the creation of new intellectual property, but if any result, the following will apply:

- Under Federal law, **(NAME OF NASA EMPLOYEE)** remains a Government employee during the developmental training assignment. Any intellectual property developed by the Government employee pursuant to this MOU is governed by applicable federal statutes, regulations, rules, and policies.
- Subject to the U.S. Government's rights and interests, Caltech shall retain exclusive title and all rights to inventions, copyright and other intellectual property arising from conceptions or efforts of JPL employees or consultants in performing this MOU. The U.S. Government retains a right to use such inventions, copyrighted materials, or other intellectual property, royalty-free, for authorized government purposes.
- Subject to U.S. Government rights and interests, NASA and Caltech shall hold joint title and rights in inventions, copyrights, and other intellectual property arising from the joint conceptions or efforts of both parties' employees or consultants in performing under this MOU.

In the performance of this MOU, JPL and NASA may exchange or develop data, information, software or other technology which may be subject to the export control laws and regulations of the United States, including the International Traffic in Arms Regulations (ITAR), 22 C.F.R. 120-130 and the Export Administration Act Regulations (EAR), 15 C.F.R. 730-774). The parties agree to fully comply with all such laws and regulations in the performance of this MOU and each party will be responsible for obtaining export licenses or other export authority as may be required before exporting controlled data, information, software or other technology to foreign countries or providing access to foreign persons (as defined in 22 C.F.R. 120.16 ).

In the event that JPL is requested by NASA to provide remote access accounts for its employees authorizing access to any JPL electronic library or server, JPL will require NASA's Export Administrator to certify that its employees requesting access are U.S. persons (as defined in 22 C.F.R. 120.15). During assignment under this MOU and while on the JPL premises and/or JPL's computing network and resources, **(NAME OF NASA EMPLOYEE)** may have access to or otherwise be provided exposure to third party proprietary and/or otherwise protected data that may not normally be available to NASA under the Prime Contract, such information and/or data shall be subject to and treated by **(NAME OF NASA EMPLOYEE)** in accordance with 18 USC 1905.

#### VIII. Key Personnel

NASA SELDP Program Plan

The following personnel are designated the principal points of contact between the parties in the performance of this agreement:

<p><b><u>NASA:</u></b>                  Christine R. Williams, Director                  Systems Engineering Leadership                  Development Program                  Tel.: (202) 358-2146                  Address:                  NASA Headquarters                  Suite 4082                  300 E. St. SW                  Washington, D.C. 20546                  E-Mail: <a href="mailto:Christine.R.Williams-1@nasa.gov">Christine.R.Williams-1@nasa.gov</a></p>	<p><b><u>Caltech:</u></b>                  (name of current assoc. director)                  Associate Director for Flight Projects                  and Mission Success                  Tel.: (818) 354-5037                  Address:                  NASA Jet Propulsion Laboratory,                  California Institute of Technology                  4800 Oak Grove Drive                  Pasadena, California 91109                  E-Mail: <a href="mailto:(current email)@jpl.nasa.gov">(current email)@jpl.nasa.gov</a></p>
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IX. Term of Agreement and Modifications

This MOU becomes effective as of the date of the last signature below. The term of this agreement is **(ACTUAL DATE OF BEGINNING ASSIGNMENT)**, through **(ACTUAL ENDING DATE OF ASSIGNMENT)**, or until canceled by either party. Any modification to this agreement shall be executed, in writing, and signed by an authorized representative of each party.

X. Right to Terminate

Either party may terminate this agreement at any time. One week's notice is preferred.

XII. Anti-Deficiency Act

All activities under or pursuant to this agreement are subject to the availability of appropriated funds, and no provision shall be interpreted to require obligation or provision of funds in violation of the Anti-Deficiency Act, 31 U.S.C. §1341.

XIII. Execution

The following individuals execute this agreement on behalf Caltech and the Government, respectively.

<p>_____</p> <p><b>(Name of Current Assoc. Director)</b>                  Associate Director for Flight Projects and Mission                  Success, NASA Jet Propulsion Laboratory,                  California Institute of Technology</p> <p>Date: _____</p>	<p>_____</p> <p><b>Christine R. Williams</b>                  Director, Systems Engineering Leadership                  Development Program, Office of the Chief                  Engineer, NASA Headquarters</p> <p>Date: _____</p>
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### 8.1.3 NASA SELDP Ethics Statement

The following SELDP Ethics Statement is required of NASA employees for SELDP assignments at JPL.

I understand that as a condition of participation in the NASA SELDP, I will consult with an ethics official in the Chief Counsel's Office of my home Center prior to beginning my assignment with JPL. I furthermore understand that upon arrival, I will consult with an ethics official located in the Chief Counsel's Office for the NASA-JPL Management Office. If any question regarding my compliance regarding the Federal ethics laws or other Federal or NASA ethics requirements arises during my assignment, I will contact an ethics official located in the Chief Counsel's Office for the NASA-JPL NMO unless the issues relates to my official duties or other aspects or my relationship with my home Center, in which case I will contact a NASA ethics official for my home Center in coordination with an ethics official at the NASA-JPL NMO.

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SELDP Participant

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Printed Name

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Date

## 8.2 Appendix B NASA Systems Engineering Training

The emphasis of the SELDP is on hands-on technical assignments at NASA field Centers with various programs and projects. Prior to, and during the participation in the program, participants are expected to conduct objective analysis of their core systems engineering knowledge, understanding, and practice. The SELDP-APPEL coordinator, Moses Adoko at [moses.adoko@hq.nasa.gov](mailto:moses.adoko@hq.nasa.gov), can help participants undertake this assessment. Should a deficiency be identified in any major SE concept, processes, policy etc., it is recommended that the participants obtain the necessary training through APPEL or a credible provider.

The APPEL Systems Engineering Curriculum is based on a development model or framework and defined SE competencies. Course offering dates and locations are available on the Agency-wide Master Calendar.

### APPEL Systems Engineering Curriculum

1. Foundations of Aerospace at NASA\*
2. Project Management and Systems Engineering\*
3. Fundamentals of Systems Engineering\*
4. Advanced Project Management and Advanced Systems Engineering\*\*
5. Lifecycle Processes and Systems Engineering
6. Concept Exploration and Systems Architecting
7. Requirements Development and Management
8. Developing and Implementing a SEMP
9. Transition, Product Delivery and Mission Operations
10. Space System Verification and Validation
11. Decision Analysis
12. Earth, Moon, and Mars
13. Space System Development: Lessons Learned
14. Software Engineering Management

\* Attendance recommended prior to applying for SELDP

\*\* Attendance recommended prior to or during SELDP.

### Other Recommended Courses:

1. Seven Axioms of Good Engineering — Learning from Failure
2. Risk Management

The following required leadership and communications courses will be provided to participants at Leadership Workshops during their SELDP year:

- Systems Thinking
- APM/ASE  
<http://www.nasa.gov/offices/oc/e/appe/curriculum/core/475.html>
- Crucial Conversation and Confrontation

The SELDP baseline set may be modified as influenced by strategic activities of the Agency or newly established best practices.

### 8.2.1 OCE/APPEL Selected SE Curriculum for SELDP

Table 7 What Courses to Take and When for SELDP

<b>Development Planning Matrix</b>				
	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>
<b>LEVELS OF PROJECT LEADERSHIP</b>	Team Practitioners/ Technical Engineers	Subsystem Leads	Project Managers/Project Systems EngineerS	Program Managers/Project Systems or Chief Engineer
<b>APPEL CORE COURSES</b>	Foundations of Aerospace at NASA	Project Mgmt and Systems Engineering	Advanced Project Mgmt and Advanced Systems Engineering	Executive*
	<b>Systems Engineering</b>			
	<ul style="list-style-type: none"> <li>Fundamentals of Systems Engineering</li> <li>Life Cycle, Processes, and Systems Engineering</li> <li>Requirements Development and Management</li> </ul>	<ul style="list-style-type: none"> <li>Concept Exploration and Systems Architecture</li> <li>Decision Analysis</li> <li>Developing and Implementing SEMP</li> <li>Earth, Moon, &amp; Mars</li> <li>Software Engineering</li> <li>Management 301 — Space System Development: Lessons Learned</li> <li>Space Systems V&amp;V</li> <li>Transition, Product Delivery, and Mission Ops</li> </ul>		
	<b>Design and Innovation</b>			
		<ul style="list-style-type: none"> <li>Innovative Design for Engineering Applications</li> <li>Seven Axioms of Good Engineering</li> </ul>		
	<b>Technical—General</b>			
		<ul style="list-style-type: none"> <li>Mars Mission System Design</li> <li>Mars Mission System Design /Lab</li> </ul>		
<b>Developmental Work Assignments: (To Be Determined by Centers)</b>				
<b>Examples of Knowledge-Sharing Activities</b>				
These are only examples. Each Center/Individual should identify those experiences specific to Center needs.	<ul style="list-style-type: none"> <li>Obtain a mentor</li> <li>Attend a technical conference</li> <li>Demonstrate working knowledge of Agency policy documents</li> <li>Join national &amp; international affiliations or technical bodies (i.e., INCOSE, PMI)</li> </ul>	<ul style="list-style-type: none"> <li>Write and present a technical paper</li> <li>Attend the Masters Forum, PM Challenge, or other non-NASA conferences</li> </ul>	<ul style="list-style-type: none"> <li>Write a technical paper and present it at the Master's Forum, PM Challenge or external NASA conference</li> <li>Study case studies</li> </ul>	<ul style="list-style-type: none"> <li>Become a mentor</li> <li>Conduct storytelling sessions</li> <li>Instruct or become a guest speaker at APPEL courses</li> <li>Write an article in <i>ASK Magazine</i></li> </ul>

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**Table 8. APPEL SE Courses**

<b>APPEL SE Courses</b>	
<b>Recommended SELDP Prerequisites</b>	
FOUNDATIONS OF AEROSPACE AT NASA (FOU)	Addresses the meaning of working at NASA and the principles of technical excellence. Focuses on providing participants with a “big picture” overview of NASA, its history, mission, its Governance model and Agency operations. Focuses on communication and team participation skills.
PROJECT MANAGEMENT & SYSTEMS ENGINEERING (PM&SE)	Enhances proficiency in applying PM and SE processes/practices over the project life cycle. Focuses on defining and implementing system projects and provides valuable insight for managing and leading project and technical teams.
FUNDAMENTALS OF SYSTEMS ENGINEERING (FSE)	Introduces methods and techniques for a structured systems development process that proceeds from requirements to concept to production to operation is based on NPR 7123.1A and 7120.5D. Focuses on the interfaces between the people, processes, and products. Equips teams with knowledge necessary to realize successful solutions.
<b>Recommended SELDP Courses</b>	
ADVANCED PROJECT MANAGEMENT & SYSTEMS ENGINEERING (APM&ASE)	Focuses on advanced concepts of PM and SE and their integration in the management of all phases and facets of the project life cycle. Uses case studies to examine topics such as system architecting, performance, risk, cost, schedule, reliability and operability, stakeholder management and acquisition strategies. Provides knowledge to realize project solutions and leverage PM & SE roles and responsibilities defined in 7120.5D and 7123.1A.
<b>Additional APPEL SE Courses</b>	
CONCEPT EXPLORATION & SYSTEM ARCHITECTING (CESA)	Processes and tools for successfully performing up-front system engineering analysis. Includes defining system scope, acceptance criteria, creating context diagrams and developing case scenarios, and work on the synthesis of the first level architecture to meet customer objectives, requirements and constraints.
DECISION ANALYSIS (DA)	Designed to provide the tools necessary to improve the quality of a factually based decision-making process for resolving technical issues at NASA.
DEVELOPING & IMPLEMENTING A SE MANAGEMENT PLAN (SEMP)	Introduces the processes that support planning, development and execution of a SE Management Plan (SEMP). Includes how SE deliverables are planned and managed. Participants experience SE technical reviews and appreciate the value of these “gates.”
EARTH, MOON, & MARS (EMM)	Introduces the remarkable discoveries of how these planetary bodies formed and the kinds of geologic processes that continue to operate on them today. Participants will also learn of the unique geologic challenges that the Moon and Mars pose to future exploration.
LIFE CYCLE, PROCESSES AND SE (LPSE)	Introduces SE processes, NASA life-cycle phases, key technical reviews, and SE management techniques. Helps participants realize the value of well-established SE processes and deliverables.
DESIGN LAB (MMSD)	Provides experience of conceptualizing and designing space missions to Mars or the Moon. Provides an integrated view of space mission design and operations.
REQUIREMENTS DEV. AND MANAGEMENT (REQ)	Provides a foundation for the development and management of project’s product requirements. Includes requirement best practices that, help project team develop a product that delivers what is needed, on-time and within cost and expected quality.
SEVEN AXIOMS OF GOOD ENGINEERING (SAGE) CASE STUDY: LEARNING FROM FAILURE	Promotes good engineering design and PM decision making via case studies and discussion. Promotes critical thinking and improves decision making among engineers, technologists, PM’s, and scientists.

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SOFTWARE ENGINEERING MANAGEMENT (SWE-301)	Introduces participants to software engineering management techniques, including project monitoring, control, and measurement..
SPACE SYSTEM DEVELOPMENT: LESSONS LEARNED (SSD)	Via lessons learned this course examines the root causes of aerospace mishaps and the lessons that can be derived from those historical incidents.
SPACE SYSTEM VERIFICATION AND VALIDATION (SSVV)	Demonstrates the processes, information, and tools necessary to implement a credible verification, integration and test program. Provides exposure to NASA and DoD standards, lessons learned, tools and experiences in validation and verification.
TRANSITION, PRODUCT DELIVERY AND MISSION OPERATIONS (TPDMO)	Demonstrates the processes, procedures, and strategies necessary to implement effective product development, transition, delivery and operations.

\*Visit <http://www.nasa.gov/offices/oce/appel/curriculum/courses/329.html> for course descriptions

### 8.2.2 How to Register FOR APPEL-Sponsored Programs

Please complete your self-registration for the Academy of Program/Project and Engineering Leadership (APPEL) courses through the SATERN online approval process. This can be found by using the following link: <https://satern.nasa.gov/elms/learner/login.jsp>. The implementation of an Agency-wide standard process through one system for all APPEL courses helps to improve consistency and efficiency in training operations and administration. The self-registration process in SATERN replaces other nomination forms previously available for APPEL. All employees requesting APPEL courses need to login to SATERN to start the self-registration process.

Please note that an estimate of Travel and Per Diem expenses must be provided by the Learner when registering for APPEL courses. Travel and Per Diem information is required for reporting to the Office of Personnel Management and it should be included in the Comments section for review. If this information is not included, the request will be denied and the employee will be required to re-register.

**TO REGISTER FOLLOW THE INSTRUCTIONS USING THE FOLLOWING LINK:**

<http://www.nasa.gov/offices/oce/appel/curriculum/register/83.html>

### 8.2.3 Developing Competencies for Success

Competencies are the combination of knowledge, skills and abilities that contribute to individual and organizational performance. The APPEL developmental framework is based on a rigorous set of competencies that practitioners should have in order to perform their jobs. These competencies define the breadth and scope of the discipline and facilitate personnel development and assessment of individual knowledge and capabilities.

These competencies were derived from many sources including extensive interviews with several hundred highly successful project managers and system engineers at NASA. The resulting competencies were vetted with both internal and external organizations to ensure completeness and accuracy. Since the competencies form the foundation of the development program, they are under configuration control and are reviewed and updated as appropriate.

A key step for the NASA's technical practitioners is to understand the requirements of their roles and the related competencies. APPEL seeks to help practitioners refine their competencies in order to reach the highest level of performance.

Performance-level descriptions for each competency have been created to guide the overall development of individuals within the program/project and engineering disciplines. Visit [http://www.nasa.gov/offices/oce/appel/pm-development/pm\\_se\\_competency\\_framework.html](http://www.nasa.gov/offices/oce/appel/pm-development/pm_se_competency_framework.html) on the APPEL website's PM&SE Development Gateway to view the competency framework.

To further support individuals as they work to identify their appropriate development activities, APPEL provides the Course Competency Matrix in the 2010 APPEL Course Catalog on-line at [http://www.nasa.gov/pdf/390149main\\_2010\\_APPEL\\_Course\\_Catalog.pdf](http://www.nasa.gov/pdf/390149main_2010_APPEL_Course_Catalog.pdf)

This catalog can be used as a guide in the selection of courses based on competency development and individual learning needs. In addition to competencies, the matrix includes other course elements that may be of interest to individuals considering attending a particular course. The table represents a snapshot of all APPEL courses including the course duration, audience, and goal for each APPEL course.