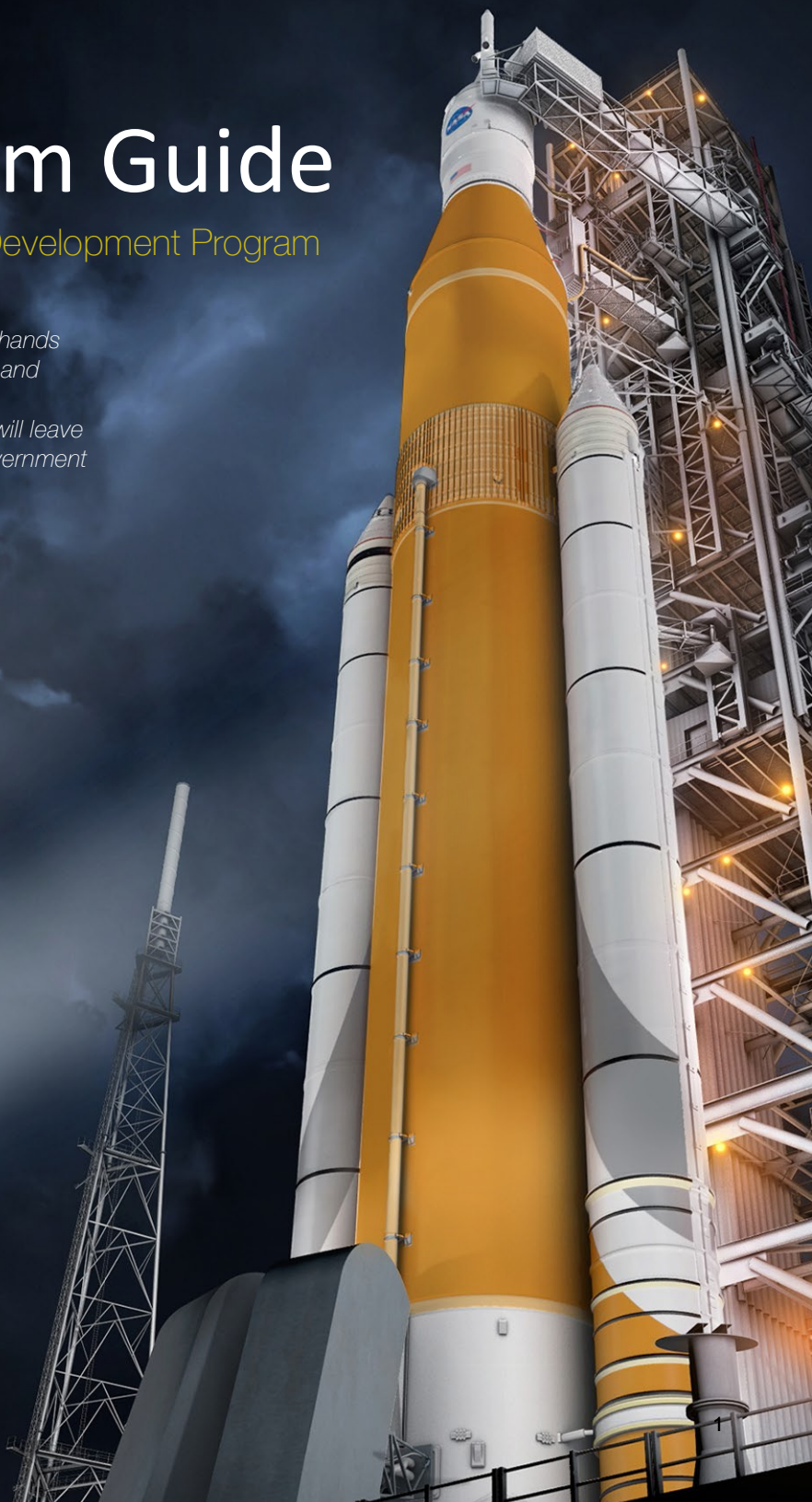
academy of program/project & engineering leadership

SELDP Program Guide

Systems Engineering Leadership Development Program

SELDP challenges systems engineers with rigorous, hands on systems engineering developmental assignments and advanced leadership training beyond what they can experience at their home centers. Each participant will leave the program having been exposed to innovative government and industry-wide concepts as well as the agency's perspective.



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OVERVIEW

Systems Engineering Leadership Development Program (SELDP)

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. NASA leadership has identified systems engineering as a critical core competency in enabling current and future mission success. While many NASA centers have hands-on systems engineering development programs that provide targeted development and systems engineering training locally, NASA identified the need for an advanced, agency-wide program that competitively selects high-potential system engineers. As a result, the agency established the Systems Engineering Leadership Development Program (SELDP).

NASA's Office of the Chief Engineer (OCE) has robust program/project management and systems engineering training programs within the Academy of Program/Project & Systems Engineering Leadership (APPEL). With over 60 in-depth courses and a commitment to engineering excellence, APPEL provides the ideal alignment for employees to gain the technical training needed to successfully compete for SELDP.

SELDP provides systems engineers with an agency-wide perspective, hands-on systems engineering developmental assignments beyond what they can learn and experience at their home centers, advanced leadership skills development, and exposure to innovative government and industry-wide systems engineering concepts.

Since its inception, SELDP has achieved a consistent 90 percent success rate of individuals transitioning into more complex and difficult positions upon returning to their organizations after completion of the program.

Equal Opportunity

Diversity is a main component of NASA's values and culture of excellence. SELDP embraces participants from a variety of backgrounds, including age, color, disability, ethnicity, family, marital status, gender identity, language, national origin, political affiliation, race, religion, sexual orientation, socio-economic status, and veteran status, as well as all other characteristics that make each systems engineer unique.

This key principle serves as the practice and policy of program recruitment and selection. Additionally, SELDP encourages the application and participation from individuals varying in life experiences, inventiveness, innovativeness, and creativity, as this is reflected throughout NASA's overall body of work.

For more information, please see NASA's Non-Discrimination Regulations for Federally Assisted Programs (CFR) and the Nondiscrimination and Equal Opportunity in NASA-Assisted Programs and Activities.

ABOUT THE PROGRAM

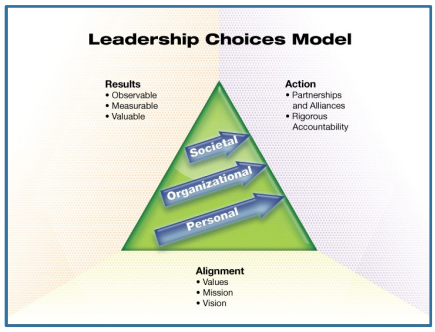
SELDP is a comprehensive program that provides leadership development, technical hands-on experience, leadership and technical training, benchmarking, mentoring, and coaching. The program's basis for design is founded in *The Art and Science of Systems Engineering*, the *NASA Systems Engineering Behavior Study*, and the Behavior Competency Model. The behaviors exhibited by NASA's highly valued systems engineers fall into five broad themes with associated competencies and their observable behaviors: leadership, attitudes and attributes, communication, problem solving and systems thinking, and technical acumen. Strategic thinking and political savvy are two additional leadership skills identified by NASA's follow-on study of technical executives and are also covered in SELDP.

The design of SELDP is unique in that it incorporates "brain-friendly" learning techniques. Neuroscience has provided a wealth of information that has improved our understanding of how people learn, grow, and develop, and what factors enable or inhibit that learning. The SELDP design is continually adapting to ensure NASA's investment in learning works with the brain and not against it, resulting in greater retention and return on investment.

Learning Strategies

1. **Leadership Development:**
   Leadership development workshops are held to support the acquisition and refinement of critical leadership skills and abilities. The Leadership Choices Model forms the core of the leadership development strategy for SELDP.

   This model focuses on enabling participants to gain clarity about their own leadership goals and objectives and to clearly align them with the mission and the goals of NASA in a way that engages others. It then helps participants define the results they are committed to achieving and enables them to achieve these goals and build connections with others.



The Leadership Choices Model was initially developed by the Council for Excellence in Government Fellows program, but has been refined and updated to support NASA's needs.
Image Credit: NASA

2. **Assessments:**
   Assessment instruments are used to help participants gain a greater understanding of their strengths as areas for development. Unique to SELDP is a NASA Systems Engineering 360 Assessment Instrument developed from the systems engineering behavior study that helps participants understand how extensively and effectively they are applying these systems engineering behaviors.

3. **Leadership Training Workshops:**
   Training in SELDP focuses on leadership, attitudes and attributes, communication, political savvy, problem solving, and systems and strategic thinking. Depending on the unique needs of each class, training courses are provided as a part of each leadership workshop.

4. **Coaching:**
   The participant's assessment results are used to form the basis for their leadership development strategy and coaching goals throughout the SELDP year. Certified professional coaches work with participants during their developmental program to ensure successful transition back to their home centers and new responsibilities.

SELDP Learning Elements

1. **Developmental Assignments:**
   Hands-on developmental assignments are a core requirement of SELDP that enables participants to gain greater understanding of systems engineering, and expand the application of their systems engineering knowledge and skills. SELDP is different from other NASA developmental programs in that the participant does not identify their own developmental assignment. Assignment matching is done by SELDP Advocates using a multi-part process that ensures assignments meet the participant's developmental needs.

   Part I: Participants identify the competencies they need to develop to meet their next level of growth against the competencies available in the developmental assignments.

   Part II: Advocates use the results of the matching process as the first step in identifying the assignments that would best provide the experience needed by the participant and then assess participants against six additional dimensions—life cycle phase, mission, level (e.g. subsystem, instrument, system, vehicle), project level (e.g., task, project, element, program), leadership experience, and human or robotic—that would broaden and expand the participant's overall experience.

   Advocates ensure participants are placed in "stretch" assignments: areas where they have little or no previous experience and would expand their understanding of systems engineering and NASA's engineering culture. One participant noted, "I am still amazed that the assignment-matching group was able to identify a suitable assignment based on a short interview and application form. My assignment fully addressed the gaps in exposure to the rest of the agency and how large programs operate."

2. **Technical Training:**
   Aside from systems engineering-oriented problem solving assignments, systems engineering and other classroom technical training is not a formal part of SELDP. Participants are expected to have the pre-requisite or equivalent courses upon entering SELDP. Little time is available for additional courses during the program year, but participants can sign up for additional APPEL courses or take advantage of center courses as needed for their assignment and as time permits.

3. **Center Visits and Outside Benchmarking:**
   Benchmarking with other NASA centers and outside organizations to expand the participant's understanding and awareness of effective systems engineering and leadership is part of each leadership workshop.

4. **Mentoring and Job Shadowing:**
All participants are assigned a mentor to guide them in their developmental assignment. Participants are also encouraged to shadow other center leaders as time permits to learn more about their assignment centers and different leadership styles.

5. **Jet Propulsion Laboratory Participants**
Participants from the Jet Propulsion Laboratory (JPL), please refer to the following table for special information regarding your participation.

Element	From NASA to JPL	From JPL to NASA
Extended Temporary Duty (TDY) & Program Travel	Funded by OCE	Task order funding provided by JPL to OCE
Salary and Benefits	Funded by Home Center	Funded from JPL burden account. Cannot use funds provided by OCE
Assignment Travel	Funded by OCE	Can be funded by the assignment center through invitational travel orders or JPL burden account
Ethics Out Briefing	Contact your Ethics Office for an out brief	
Forms	Memorandum of Understanding (MOU) for Temp. Assignments to JPL & NASA SELDP Ethics Statement	

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. 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 (MOU) for Temporary Assignment at the Jet Propulsion Laboratory of NASA Employee Under NASA's Systems Engineering Leadership Development Program** [Attachment A]. Completion of this document entails filling in the blanks labeled in all-caps according to the specific details of the temporary assignment. Once completed and returned to the SELDP staff, the document will be signed by officials from NASA and Caltech. The participant does not sign this document.

2. The second document is entitled **NASA SELDP Ethics Statement** [Attachment B] 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 participants home Center with participation from the Chief Counsel's office at the JPL NMO. Both documents should be returned to SELDP staff when complete.

Instructions for completing the form entitled "Memorandum of Understanding (MOU) 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 regarding JPL:

1. Does *"LENGTH OF ASSIGNMENT"* include the time needed for travel and transportation of personal belongings and family members to and from the duty station?

   Yes. The length of assignment should be designed to encompass all SELDP program activities that are directly related to the new work assignment.

2. Does *"LOCATION WHERE THE NASA EMPLOYEE WILL WORK"* always mean "NASA JPL, Pasadena, CA?"

   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. 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 EMPLOYEES JOB ASSIGNMENT"*?

   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. What are the "important" parts of this MOU, or to what should I give the most attention?

   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. Is there anyone that I need to contact when I arrive at JPL to begin the assignment?
   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. What if I have other questions?
   Feel free to contact the SELDP staff with any questions.

2016-2017 Selection Schedule *(*Dates are subject to change)*

Month	Program Activities
January 2016	Release SELDP Program Call (See Call for Nominations Letter for current schedule)
April 2016	Nominations and Assignments Due
June 2016	Candidate Interviews and Participant Selection

Program Year Schedule *(*Dates are subject to change)*

Month	Program Activities
August 2016	Orientation Workshop – Coaching Begins
August 2016	Developmental Assignments Can Begin (6-9 months, over 18 months)
October 2016	Leading for Results
January 2017	Leading Through Power Dialogue and Collaboration
March 2017	Leading Through Powerful Communication
May 2017	Leading in a Dynamic Environment
July 2017	Leading With Presence
September 2017	Using Your Leadership Voice

SELDP Funding

Centers are responsible for funding:
Participant's salary

- Travel to/from the interview
- Travel to/from orientation
- Training and associated travel that is not part of SELDP workshops
- Additional trips home, above the allowed quarterly trip
- Project travel required for participants assigned to their center

The OCE funds:

All other program travel and training for participants, including NASA employees assigned to JPL. Not all reimbursements allowed by the Federal Travel Regulations (FTR) are covered by SELDP. (Note: Items covered in the FTR that are not reimbursable by SELDP include commuting mileage and costs, maid services, dry cleaning and laundry, and rental cars.)

JPL Participants:

JPL is responsible for funding all costs associated with their employees' participation in the program as noted above, with the exception of employee project travel required for participants assigned to their center.

HOW TO PARTICIPATE

SELDP participants are identified using a rigorous nomination and selection process. Every two years, NASA's Chief Engineer distributes a call for nominations to all NASA centers. Center leadership identifies strong candidates for the program and submits the appropriate nomination forms, which are reviewed and processed by the SELDP selection committee.

NASA and the centers gain the greatest return on investment when nominees are selected as part of the center's strategic mid- to long-term investment. This investment is only successful when a center's systems engineering needs are met, which means that upon return, the participant is placed in a position where the learning experience they gained in the program is quickly applied to meeting essential center needs.

Candidate Eligibility

SELDP candidate criteria:

- Full-time, permanent GS-13 to GS-15 NASA employee or a senior systems engineer at JPL.
- Bachelor's degree in engineering or Specialties of Aerospace Technology (AST) equivalent.
- Willing and available to leave their home center and take on an assignment at another NASA center for six to nine months.

Experience needed to be successful in SELDP:

- The participant is an employee who understands and has exposure to a breadth of systems engineering competencies as defined by APPEL.
- The participant has experience applying systems engineering principles on one or more projects or programs.
- The participant is at least APPEL Proficiency Level II.
- The participant has taken one or more of the recommended systems engineering APPEL trainings, including: Foundations of Aerospace at NASA, Project Management and Systems Engineering, and Fundamentals of Systems Engineering, or equivalent courses.

Additional candidate considerations:

Nominees for SELDP must be individuals who have the experience and opportunity to take advantage of a developmental assignment away from their home center for six to nine months. Family obligations and current assignment requirements and timing should be taken into account to determine the optimal window of 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.

Candidate Nomination

Before identifying candidates, centers should consider the systems engineering knowledge, skills, and abilities they need to successfully run their programs in the next 18 to 24 months. Center engineering leadership is encouraged to consider the following questions when selecting nominees for SELDP:

- Why are you nominating this person for SELDP at this time in their career?
- In your opinion, why is SELDP the best option for the candidate?
- What specific learning gaps does SELDP fill for this person?
- What unique learning and experience will this person gain from SELDP that will help them do a better job?
- What systems engineering challenges will your center be facing in the next 18 to 24 months?
- What knowledge, skill, and/or experience does this person need to bring back that will help support these challenges?

The competitive process ensures that:

- Participants have demonstrated the leadership behaviors and aptitude that NASA identifies as critical to becoming an expert systems engineer, along with demonstrated technical/discipline capabilities.
- The most qualified nominees are selected for this opportunity when the learning will have the greatest impact on the employee and provide the greatest value to NASA.
- Participants have the experience and attitude to be successful in the program.
- There is an appropriate assignment available to meet the participant's needs.
- Participants have top-level center engineering leadership support needed to be successful in the program.
- Participants are placed in a position that quickly applies their SELDP learning when they return to their home center to ensure maximum transfer of learning and return on investment.

Agency Selection Process

Center engineering directors or their designees and members of the Safety and Mission Assurance community serve as the selection panel for SELDP participants. Participants are chosen using a four-part competitive selection process:

1. Center competition, nomination, and endorsement by center engineering leadership and the center director.
2. Rating and ranking of applications by the SELDP selection panel based on specific criteria to ensure applicant has met the program requirements and has the background to be successful in SELDP.
3. Selection panel interview of qualified applicants ensure applicant has the demonstrated leadership behaviors and aptitudes of highly successful systems engineers.
4. Advocate matching of selected applicants to available developmental assignments.

Application Materials

Below are the detailed program requirements, call for participants, nomination forms, and other pertinent materials to nominate candidates for SELDP. The call and application materials are scheduled for release every other year.

Program Requirements:

- Provide a comprehensive development program that provides for leadership and technical development, training and benchmarking, coaching, and mentoring.
- Provide opportunities for employees from across NASA to participate in a year-long developmental program. Participants are to be GS-13 or GS-15 engineers or AST equivalents. Participants from the JPL must be Senior Systems Engineers.
- Provide a process that ensures the selection of high potential participants who have proven technical/ discipline capability and who have demonstrated key leadership capabilities and behaviors. Individuals selected should be nominated by their Center Director and Center Engineering Director and expected to lead higher-level or more complex efforts in the next 18 to 24 months, not employees who are merely available. The SELDP competitive process ensures that:
    - Participants have demonstrated the leadership behaviors and aptitude that NASA identifies as critical to becoming an expert systems engineer (see *Systems Engineering Leadership Behavior Study*), along with demonstrated technical/discipline capabilities (see APPEL Systems Engineering Technical/Discipline Competency Model and APPEL Systems Engineering related courses).
    - 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 participants' 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;
    - Obtain critical thinking, systems thinking, judgment, and decision making skills, through training and case studies, that are 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 top NASA systems engineers, both at their home centers and at their developmental assignments;
    - Improve leadership effectiveness through coaching and feedback;
    - Provide interactions and learning from key NASA and outside leaders;
    - Provide technical training before the start of assignments that are critical to success;
    - Benchmark with other NASA centers and world-class outside systems engineering organizations.

- Ensure centers have individual development plans (IDP) for each participant. Identified experienced center systems engineering advocates will perform a gap analysis for each participant and match participants with the appropriate developmental assignment.

Nomination Forms:

- **SELDP Nomination Form –** Log into the NASA Electronic Forms Portal, search for form 1781 and complete.
- **Form NF 1781A: SELDP Assignment Summary –** To be completed by the SELDP advocate. Log into the NASA Electronic Forms Portal, search for form 1781A and complete.
- **Form NF 1781B: SELDP Participant Summary –** Checklist for the SELDP candidate and to be filled out by the candidate and supervisor. Log into the NASA Electronic Forms Portal, search for form 1781A and complete.

Nomination Supplements:

- **Current Selection Criteria** [Attachment C] **–** Identifies the criteria used by the SELDP Selection Panel to rate and rank nominee applications.
- **Current SELDP Supervisor and Engineering Director's Application Checklist** [Attachment D] – Identifies items for consideration throughout the participant nomination process to determine the best candidates for SELDP. This checklist should not be included in the final application package submitted to NASA Headquarters.
- **Current Engineering Director and Center Director Nomination and Endorsement Template/Example** [Attachment E] – Sample Word document for participant endorsement and nomination. Please complete and return with nomination materials.

Please check with your Center Training Office for center-specific application requirements and schedule.

LEARNING AND SUPPORT NETWORK

SELDP participants benefit from comprehensive training and development aligned with a sophisticated learning and support network. This model is essential to NASA mission success and return on investment for the program and its class.

System Map Interrelationships

POSITIONS	RESPONSIBILITIES & RELATIONSHIPS
OCE/SELDP Program Management	Defines learning needs, establishes program goals, and coordinates with the SELDP Board—the Engineering Management Board (EMB). Designs, delivers, and assess program.
EMB	Provides leadership guidance, and identifies and endorses high-potential candidates.
Center Directors	Coordinates with the EMB on the goals and strategy for using SELDP to develop center employees.
Home Supervisors and Mentors	Identifies potential candidates, provides input into their developmental assessment, and defines how employee will contribute upon return.
Advocates	Appointed by the EMB. Coordinates candidate identification, mentor participants, and provides status updates to EMB.
Center Training Coordinators	Coordinates local candidate selection with all parts of the system.
Participants	Responsible for learning, performing assignments, and communicating their status with home center. Accountable for returning to their centers with abilities and readiness to perform at the next highest level.
Assignment Supervisors and Mentors	Identifies potential developmental assignments. Responsible for developing the participants while on assignment.
Consultants and Trainers	Responsible for training and developing participants and providing advice on recommended program changes.
Coaches	Provides one-on-one and group coaching to participants.
Outside NASA	Shares program information and findings with outside organizations.

OCE SELDP Program Management

NAME	TITLE
Ralph Roe	NASA Chief Engineer
Dawn Schaible	NASA Deputy Chief Engineer, SELDP Sponsor
Roger Forsgren	Director of APPEL, SELDP Program Director
Jon Holladay	NASA Engineering & Safety Center (NESC) Systems Engineering Tech Fellow
Kevin Magee	SELDP Program Manager

RESOURCES

SELDP draws upon a number of reports, studies, and models to develop program participants, and provides a variety of additional learning content and resources.

Systems Engineering Competencies

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 personal 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 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. The NASA Project Management and Systems Engineering Competency Model consists of 18 project management competency areas, 17 systems engineering competency areas, and 14 competency areas common to both the project management and systems engineering communities. Performance-level descriptions for each competency have been created to guide the overall development of individuals within the program/project and engineering disciplines. Visit APPEL's PM&SE Career Development Framework to learn more.

Studies and Suggested Readings

- **Executive Leadership at NASA: A Behavioral Framework**
  Published in June 2010, this study was conducted to identify the behaviors and attributes exhibited by the agency's most successful executives. NASA Systems Engineering Behavior Study
  Published in October 2008, this study was conducted to identify the characteristics or behaviors frequently observed in highly regarded systems engineers at NASA.

- **NASA Systems Engineering Behavior Study**
  Published in October 2008, this study was conducted to identify the characteristics or behaviors frequently observed in highly regarded systems engineers at NASA.

- **Executive Behavior Validation Study**
  Published in December 2011, this large-scale study was conducted to quantitatively analyze the behavioral framework developed in the *Executive Leadership at NASA: A Behavioral Framework* publication.

- **Recommended Reading List**
  SELDP participants may be interested in these suggested readings in systems engineering, systems thinking, leadership, project management, and related disciplines.

Systems Engineering Curriculum

The emphasis of the SELDP is on hands-on technical assignments at NASA field centers with various programs and projects. Prior to and during participation in the program, participants are expected to conduct objective analysis of their core systems engineering knowledge, understanding, and practice. The APPEL SELDP coordinator assists participants with this assessment. Should a deficiency be identified in any major systems engineering concept, processes, policy etc., it is recommended that the participants obtain the necessary training through APPEL or another credible provider.

The APPEL Systems Engineering Curriculum is based on a development model or framework and defined systems engineering competencies. Course offering dates and locations are available on the APPEL Master Schedule.

Recommended SELDP Prerequisite Courses:

- **Foundations of Aerospace at NASA***
  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 and Systems Engineering***
  Enhances proficiency in applying project management and systems engineering 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***
  Introduces methods and techniques for a structured systems development process that proceeds from requirements to concept to production to operation, based on NPR 7123.1B and NPR 7120.5D. Focuses on the interfaces between the people, processes, and products. Equips teams with knowledge necessary to realize successful solutions.

**Attendance In at least one prerequisite course required prior to applying for SELDP.*

Recommended SELDP Courses:

- **Advanced Project Management and Advanced Systems Engineering****
  Focuses on advanced concepts of project management and systems engineering, 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 project management and systems engineering roles and responsibilities defined in NPR 7120.5D and NPR 7123.1A.

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

Additional APPEL Systems Engineering Courses:

- **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 and Implementing a Systems Engineering Management Plan (SEMP)**
  Introduces the processes that support planning, development, and execution of a Systems Engineering Management Plan (SEMP). Includes how systems engineering deliverables are planned and managed. Participants experience systems engineering technical reviews and appreciate the value of these 'gates.'

- **Earth, Moon, and 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 Systems Engineering (LPSE)**
  Introduces systems engineering processes, NASA life-cycle phases, key technical reviews, and systems engineering management techniques. Helps participants realize the value of well-established systems engineering processes and deliverables.

- **Manned Mission and System 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 Development and Management (REQ)**
  Provides a foundation for the development and management of a project's product requirements. Includes requirement best practices, which help project teams develop a product that delivers what is needed — on-time and within cost and expected quality.

- **Seven Axioms of Good Engineering (SAGE) A Case Study Course: Learning From Failure**
  Promotes good engineering design and project management decision making via case studies and discussion. Promotes critical thinking and improves decision making among engineers, technologists, project managers, and scientists.

- **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 Department of Defense (DoD) standards, lessons learned, tools, and experiences in validation and verification.

The following required leadership and communications courses are provided to participants at leadership workshops during their SELDP year. These courses are modified or changed based on an annual analysis of key leadership skills needed at NASA:

- Building Partnerships through Systems Thinking
- Crucial Conversations
- Leading Change through Effective Facilitation
- Leading Others through Coaching

- Business Acumen and Political Savvy
- Leading with the Brain in Mind
- Building a Reentry Strategy
- Driving Results

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

Videos and Images

Watch videos of practitioners and former SELDP graduates sharing their insights about systems engineering and view images from each class.

View the Systems Engineering playlist on APPEL's YouTube channel.
View images from each class on APPEL's Flickr page.
Read stories about SELDP events and participants.

ATTACHMENTS

Attachment A: Memorandum of Understanding for Temporary Assignment at the Jet Propulsion Laboratory (JPL) of NASA Employee Under NASA's SELDP

Attachment B: NASA SELDP Ethics Statement

Attachment C: Selection Criteria

Attachment D: Current SELDP Supervisor and Engineering Directors Application Checklist

Attachment E: Engineering and Center Director Endorsement Letter

ATTACHMENT A

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

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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 NASAs 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 JPLs 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

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

NASA:
Roger Forsgren, Director
Systems Engineering Development Leadership Program

NASA Headquarters MS:
6G35
300 E. Street SW
Washington, DC 20546-0001
Roger.c.forsgren@nasa.gov
Tel: (202) 358-3662

Caltech:
(name of current Associate Director)
Associate Director for Flight Projects and Mission Success

NASA Jet Propulsion Laboratory, California Institute of Technology 4800
Oak Grove Drive
Pasadena, CA 91109
Tel: (818) 354-5037
(current email)@jpl.nasa.gov

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-weeks 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 of Caltech and the Government, respectively.

Roger C. Forsgren **Date**
Director, Systems Engineering Development
Leadership Program

NASA Headquarters
300 E. Street SW, MS: 6G35
Washington, DC 20546-0001
Tel: (202) 358-3662

Name of Current Associate Director **Date**
Associate Director for Flight Projects and
Mission Success

NASA Jet Propulsion Laboratory, California
Institute of Technology
4800 Oak Grove Drive
Pasadena, CA 91109
Tel: (818) 354-5037

ATTACHMENT B

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 Counsels 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 Counsels 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 Counsels Office for the NASA-JPL NMO unless the issue 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.

SELDP Participant Name Here **Date**

ATTACHMENT C

Systems Engineering Leadership Development Program (SELDP) Selection Criteria: Rating and Ranking Applications

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Assessing the Nominee Against the Art and Science of Systems Engineering

Rating Factor	Maximum Points Awarded	Description
Experience (Application Question #11)	40	Has the nominee had the requisite experience in complexity and number of years to adequately prepare him/her to be successful in SELDP? Has the nominee proven to be able to effectively translate the opportunities he/she has been provided into measurable results for the Agency? Nominees will be rated on: • Relevant Past Experience: Type & Number of Years of demonstrated SE discipline knowledge and practical experience within area of expertise. • Participated in, or have an understanding and exposure to phases of project life cycle development • Discipline and/or Systems Engineering Competency • Major Accomplishments (Results Achieved) Including Awards Received
Developmental Preparation (Application Question #12)	30	How well is the candidate prepared to make maximum use of the SELDP developmental opportunity? Does he/she have the requisite training and development necessary to be successful in the SELDP? Is this the right program for this nominee at this time in his/her career? Nominees will be rated on: • Degree(s) and Certificate(s) Obtained • APPEL Training Completed • Other Professional Development • Leadership Development Including Agency-wide Courses as Applicable

Management Endorsement and Statement of Need (Center Nomination and Endorsement Memo. Additional information may also be available in Application Question #13.)	25	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 Systems Engineering role? Does the Center have a clear strategy for this individual that will effectively use the knowledge, skills and abilities gained in SELDP to support the achievement of the Center goals? Is there a good plan to enhance NASA's return-on investment? Nominees will be rated on: • Center's Overall Endorsement and Assessment of the Nominee's SE Leadership Capabilities • Alignment of Individual Development Needs with Agency/Center Program Needs • Reentry Strategy (How learning will be applied quickly?)
Discretionary	5	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.
Maximum Points Awarded	100	

ATTACHMENT D

SUPERVISOR AND ENGINEERING DIRECTOR'S SELDP APPLICATION CHECKLIST

No.	Item	Complete
1	Is the nominee a full-time permanent civil servant, grade GS-13, 14, or 15 for NASA employees, and Senior SE's at JPL?	
2	Does the nominee have a Bachelor's in engineering or AST equivalent?	
3	Have you assessed the systems engineering knowledge, skills and abilities the nominee will need to successfully run programs and projects 18 to 24 months from now; and the knowledge, skills and experience the nominee needs to obtain to support these goals?	
4	Has the nominee had NASA-wide exposure, and possesses expanded systems engineering, leadership skills and experience?	
5	Has the nominee demonstrated the leadership behaviors and aptitude listed on Attachment A, Selection Criteria?	
6	Has the nominee graduated from their Center's systems engineering program, or can they demonstrate through their experience, training and education that they have this knowledge and experience?	
7	Has the nominee taken the prerequisite APPEL SE training including Foundation of Aerospace at NASA, Project Management and Systems Engineering and Fundamentals of Systems Engineering or equivalent? If not, do they have the experience that shows they do not require this training to be successful in the program?	
8	Have you identified potential positions where the nominees' training and experience can be applied upon return, and have you talked to your nominee about what they need to focus on developing during the program to meet these needs?	
9	Have you discussed with your Center SELDP Advocate the type of assignment that will help you meet your mission and your nominee's developmental needs?	
10	Are you prepared to fully release your nominee from their current assignment(s) for 6 to 12 months?	
11	Have you reviewed the SELDP Call Letter and are you aware of the Center's funding requirements?	
12	Have you reviewed the SELDP Schedule, Attachment D, and confirmed the nominee can attend the required interviews and Orientation?	

ATTACHMENT E

Engineering Director and Center Director Nomination and endorsement Template

To: NASA Chief Engineer

FROM: Center Chief Engineer/Engineering Management Board Member

SUBJECT: Systems Engineering Leadership Development Program (SELDP)
Engineering Director and Center Director Nomination and Endorsement

(Center Name) is pleased to nominate the following candidate(s) to the Systems Engineering Leadership Development Program (SELDP).

Nominee rank order and rationale:

Priority	Nominee	Nominee Development Path	Benefit to the Center/Reentry
1			
2			
3			

Signature of Center Chief Engineer/Engineering Management Board Member

Concurrence:

Name, Center Director Date

Example

To: NASA Chief Engineer

FROM: Center Chief Engineer/Engineering Management Board Member

SUBJECT: Systems Engineering Leadership Development Program (SELDP)
Engineering Director and Center Director Nomination and Endorsement

(Center Name) is pleased to nominate the following candidate(s) to the Systems Engineering Leadership Development Program (SELDP).

Nominee rank order and rationale:

Priority	Nominee	Nominee Development Path	Benefit to the Center/Reentry Strategy
1	Jane Smith	Jane has 20 years experience in Electrical engineering. She has been working in systems engineering for 2 years and has been assigned as lead on the XYZ program in the early phase of this project. Jane needs implementations experience. She has exhibited good leadership skills and will need more advanced communication and political savvy skills to move to the next level.	The Center is working more closely with international partners in implementing hardware and software in the XYZ project and needs to have SE's with an understanding of this phase and who can work cross culturally. With the experience Jane gains in implementation and with advanced leadership skills she will be able to support the Center in fulfilling this critical need upon her return.
2	Edgar Sanchez	Edgar has a degree in systems engineering and full life cycle experience from his experience at the Center and his position in the Air Force however all the experience is in robotics. He is now working on projects that require more collaboration with Human Space Flight Centers and University partners.	The Center will benefit great from this expanded perspective of our partners' SE processes and procedures. Edgar is our second priority because knowledge and experience currently exists to meet our immediate needs. However, the volume of work is increasing and several individuals currently working in this area are expected to retire in the next 4 years. Upon return Edgar will be well positioned to serve as a lead SE on one of our smaller projects expected to be funded in that time frame.

Signature of Center Chief Engineer/Engineering Management Board Member

Concurrence:

Name, Center Director Date