

# **SPRDE Science and Technology (S&T) Management Workforce Competency Assessment Report**

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# Executive Summary

## Background

In response to tasking from the Director of Human Capital Initiatives (HCI) for the Department of Defense's Acquisition, Technology, and Logistics (AT&L) workforce, CNA is working with HCI and workforce representatives to develop competency models for each of the major career fields within the AT&L workforce. This report contains CNA's analysis of the Science and Technology (S&T) career field.

Together, HCI, S&T leadership and subject matter experts (SMEs), with guidance from CNA, developed and validated a model of performance (presented in Appendix A) consisting of competencies determined to be necessary to meet S&T's mission goals. We used the model to create a competency assessment, in which we invited S&T personnel to participate. Respondents reported on their proficiency in each competency element. They also indicated how critical each competency element was to their job. Employees indicated how frequently they perform each competency element and responded to 16 demographic and intentions questions.

The analysis presented in this report uses data collected from the competency assessment to address the following three research goals: (1) to assess the current S&T capability of the workforce, (2) to describe how those capabilities are distributed across segments and career levels, and (3) to validate the competency model for the S&T workforce.

## Approach

### Participation rates

The targeted S&T population for this assessment consists of close to 2,700 employees. 337 employees participated in the competency assessment across all workforce segments (services and 4<sup>th</sup> Estate agencies), which represent 13 percent of the S&T population.

### Competency analyses

In some previous reports, we were able to average employee and supervisor ratings and perform the competency analyses using the composite ratings. However, because of the low percentage of paired employee-supervisor responses we only analyzed employee responses in this report.

## Findings

Our importance results indicated that

- Almost all competencies were highly important across the entire S&T workforce.

Table 1. Highly important S&T competencies, by entire S&T workforce.

Competencies	S&T	
	Audience-Focused Communication	Core Communication Skills
Scientific and Technical Contributions	Technical Contributions	
Program Management	Strategic Planning	
Team Building	Influence	
Professional Character	Workforce Development	

## Results

We recommend S&T management consider using our analysis results to:

- Develop proficiency standards
- Develop gap-closure strategies for high importance competencies that have lower proficiency ratings

- Consider developing mentoring programs and maintaining those already in place.

In presenting our extensive analysis of competency data we did not explicitly identify proficiency gaps based on a standard. We present and discuss the data in ways intended to help leadership think about the current state of the S&T workforce. Given that no proficiency standards currently exist, we strongly encourage S&T leadership to set proficiency standards based on this baseline for future investments in gap closure strategies. Once standards have been set, results such as these can be used to discover existing or potential gaps at an individual and organizational level.

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# Section 1: Background and model overview

Personnel challenges within the AT&L community must be addressed in order for the workforce to effectively perform its mission. As part of the AT&L workforce, the S&T career field conducts, and/or monitors science and technology activities including basic research, applied research and/or advanced technology development, in support of acquisition programs.

*Science and Technology (S&T) managers are typically scientists and engineers who manage basic research, applied research, and/or advanced technology development activities. They may also be involved with direct support to acquisition program managers. Their primary duties include developing program plans for S&T projects, developing budgets for assigned projects; and acquiring the services of expert scientists, engineers, and technical support personnel to perform S&T work for DoD. Additional primary duties involve overseeing in-house research or design and external research or design efforts performed by universities, industry, or other Federal Government organizations; and providing matrix support to program managers or other DoD activities. These duties also include conducting evaluations of S&T products to determine their effectiveness, including conducting Technology Readiness Assessments; interfacing with the technology customer to expedite the transition of technology to the user; and developing Technology Transition Agreement.<sup>1</sup>*

Rapid changes in the acquisition environment, retirement eligibility of baby boomers, and potential talent shortages threaten the strength and stability of AT&L to meet its mission goals. Acquisition personnel are a key focus of government-wide initiatives to enhance recruiting, training, and retention.<sup>2</sup> This

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<sup>1</sup> <https://dap.dau.mil/career/stm/Pages/Default.aspx>

<sup>2</sup> Department of Defense, Acquisition, Technology & Logistics, *AT&L Human Capital Strategic Plan v3.0*, 2007.

report presents the most recent assessment of the competencies of the AT&L S&T career field.

The Office of Personnel Management (OPM) describes a competency as “an observable, measurable pattern of skills, knowledge, abilities, behaviors and other characteristics that an individual needs to perform work roles or occupational functions successfully.” OPM’s definition of a competency is the foundation on which AT&L workforce competency models are built. The S&T workforce competency-based assessment described here aligns with the AT&L Human Capital Strategic Plan and is one element of an approach by the Human Capital Initiatives (HCI) Office to prepare the AT&L workforce for the future.<sup>3</sup> The S&T workforce assessment is part of a larger competency assessment program addressing all career fields within the AT&L community.

## Research objectives

The research goals for the overall AT&L Competency Program are :<sup>4</sup>

- AT&L Goal-1: Define the competencies required to deliver (needed) capabilities
- AT&L Goal-2: Assess the workforce to identify current and future gaps

The competency model used for this assessment satisfies the first AT&L goal. The assessment results shared in this report will help achieve the second goal.

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<sup>3</sup> Ken Krieg, Under Secretary of Defense for Acquisition, Technology & Logistics, *AT&L Human Capital Strategic Plan v3.0*, 2007.

<sup>4</sup> Department of Defense, Acquisition, Technology & Logistics, *AT&L Human Capital Strategic Plan v3.0*, 2007.

## Model components

AT&L competency models have both a technical and a professional component. Technical competencies are functional-specific competencies associated with a career field (e.g., Technical Contributions). Professional competencies are leadership, relational, cognitive, and management-focused and can be applied to all career fields (e.g., Audience-Focused Communication). Competency models contain high-level units of competence that hold more descriptive competencies with concise descriptions of behaviors and the associated goal of the behavior needed to demonstrate the competency (referred to as competency elements). In addition, competencies often include short statements about the knowledge required to perform the behaviors (referred to as knowledge items).

## Model development

The S&T competency model was developed and validated in four phases. In **Phase I**, the competency assessment model development phase, career field leadership served as an expert panel (EP). They identified the behaviors, skills, characteristics, and knowledge they believe are required to be a successful S&T employee. Through successive discussions between S&T leadership and CNA, this information was developed into a competency model framework, which was then used to solicit more detailed competency information from a larger group of subject matter experts (SMEs).

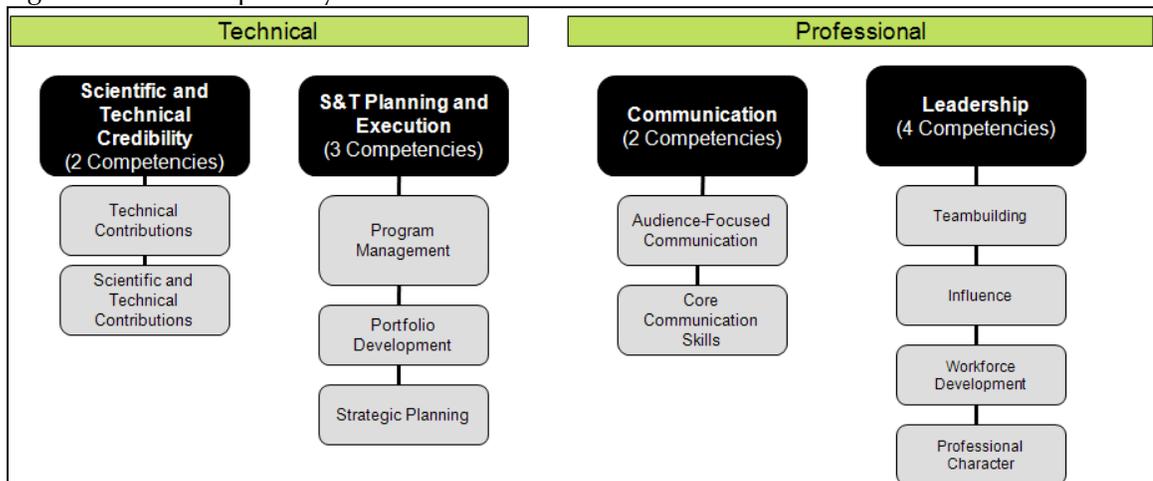
At the end of Phase I, expert panel members identified successful S&T employees from all representative services and agencies to serve as SMEs and to support development of a model from the framework. Criteria to serve as an SME ensured that participants represented the entire S&T workforce population and that they were experienced, superior employees. This ensured that the final competency model would accurately reflect successful performance criteria.

In **Phase II**, SMEs were asked to provide data about what makes them successful in their jobs. CNA analysts conducted four focus group sessions—one at each service segment’s SME worksite (i.e., Air Force, Navy, Army, and Fourth Estate). Each service segment provided four to six SMEs for a total of 22. The SMEs offered significant feedback on the EPs S&T model framework through a series of facilitated discussions. Specifically, each SME was provided a copy of the EPs competency model framework. A discussion transpired on what the SMEs would keep, add, or change about the competency units, competencies, and competency elements.

In **Phase III**, CNA worked with S&T leadership and workforce experts to decide how to use the information provided by the SMEs to refine the S&T competency framework developed by the expert panel. CNA used this resulting competency model to build a web-based assessment tool to capture workforce-wide assessment data.

The S&T competency model consists of 62 elements with five technical and six professional competencies, all organized into four units of competence. Figure 1, below, shows the final S&T competency model and the detailed elements are listed in Appendix A. The Phase IV assessment of the S&T workforce used this competency model.

Figure 1. S&T competency model



**Phase IV** of the S&T competency assessment process began in February 2011. At that time, CNA administered the assessment to the S&T workforce. Employees had 14 weeks to complete the assessment before the assessment closed June 6, 2011. The analyses of employee-provided proficiency, criticality, and frequency ratings are described in this report.

## **Survey approval**

The Director of Human Capital Initiatives submitted the assessment survey to the Defense Manpower Data Center (DMDC) and Washington Headquarters Services (WHS) for survey approval in late 2009. We received survey approval in July 2010, under WHS survey license number DD-AT&L (AR) 2431.

## **Section summary**

We developed the Competency Model for the S&T workforce using the same process used for each of the other Acquisition workforces. This process started with a small group of Expert Panel members who developed a framework for the model. The process then expanded the audience to a larger group of SMEs from across the workforce, who validated the content in the framework to produce the recommended model. Finally, we assessed the still broader workforce population against this model. This final assessment provides further validation of the model, as well as demographic, proficiency, and importance ratings. The assessment survey was approved, prior to the launch of the assessment, by both DMDC and WHS.

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## Section 2: Rating and analysis methodology

The original intent of this assessment was to conduct as close to an S&T workforce census as possible rather than a sampling of employees. We received 337 employee assessment responses. The response rate was evaluated against population statistics, in order to understand the degree to which the participants are reflective of the population. Therefore, our discussion of methodology starts with a discussion of the observed participation rates.

### Participation rates

Overall, 13 percent of the S&T workforce contributed in some way to the assessment. Across all services and agencies, employees completed 337 self-assessments and supervisors assessed 33 employees, not all of whom participated in the assessment. The S&T workforce has employees in all three service departments, as well as 4<sup>th</sup> Estate agencies. Participation rates for the overall S&T workforce and for each of the four segments of the workforce—Air Force, Army, Navy, and 4<sup>th</sup> Estate—are shown in Table 1.

As we previously mentioned, the 13 percent of the workforce that responded was not a random sample, which is needed in order to statistically extrapolate to the workforce as a whole. In the S&T demographic dimensions (MIL/CIV and segment) that we were able to explore, we found no major evidence that our sample is not representative of the entire workforce. However, caution should still be exercised in extrapolating beyond the survey respondents. These results do represent the 13 percent of the workforce who responded to the survey.

Table 1. Participation rates by S&T workforce segment

Final Assessment Status	S&T-All		Air Force		Army		Navy		4 <sup>th</sup> Estate	
	Participant Count	%	Participant Count	%						
Number of people invited	2,680	100	1,926	100	255	100	321	100	178	100
Completed or partially completed <b>Employee</b> Assessments	337	13	223	12	34	13	35	11	45	25
Completed or partially completed <b>Supervisory</b> Assessments	33	1	19	1	1	1	10	3	3	2
Completed or partially completed <b>Employee and Supervisory</b> Assessments	27	1	16	1	1	1	7	2	3	2

## Methodology changes driven by participation rates

### Changes in the data used for analysis

We have used a multi-rater approach for some prior Acquisition workforce assessments, by capturing criticality and proficiency ratings for each employee from both the employee and his or her supervisor. The response rate for paired S&T employee-supervisor assessments was, however, too low to provide sufficient data for analysis. Therefore, we modified our methodology to use only employee responses. This approach provided the largest consistent set of responses for our analysis. The number of employee responses is representative among some demographics dimensions of the overall S&T workforce population. The results are, however, less verifiable than employee-supervisor paired responses, because the employee proficiency and criticality responses have not been validated against supervisor responses. See the section on *Data used for analysis* for a further discussion of this topic.

### Changes to how data is aggregated and reported

In this report, we provide results at the overall S&T workforce level. We will include separate breakdowns at the segment and career levels where the findings may be unique from what are in the overall S&T findings. This methodology for data aggregation and reporting eliminates most of the problems associated with

low response analysis, which requires masking of responses due to privacy and confidentiality issues.

## Competency ratings

Employees rated their own proficiency for each element of the competency model, how critical they believed the competency element to be in performing their current job, and how frequently they use that competency element. Each employee's supervisor was also asked to rate the proficiency of the employee for each element in the competency model and the criticality of the element to the employee's job. Behavioral descriptions for each competency element assisted the participant in selecting the most appropriate rating for each element. Each rating scale contained five usable ratings, enumerated one through five, and one rating of zero, which indicated that the employee or supervisor could not respond for this element and for this rating category (proficiency, criticality, or frequency). We excluded all zero ratings in calculating average response rates. The rating scales used are below:

**Proficiency:** How proficient are you at the competency element behaviors? (Employee) / How proficient is the employee whom you are rating? (Supervisor)

0. No Exposure to or awareness of this competency
1. Awareness: Applies the competency in the *simplest* situations
2. Basic: Applies the competency in *somewhat complex* situations
3. Intermediate: Applies the competency in *complex* situations
4. Advanced: Applies the competency in *considerably complex* situations
5. Expert: Applies the competency in *exceptionally complex* situations

**Criticality:** How critical is this activity in your job? (Employee) / How critical is this behavior to the employee whom you are rating? (Supervisor)

0. N/A: Not needed in *my* job (Employee) / N/A: Not needed in *the* job (Supervisor)
1. Not Critical
2. Somewhat Critical

3. Fairly Critical
4. Very Critical
5. Extremely Critical

**Frequency:** How often do you do this activity in your job?  
(Employee only)

0. Never: Not needed in my job
1. Almost Never
2. Rarely
3. Occasionally
4. Frequently
5. Very Frequently

## Career level

We used the employees' responses to answering the question, what career level they are at currently (Entry, Journey, and Senior) as opposed to their certification level.

**Entry-level:** Employees in Entry-Level positions generally understand the competency principles and can execute with guidance. Typical experience: 0-2 years' Systems Engineering experience.

**Journey-level:** Employees in Journey-Level positions are able to perform on their own with some/limited guidance. At this level, they are gaining depth and different office/agency mission perspectives. Typical experience: 3-5 years' Systems Engineering experience.

**Senior-level:** Employees in Senior-Level positions provide expert advice to management, have extensive practical application and experience across different offices/agencies/ missions, and/or serve at the management and executive level. May lead teams and organizations composed of Entry- and Journey-Level personnel. Typical experience: 6+ years' Systems Engineering experience.

## **Analysis of importance**

We asked employees to rate the criticality and frequency of use of each competency element against a standard five-point scale. We computed the mean of both ratings by competency, in order to assign relative importance. We categorized competencies as high, medium, or low based on their mean criticality and frequency values. We also computed mean criticality and frequency ratings by career level and grouped them according to relative importance.

Prior to analyzing importance data, we eliminated any responses that did not include a value of one through five for either criticality or frequency of use and calculated the sample sizes for importance of each competency by counting respondents who provided reliable frequency or criticality responses at the competency element level. Eliminating responses using our validation criteria (outlined separately) changed the sample sizes for each question in the assessment.

## **Analysis of proficiency**

We analyzed proficiency data received from respondents in the S&T workforce communities. First, we computed mean proficiency values for each competency by career level. Next, we plotted these values in order to get a sense of the proficiency status for each grouping of respondents.

We compared mean proficiency levels across Journey and Senior career levels to determine the reported proficiency status for each. We used the same process to remove incomplete/invalid data from our proficiency data set as we did for our importance analysis.

## **Data used for analysis**

We obtained only 33 sets of paired responses from an employee and his or her supervisor, across the entire S&T workforce. If we were to perform our analysis using the multi-rater approach, this

low level of response would be insufficient for the level and types of analysis needed by workforce management to make relevant conclusions for the workforce as a whole.

The low number of paired employee-supervisor response sets and validation criteria did not allow us to precisely ascertain if the difference in ratings between responses were representative among some of the demographic dimensions of the larger sample of responses.

We obtained only 12 responses from Entry-level S&T employees. Because of this low level of response, we limited our importance and proficiency analyses to Journey- and Senior-level respondents.

To ensure that the data set contained reliable data for analysis, we validated the data set and excluded the following scenarios from the analysis:

- *If the employee selected 0: (Not needed in my job) in the frequency or criticality rating for an element.*
- *If the employee selected 0: (No Exposure to or awareness of this competency) in the proficiency rating for an element.*
- *If the criticality, proficiency, or frequency ratings were blank for an element.*
- *If the responding employee was identified as a contractor by “.ctr” in their email address.*
- *If a systematic response pattern was identified (i.e., AAA, ABA, ABB, etc).*

## Section summary

Overall, 13 percent of the S&T workforce contributed to the assessment, completing 337 self-assessments. The lower than expected response rates, especially from supervisors, required us to only use employee responses for analysis.

The methodologies for analysis of importance and proficiency were consistent with the other Acquisition workforces, and the rating scales were identical.

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## Section 3: Workforce demographics

Respondents were asked 16 demographic and intentions questions. These questions and the selections available to each respondent are shown in appendix B and additional demographic tables are in appendix D. Our analysis focuses on experience, pay grade, military/civilian status, career and certification level, education and intent to retire. Supervisors were presented the same demographic questions when they responded as an employee, but provided no demographic or intention inputs in their supervisory responses. Demographic items were voluntary; not all respondents answered all items.

What follows helps create a profile of the S&T workforce obtained from the demographic responses.

### Experience

**Of the S&T respondents who provided experience information, about one-fourth have more than 25 years of experience in S&T.**

Results presented in Table 2 are derived from the following demographic question: *How many years have you worked in a Science and Technology Organization?*

The Navy segment has a larger percentage of respondents with less than 10 years of experience (54 percent) than the Air Force (34 percent). Approximately 42 percent of S&T respondents have 21 or more years of S&T experience.

Table 2. S&T organization experience responses by segment

Years of Experience	S&T-All		Air Force		Army		Navy		4 <sup>th</sup> Estate	
	Participant Count	%	Participant Count	%	Participant Count	%	Participant Count	%	Participant Count	%
Less than 5	48	14	28	13	4	12	8	23	8	18
5 to 10	75	22	47	21	9	26	11	31	8	18
11 to 15	40	12	28	13	4	12	1	3	7	16
16 to 20	34	10	26	12	1	3	3	9	4	9
21 to 25	53	16	42	19	6	18	2	6	3	7
More than 25	87	26	52	23	10	29	10	29	15	33
All Respondents	337	100	223	101*	34	100	35	101*	45	101*

\*Rounding accounts for a summation of over/under 100 percent.

**Of the S&T respondents who provided acquisition experience information, the majority have over 10 years of experience in an acquisition environment.**

Results presented in Table 3 are derived from the following demographic question: *Please choose your total years of Acquisition experience, including those worked in Science and Technology:*

S&T respondents, on average, have more than a decade of experience in acquisitions. This does not hold, however, for Navy and 4<sup>th</sup> Estate personnel. Most S&T respondents from these two segments have less than 10 years of experience. Approximately 35 percent of S&T respondents have 21 or more years of experience in acquisition.

Table 3. Acquisition experience responses by S&T segment

Years of Experience	S&T-All		Air Force		Army		Navy		4 <sup>th</sup> Estate	
	Participant Count	%	Participant Count	%	Participant Count	%	Participant Count	%	Participant Count	%
Less than 5	62	18	32	14	7	21	10	29	13	29
5 to 10	65	19	33	15	7	21	12	34	13	29
11 to 15	51	15	38	17	6	18	2	6	5	11
16 to 20	41	12	30	13	4	12	3	9	4	9
21 to 25	50	15	41	18	5	15	2	6	2	4
More than 25	68	20	49	22	5	15	6	17	8	18
All Respondents	337	99*	223	99*	34	102*	35	101*	45	100

\*Rounding accounts for a summation of over/under 100 percent.

## Military vs. civilian status

**Most S&T respondents are civilians.**

Results presented in Table 4 are derived from the following demographic question: *Choose your current status.*

Most of the S&T respondents are civilians (96 percent) and Army respondents report that they are all civilian (100 percent).

Table 4. Military versus civilian responses by S&T segment

Military/Civilian Status	S&T-All		Air Force		Army		Navy		4 <sup>th</sup> Estate	
	Participant Count	%	Participant Count	%						
Civilian	325	96	215	96	34	100	33	94	43	96
Military	11	3	7	3	0	0	2	6	2	4
Reserve	1	0	1	0	0	0	0	0	0	0
All Respondents	337	99*	223	99*	34	100	35	100	45	100

\*Rounding accounts for a summation of over/under 100 percent.

**Most S&T respondents are paid according to the GS-Level pay scale and the GS-14 or higher grade level range contains the largest number of respondents.**

Results presented in Table 5 are derived from the following demographic question: *What is your grade/equivalent rank?*

The majority of S&T civilian respondents are paid according to the GS-Level pay scale. Within the GS-Level pay scale system, most civilian respondents fall in the GS-11 to GS-13 and GS-14 or higher ranges.

Table 5. Civilian grade level/pay band responses by S&T segment

Grade Level/ Pay Band	S&T-All		Air Force		Army		Navy		4 <sup>th</sup> Estate	
	#	% All	#	% All	#	% All	#	% All	#	% All
GS-10 or below	2	1	0	0	0	0	1	3	1	2
GS-11 to GS-13	64	19	35	16	12	35	7	20	10	22
GS-14 or higher	144	43	91	41	10	29	11	31	32	71
NSPS Pay Band 2	4	1	2	1	0	0	2	6	0	0
NSPS Pay Band 3	13	4	2	1	3	9	8	23	0	0
O1 to O3	3	1	2	1	0	0	1	3	0	0
O4 or Higher	6	2	5	2	0	0	1	3	0	0
Other Pay Plan	100	30	85	38	9	26	4	11	2	4
All Respondents	336	101*	222	100	34	99*	35	100	45	99*

\*Rounding accounts for a summation of over/under 100 percent.

## Career level and Certification Level

**Most S&T respondents designate that they are at the Senior career level.**

Results presented in Table 6 are derived from the following demographic question: *What is your current career level?*

A majority of the S&T workforce participants indicate “Senior” as their career level (75 percent). This holds for each of the individual workforce segments.

Table 6. Career level responses by S&T segment

Career Level	S&T-All		Air Force		Army		Navy		4th Estate	
	Participant Count	%								
Entry	12	4	7	3	0	0	1	3	4	9
Journey	70	21	41	19	9	27	9	26	11	24
Senior	250	75	172	78	24	73	24	71	30	67
All Respondents	332	100	220	100	33	100	34	99*	45	100

\*Rounding accounts for a summation of over/under 100 percent.

Subsequent analyses in this report will be described by Journey and Senior career levels, in order to examine differences in competency importance and proficiency. This is juxtaposed against the Certification Level which is restricted to their DAWIA level. Human capital initiatives should take into account both, however, this competency analysis does not presume that certification level is equivalent to career level.

**S&T respondents are primarily at Level 3 Certification level.**

Results presented in Table 7 are derived from the following demographic question: *My current DAWIA certification level is:*

Most of the S&T respondents indicated they are Level III certified (64 percent). Army has the largest percentage of S&T professionals at Level III (79 percent) and Air Force has the lowest (61 percent).

Table 7. Certification level responses by S&T segment

Level	S&T-All		Air Force		Army		Navy		4th Estate	
	Participant Count	%	Participant Count	%	Participant Count	%	Participant Count	%	Participant Count	%
One	22	7	15	7	0	0	5	14	2	4
Two	70	21	55	25	4	12	5	14	6	13
Three	216	64	135	61	27	79	22	63	32	71
None	28	8	17	8	3	9	3	9	5	11
All Respondents	336	100	222	101*	34	100	35	100	45	99*

\*Rounding accounts for a summation of over/under 100 percent.

Together with the career level (Table 6) where most respondents indicate they are at the Senior level, the

demographics suggest that the assessment results are driven by S&T professionals of considerable experience and qualifications.

## Education

**The majority of S&T respondents have achieved a graduate degree.**

Results presented in Table 8 are derived from the following demographic question: *What is your highest level of educational attainment?*

The highest level of educational achievement by most of S&T respondents is a graduate degree (85 percent). 4th Estate had the highest percentage (98 percent) of their respondents with a graduate degree, followed by Air Force with the next largest percentage of respondents with a graduate degree (86 percent).

Table 8. Education levels and focus responses by S&T segment

Highest Level Educational Achievement	S&T-All		Air Force		Army		Navy		4 <sup>th</sup> Estate	
	Participant Count	%	Participant Count	%						
Undergraduate Degree	52	15	31	14	10	29	10	29	1	2
Graduate Degree	285	85	192	86	24	71	25	71	44	98
All Respondents	337	100	223	100	34	100	35	100	45	100

## Section summary

The responses to the demographic portion of the competency assessment provide insight into the composition of the S&T workforce.

Results indicate that about one-fourth of respondents have more than 25 years of S&T organization experience. The respondents largely consist of federal civilians. The majority of civilian respondents are within the GS-Level pay scale and most reside in the GS-14 or higher grade-level range. Most S&T respondents (64 percent) are Level 3 certified. We

found that 85 percent of respondents in the S&T workforce have a graduate degree.

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## Section 4: Relative importance of competencies

Each assessment participant rated the criticality and frequency of use for each of the 62 competency elements. We computed the mean criticality and the mean frequency of each competency, which we then used to assign relative importance. We categorize competencies in terms of importance as follows:

- Competencies that have both a mean criticality rating AND a mean frequency rating of 3.0 or above have *high importance*.
- Competencies that have either a mean criticality rating OR a mean frequency rating of 3.0 or above have *medium importance*.
- Competencies that have both a mean criticality rating AND a mean frequency rating below 3.0 have *lower importance*.

In this section we discuss the relative importance of competencies by career level, highlighting the high and medium importance competencies. We focus on Journey- and Senior-levels, as these career levels generated enough respondents.

### Relative importance of competencies across S&T

**Communication and Leadership competencies are important across career levels.**

The professional competencies in the Units of Competence ‘Communication’ and ‘Leadership’ were found to be highly important across both Journey and Senior career levels. These include:

- Audience-focused Communication
- Core Communication Skills
- Influence
- Professional Character
- Teambuilding

These findings emphasize the importance of incorporating professional competencies into development and planning for the S&T workforce.

**Technical competencies have low to medium importance at the Journey level.**

The competencies in the Units of Competence ‘Scientific and Technical Credibility’ and ‘S & T Planning and Execution’ have moderate to low importance at the Journey level. These competencies rise to high importance at the Senior level (except for Portfolio Development).

Figure 2. Importance ratings for the S&T career field, by career level

U of C	Competency		Journey			Senior		
			Freq	Crit	Imp	Freq	Crit	Imp
Communication	1	Audience-Focused Communication	3.03	3.29	●	3.39	3.69	●
	2	Core Communication Skills	3.08	3.25	●	3.50	3.63	●
Scientific and Technical Credibility	3	Scientific and Technical Contributions	2.79	2.95		3.18	3.27	●
	4	Technical Contributions	2.90	3.14	○	3.24	3.52	●
S & T Planning and Execution	5	Program Management	2.75	3.08	○	3.20	3.47	●
	6	Portfolio Development	2.56	2.91		2.88	3.20	○
	7	Strategic Planning	2.65	3.09	○	3.19	3.59	●
Leadership	8	Influence	3.19	3.24	●	3.64	3.85	●
	9	Professional Character	3.63	3.71	●	3.96	4.15	●
	10	Teambuilding	3.07	3.30	●	3.49	3.74	●
	11	Workforce Development	2.81	3.26	○	3.35	3.73	●

The dots indicate relative importance of each competency according to respondents: green = high importance; yellow = medium importance; no shading = lower importance.

## Section summary

We examined the relative importance of competencies by Journey and Senior career level across all S&T respondents.

Overall, the relative importance of competencies increases with career level. Audience-focused Communication, Core Communication Skills, Influence, Professional Character, and Teambuilding, however, are highly important for both Journey- and Senior-level professionals.

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## Section 5: Proficiency ratings

In this section we present the average proficiency ratings provided by assessment participants for all competencies in the S&T competency model. We display our results for each competency by career level. We finish our discussion by highlighting the proficiency of highly important competencies.

### Proficiency ratings of S&T respondents

**High importance competencies were all high proficiency.**

Across both the Journey and Senior levels, we found that all the high importance competencies had at least *intermediate* to *advanced* proficiency. This finding suggests that the career field is successfully managing the workforce relative to the most important competencies for successful outcomes in performance.

**Proficiency differences were observed between Journey and Senior levels on technical competencies.**

The largest increase in proficiency between the Journey and Senior levels is in the 'S&T Planning and Execution' Unit of competence, specifically in the Strategic Planning and Program Management competencies. The workforce reported a full point increase from *basic* to *intermediate proficiency* (2 to 3) to *intermediate* to *advanced proficiency* (3 to 4). Most of the workforce (who responded) is at the senior level in their career and as we will see in Section 6, almost half of these plan on retiring over the next 10 years. The senior-level retirees will be taking these importance technical competencies and their related behaviors, knowledge, and characteristics with them when they retire. Thus these competencies are most critical to focus development and succession planning around.

Figure 3. Average proficiency level by career level for the S&T workforce

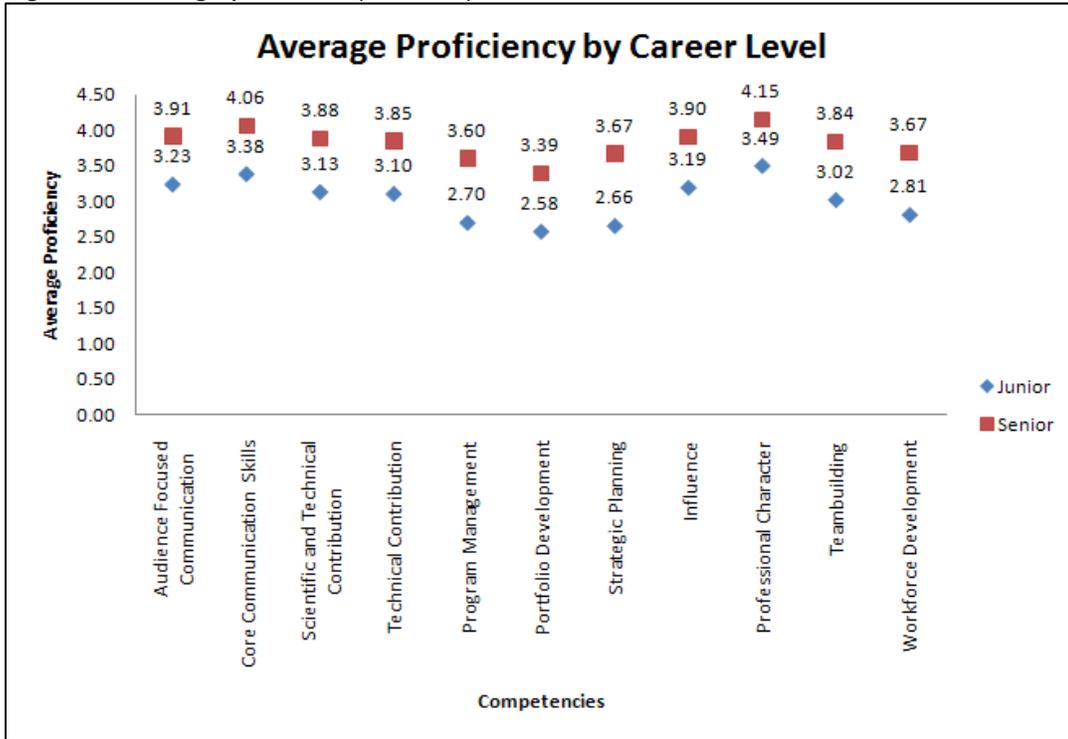


Figure 4. Mean proficiency ratings for the S&T community, by career level

U of C	Competency	Journey	Senior
Communication	Audience-Focused Communication	3.23	3.91
	Core Communication Skills	3.38	4.06
Scientific and Technical Credibility	Scientific and Technical Contribution	3.13	3.88
	Technical Contribution	3.10	3.85
S & T Planning and Execution	Program Management	2.70	3.60
	Portfolio Development	2.58	3.39
	Strategic Planning	2.66	3.67
Leadership	Influence	3.19	3.90
	Professional Character	3.49	4.15
	Teambuilding	3.02	3.84
	Workforce Development	2.81	3.67

## Section summary

Across both the Journey and Senior levels, we found that all the high importance competencies had at least *intermediate* to *advanced* proficiency.

We observed that between Journey- and Senior-level respondents, there was a one point increase for two competencies: Strategic Planning and Program Management. Because of potential retirements of Senior-level employees, these two competencies are most critical to focus development and succession planning around.

The results of our proficiency analysis should not be used to judge whether adequate levels of proficiency have been achieved for each group for two main reasons:

- Although our proficiency analysis suggests that most assessment respondents have *intermediate* proficiency (scale rating of 3) in most highly important competencies, individual responses are often higher or lower than the average response.
- There are no proficiency standards for the S&T workforce. One grouping of the workforce may have consistently rated itself above *intermediate* proficiency in a given competency, but the proficiency rating might fall well short of what is actually needed to get the job done. Alternatively, it may not be necessary for employees at certain career levels or in certain communities to be proficient in some competencies.

Therefore, S&T leadership should consider using the proficiency analysis presented in this report as the impetus for developing proficiency standards. Once standards are set, results such as these can be used to determine whether and where deficiencies exist in the S&T workforce.

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## Section 6: Intentions responses

In this section we present the results of our analysis of respondent-provided intentions data. Our discussion focuses on how respondent intentions relate to continued service in the S&T career field.

### Retirement Intention

Despite the fact that the majority of respondents are in the Senior career level (Table 6), most respondents intend to stay within the workforce for at least 10 years. S&T professionals are also about twice more likely to retire in 4 to 10 years than in less than 4 years (Figure 5).

Figure 5: Years until retirement in the S&T workforce by segment

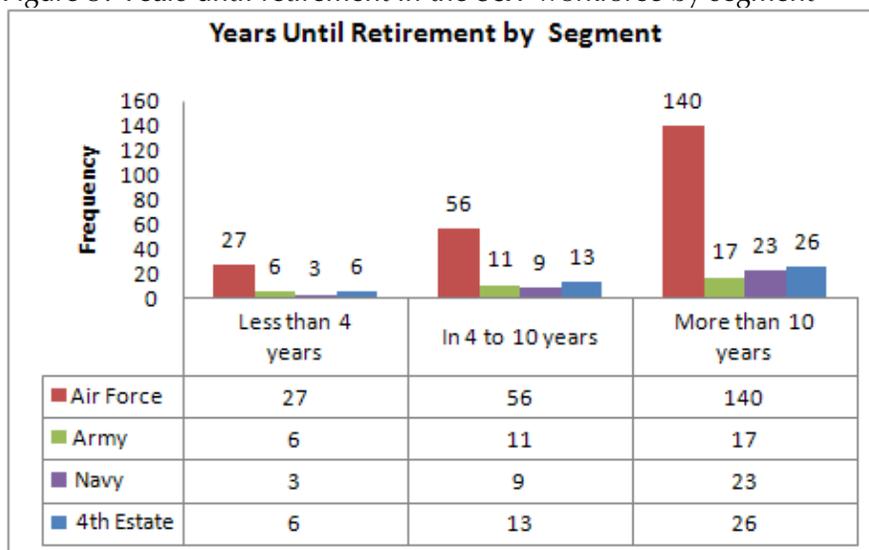
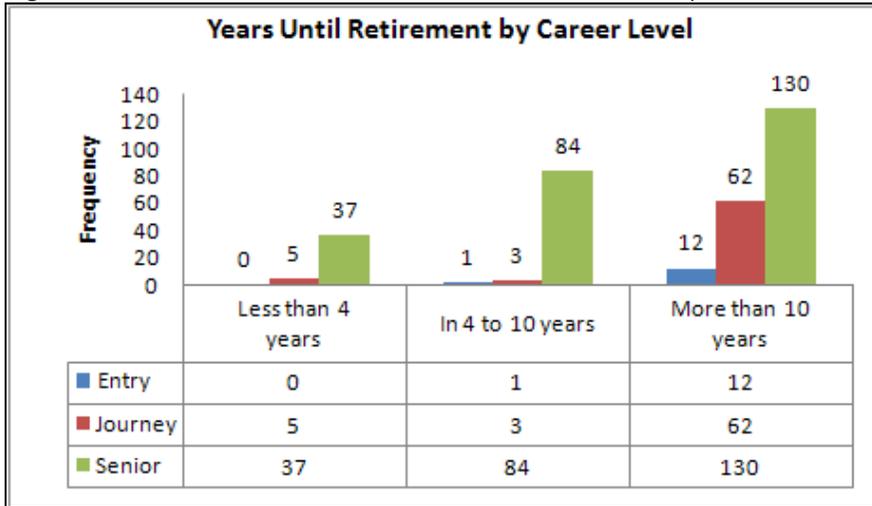


Figure 6: Years until retirement in the S&T workforce by career level

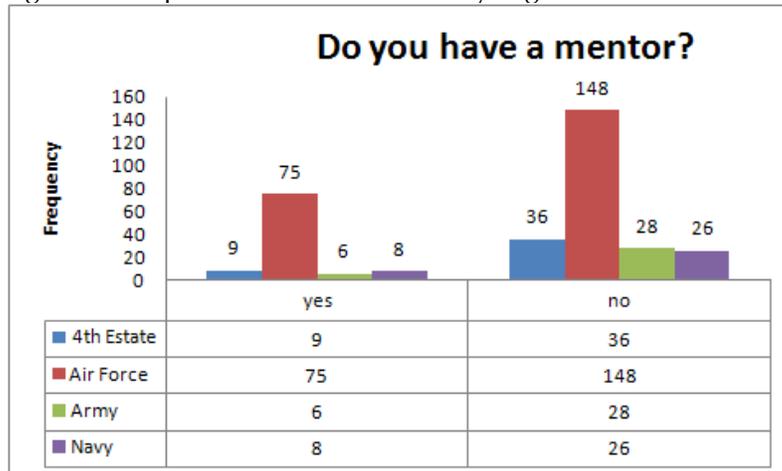


At the Entry and Journey career levels, the vast majority intends to retire in more than 10 years. In contrast, almost half of Senior-level respondents intend to retire in 10 or fewer years. Of those who intend to retire in less than 10 years, less than one-third plan to retire in less than 4 years (Figure 6).

## Mentoring and Its Usefulness

Less than one-fourth of Army, Navy, and Fourth Estate respondents had mentors while about one-third of Air Force respondents reported having a mentor (Figure 7). Ninety-one percent of those with mentors thought the relationship useful.

Figure 7. Respondents with mentors by segment



## Section summary

The question, *When do you plan to retire or resign?*, allows S&T senior leadership to observe a subset of their workforce's career intentions. As can be seen in Figure 6, almost half of Senior-level respondents reported that they plan on retiring or resigning in the next 10 years. These numbers may suggest a future need to ensure that institutional knowledge and processes are captured from these individuals, should they retire. We caveat that these responses are only from a subset of the S&T workforce and are not necessarily indicative of the workforce as a whole.

We recommend adding additional retirement questions in future assessments; understanding and accounting for knowledge loss is important to successful workforce effectiveness.

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## Section 7: Conclusion and next steps

Our analysis of employee-provided responses to the S&T competency assessment suggests that the S&T competency model captures competencies pertinent to the S&T sample of respondents. The results presented in the report are primarily driven by Journey and Senior level professionals of considerable experience and high certification levels. The relatively low response rates, however, did not allow us to assess the model across certain S&T communities.

We found that five competencies were highly important at both the Journey and Senior career levels. These competencies had higher average proficiency level ratings than their less important counterparts. The lack of proficiency standards does not allow us to ascertain whether these proficiency levels signal any workforce areas of focus.

Although a relatively small percentage (about 3 out of 10) of S&T respondents reported having a mentor the vast majority of those who have a mentor found it useful for their careers.

We recommend S&T management consider using our analysis results to:

- Develop proficiency standards
- Develop gap-closure strategies for high importance competencies that have lower proficiency ratings
- Consider developing mentoring programs and maintaining those already in place.

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# Appendix A: S&T workforce competency model

Table 9: Complete and detailed S&T competency model

Unit of Competence	Competency	Element	
Communication	Core Communication Skills	Communicate highly technical and complex concepts in a clear and organized manner, both verbally and in writing, to inform and persuade others to adopt and act on specific ideas.	
		Prepare and deliver an advocacy briefing or program briefing to technical/non-technical senior leaders proposing a new research or technology endeavor.	
		Establish two-way communication throughout the organizational hierarchy, its customers, and key stakeholders.	
		Actively solicit feedback and use this feedback to make informed strategic decisions.	
		Publish a technical article in a refereed journal or classified meeting proceedings.	
		Prepare and deliver a speech to a conference or symposium audience.	
	Audience-Focused Communication	Tailor all communications to the audience and the intended purpose in order to enhance message acceptance. The audience may include stakeholders, peers, press/media, and leadership. The purpose may include technical/financial program justification, a promotion of technology issues to a group of peers, or in-house / external education initiatives.	
		Prepare and deliver a program briefing to technical and non-technical senior leaders.	
		Monitor the audiences' body language and adjust your presentation accordingly.	
		Effectively communicate technical requirements to all stakeholders.	
		Maintain/improve customer satisfaction through measurable means.	
		Contribute and collaborate measurably to the advancement of science and technology.	
		Support capability through science, technology, and research (e.g., patents, publications, technology transitions, rapid fielding, invention and innovation).	
		Provide technical or subject matter expertise to an acquisition program and ops sustainment.	
Scientific and Technical Credibility	Technical Contributions	Facilitate technology transition or rapid fielding to an acquisition program.	
		Conduct research leading to the granting of a patent or award or the publication of a technical paper or conference presentation.	
		Scientific and Technical Contributions	Show evidence of technical excellence (e.g., academic credentials, peer recognition, leadership recognition, recent publications, participation on senior advisory boards & professional societies) to support the credibility of the organization.
			Foster innovation and problem solving, allow others to take risks, explore new approaches & alternative scientific perspectives.
			Serve as a reviewer of proposed journal articles.
	Pursue higher learning (graduate degree, post-doctorate research, professional certificate, etc.) in your field or another field.		

		Serve as a member of a technical committee/board.
		Serve as a technical consultant/expert on project reviews.
S&T Planning and Execution	Strategic Planning	Develop high-impact, innovative, and appropriately challenging programs, which support the strategic agency mission.
		Write a vision and technological strategies that are customer focused, multi-disciplinary, and significantly innovative and creative.
		Focus the long-term business and competitive interests and strategies of the organization within a global context.
		Translate war fighter capability requirements into science and technology development plans.
		Develop a science and technology investment strategy to meet the needs of a war fighter customer.
		Develop a technology roadmap for a technology area.
		Participate in the generation of science, technology development and risk strategy.
		Manage human capital, financial resources, and laboratory/facility capital.
	Portfolio Development	Develop S&T portfolios consistent with service/agency core functions, requirements and technology opportunities.
		Develop science & technology thrusts, consistent with stakeholder requirements, to maximize value to the war fighter.
		Develop a prioritization schema and apply it to a portfolio of science, technology, and risk programs.
		Synchronize or align technology projects with technology roadmap and investment strategy to meet customer timelines.
		Coordinate with relevant programs, efforts, and communities including those in other services and agencies to maximally leverage Science & Technology as appropriate, form new alliances, or uncover new S&T directions.
		Demonstrate working knowledge of goals, requirements, and processes in other services and agencies.
		Collaborate internationally at a technical level ensuring wide access to diverse perspectives (e.g. joint publications, joint research projects, etc.)
		Collaborate internationally at a programmatic level demonstrating both partnership building skills and requisite knowledge of policies, procedures, and practices.
	Program Management	Manage cost schedule performance and risk associated with individual technology development efforts in order to efficiently deliver technical capabilities/products, with all appropriate parties.
		Develop and execute a program baseline addressing scope, content, deliverables, cost, schedule, technical performance, and manage technical risk.
		Participate in developing a Technology Transition Agreement.
		Employ appropriate contracting methods and effectively manage contractor performance.
		Lead team in the generation of a multi-agency Technology Development Strategy.
Manage project funds to ensure project stays on budget and obligations and disbursements are timely.		
Leadership	Professional Character	Exhibit characteristics such as courage, decisiveness, integrity in order to engender trust amongst the workforce, stakeholders, and industry.
		Report program status in an objective manner.
		Meet agreed upon commitments with stakeholders.
		Conduct business in accordance with the Joint ethics regulation and the Program Managers Bill of Rights.
	Workforce Development	Demonstrate the ability to recruit, retain, and develop an effective technical staff to ensure the organization has the required personnel resources to accomplish the mission.

		Foster an innovative, collaborative, synergistic, environment.
		Submit deserving employees and team members for awards & decorations.
		Determine the necessary in house skill set to accomplish the mission.
		Serve as a situational and supervisory mentor for a scientist, engineer, or product-oriented manager (e.g., program, financial, or business).
		Develop employees and provide employees with growth opportunities, research, and academic outreach.
	Influence	Demonstrate the ability to build support from your workforce and stakeholders to adopt and act on specific ideas.
		Cultivate an effective working relationship with key customers, peers and superiors; influence others in all directions.
		Provide objective advocacy for a specific idea or technology approach.
		Lead change, communicate change, and explain the rationale and steps to the change direction.
	Teambuilding	Lead teams by providing proactive and clear direction and motivation to ensure the proper application of scientific and engineering processes and the overall success of the technical management process.
		Build an Integrated Product Team to address a specific technology, transition or rapid fielding requirement.
		Ensure that the organizational element you manage functions as an effective team; respect diversity and clarity of thought.
		Communicate project mission, vision, and be results-oriented.

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## Appendix B: S&T demographic and intentions questions

Table 10: S&T demographic and intentions questions, response options, and applicable research goals

Demographic/Intentions Questions	Response Options
1) Please identify your Service/Defense Agency?	Army Navy Air Force Not Applicable Other Defense Agency Other: FILL IN
2) What is your Organization?	FILL IN
3) What is your Job Title?	FILL IN
4) What is your Grade/Equivalent Rank?	GS-10 or below GS-11 to GS-13 GS-14 or higher NSPS Pay Band 1 NSPS Pay Band 2 NSPS Pay Band 3 E1 to E5 E6 to E9 O1 to O3 O4 or Higher Other Pay Plan
5) Please identify your Career Field:	Life Cycle Logistics Program Management Business, Cost Estimating & Financial Management (BCEFM) SPRDE Systems Engineering SPRDE Science and Technology Facilities Engineering Property Test and Evaluation Contracting Information Technology (IT) Other Logistics Related Other Non-Logistics Related I don't know Other
6) How many years have you worked in a Science and Technology Organization?	Less than 5 years 5 to 10 years 11 to 15 years 16 to 20 years 21 to 25 years More than 25 years

Demographic/Intentions Questions	Response Options
7) Please choose your total years of Acquisition experience, including those worked in Science and Technology:	Less than 5 years 5 to 10 years 11 to 15 years 16 to 20 years 21 to 25 years More than 25 years
8) What is the most representative category applicable to your work?	Basic Research Applied Research Advanced Technology Development Engineering and Manufacturing Development Production and Deployment Operations and Support Other: FILL IN
9) Please provide your Location:	FILL IN
10) My current DAWIA certification level is:	None Level I Level II Level III
11) Choose your Employment Status:	Military Civilian Reserve
12) My highest level of education is:	High School Attended College Undergraduate Degree Graduate Degree
13) If you work in a PMO (or equivalent), the most representative acquisition category applicable to my work is:	Pre-ACAT Technology Project ACAT IA ACAT ID ACAT IAM/MAIS ACAT II ACAT III Not applicable Other: FILL IN
14a) Do you have a/more than one mentor?	Yes No
14b) If yes, how was/were the mentor(s) assigned?	Assigned by someone else Self-selected Other
14c) If you have a/more than one mentor, has it been beneficial to you?	Yes No
15) Retirement Plan:	CSRS (Civil Service Retirement System) FERS (Federal Employees Retirement System) Not Applicable (No Retirement Plan / Other Retirement Plan) Not Sure
16) In How Many Years Do You Plan To Retire?	Less than 4 years In 4 to 10 years More than 10 years

## Appendix C: Additional Data Tables

Figure 8. Importance ratings for the S&T career field, by career level

U of C	Competency		Entry		
			Freq	Crit	Imp
Communication	1	Audience-Focused Communication	2.40	2.98	
	2	Core Communication Skills	2.65	3.06	●
Scientific and Technical Credibility	3	Scientific and Technical Contributions	2.83	3.09	●
	4	Technical Contributions	2.37	2.78	
S & T Planning and Execution	5	Program Management	2.29	2.98	
	6	Portfolio Development	2.00	2.52	
	7	Strategic Planning	2.19	2.95	
Leadership	8	Influence	2.67	3.02	●
	9	Professional Character	3.11	3.33	●
	10	Teambuilding	2.48	2.92	
	11	Workforce Development	2.97	3.24	●

Figure 9. Mean proficiency ratings for the S&T community, by career level

U of C	Competency	Entry
Communication	Audience-Focused Communication	2.54
	Core Communication Skills	2.67
Scientific and Technical Credibility	Scientific and Technical Contribution	2.82
	Technical Contribution	2.36
S & T Planning and Execution	Program Management	1.92
	Portfolio Development	1.66
	Strategic Planning	1.81
Leadership	Influence	2.48
	Professional Character	2.59
	Teambuilding	2.24
	Workforce Development	2.59

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## Appendix D: Additional Demographic Data

Table 9. Organization, by S&T workforce segment

Organization	All Count of participants	Air Force Count of participants	Army Count of participants	Navy Count of participants	4 <sup>th</sup> Estate Count of participants
711 HPW	10	10	0	0	0
711 HPW/RH	1	1	0	0	0
711 HPW/RHCI	2	2	0	0	0
711 HPW/RHDO	1	1	0	0	0
711 HPW/RHDR	1	1	0	0	0
711 HPW/RHPC	1	1	0	0	0
711HPW	1	1	0	0	0
711HPW/RH	1	1	0	0	0
711HPW/RHCV	1	1	0	0	0
711HPW/RHXS	1	1	0	0	0
7IS	1	1	0	0	0
AAC/SES	1	1	0	0	0
AF Research Laboratory	3	3	0	0	0
AFMC	3	3	0	0	0
AFMC/AFRL	3	3	0	0	0
AFMC/AFRL/RXBC	1	1	0	0	0
AFOSR	2	2	0	0	0
AFRL	112	112	0	0	0
AFRL 711 HPW/RHCV	1	1	0	0	0
AFRL 711HPW/RHPC	1	1	0	0	0
AFRL Air Vehicles Directorate	1	1	0	0	0
AFRL/711 HPW	1	1	0	0	0
AFRL/711HPW/RHCBB	1	1	0	0	0
AFRL/RB	1	1	0	0	0
AFRL/RBAC	1	1	0	0	0
AFRL/RBAH	1	1	0	0	0
AFRL/RBAT	1	1	0	0	0
AFRL/RBS	1	1	0	0	0
AFRL/RBSD	1	1	0	0	0
AFRL/RBSI	1	1	0	0	0
AFRL/RBSV	1	1	0	0	0

AFRL/RCMI	1	1	0	0	0
AFRL/RD	1	1	0	0	0
AFRL/RDTA	1	1	0	0	0
AFRL/RHDO	1	1	0	0	0
AFRL/RI	1	1	0	0	0
AFRL/RISB	1	1	0	0	0
AFRL/RVBX	1	1	0	0	0
AFRL/RW	1	1	0	0	0
afr/rx	2	2	0	0	0
afr/rxbn	1	1	0	0	0
AFRL/RXLM	1	1	0	0	0
AFRL/RXM	1	1	0	0	0
AFRL/RXME	2	2	0	0	0
AFRL/RXOP	1	1	0	0	0
AFRL/RXPJ	1	1	0	0	0
AFRL/RXQ	1	1	0	0	0
AFRL/RX	1	1	0	0	0
AFRL/RXAA	1	1	0	0	0
AFRL/RXDD	1	1	0	0	0
afr/rxhc	1	1	0	0	0
AFRL/RXMR	1	1	0	0	0
AFRL/RXMW	1	1	0	0	0
AFRL/RXYS	1	1	0	0	0
AFRL/RZ	3	3	0	0	0
AFRL/RZPE	1	1	0	0	0
AFRL/RZPS	3	3	0	0	0
AFRL/RZSS	1	1	0	0	0
AFRL/RZTA	1	1	0	0	0
AFRL/RZTF	1	1	0	0	0
AFRL/RZTS	1	1	0	0	0
Air Force Research Lab	5	5	0	0	0
Air Force Research Laboratory	12	12	0	0	0
Air Force Research Laboratory AFRL	1	1	0	0	0
AMC	1	0	1	0	0
AMC AMCOM USATA	1	0	1	0	0
ARDEC	3	0	3	0	0
ARL-HRED-STTC	1	0	1	0	0
ARL-STTC	1	0	1	0	0
Army RDECOM CERDEC NVESD ST	1	0	1	0	0
ASA(ALT)	1	0	1	0	0
ASC/WIN	1	1	0	0	0

AVIATION ENGINEERING	1	0	0	0	1
CERDEC/ NVESD	1	0	1	0	0
Chem Bio Defense	1	0	0	0	1
CX	1	0	0	0	1
DAU/CNE	1	0	0	0	1
DCMA	1	0	0	0	1
DCMAW	1	0	0	0	1
Defense Acquisition University	2	0	0	0	2
Defense Threat Reducion Agency	1	0	0	0	1
Defense Threat Reduction Agency	5	1	0	0	4
DTRA	11	1	0	0	10
DTRA RD-CB	1	0	0	0	1
DTRA RD-CBZ	1	0	0	0	1
DTRA, RD-NTSA	1	0	0	0	1
DTRA/CB	1	0	0	0	1
DTRA/RD-BA	1	1	0	0	0
DTRA/RD-CXTD	1	0	0	0	1
DTRA-RD	1	0	0	0	1
Edgewood Chemical Biological Center	1	0	1	0	0
HQ, USAMRMC	1	0	1	0	0
Innovation and Systems Engineering Office	1	0	0	0	1
JSTO	3	0	0	0	2
JSTO - TMT	1	0	0	0	1
Natick Soldier RDEC, RDE Command	1	0	1	0	0
NAVAIR	2	0	0	2	0
Naval Facilities Engineering Command Southwest	1	0	0	1	0
naval research lab	2	0	0	2	0
Naval Surface Warfare Center	1	0	0	1	0
NAVSEA	1	0	0	1	0
Navy Surface Warfare Center, Dahlgren	1	0	0	1	0
NAWC-TSD	1	0	0	1	0
NFESC	1	0	0	1	0
NSRDEC	2	0	2	0	0
NSRDEC/CFD	1	0	1	0	0
NSWC	1	0	0	1	0
NSWC Carderock	1	0	0	1	0
NSWC IHD	1	0	0	1	0
NSWC PCD	2	0	0	2	0
NSWCCD	1	0	0	1	0
NVESD	2	0	2	0	0
Office of Naval Research	3	0	0	3	0

ONR	3	0	0	3	0
Operations and Nuclear Support	1	0	0	0	0
PM AAA	1	0	0	1	0
PM AAA, EFV Program	1	0	0	1	0
PMAAA/PEO-LS/USMC	1	0	0	1	0
PMACWA	1	0	1	0	0
RD	1	0	0	0	1
RD CBS	1	0	0	0	1
RD TVT	1	0	0	0	1
RD-BA	1	0	0	0	1
RD-BAS	1	0	0	0	1
RD-CB and OASD(NCB/CB)	1	0	0	0	1
RDCB-TMT	1	0	0	0	1
RD-CXT	1	0	0	0	1
RDECOM AATD	1	0	1	0	0
RDECOM CERDEC NVESD	1	0	1	0	0
RD-NT	1	0	0	0	1
Research and Development Enterprise, Basic and Applied Sciences Directorate	1	0	0	0	1
Research and Development Enterprise	1	0	0	0	1
RY	1	1	0	0	0
RYMDB	1	1	0	0	0
SDDC/TEA	1	0	1	0	0
Sensors Directorate	1	1	0	0	0
Space and Naval Warfare Systems Center Pacific	1	0	0	1	0
Space Command	1	1	0	0	0
SPAWAR	1	0	0	1	0
SPAWAR Systems Center Pacific	1	0	0	1	0
SPAWARSYSCEN - Pacific	1	0	0	1	0
SSC Pacific	2	0	0	2	0
SSP	1	0	0	1	0
TD	1	1	0	0	0
Test Division	1	0	0	0	1
U.S. Army Aeromedical Research Laboratory	1	0	1	0	0
US Army AMRDEC	1	0	1	0	0
US ARMY DAC	1	0	1	0	0
US ARMY RDECOM CERDEC NVESD	1	0	1	0	0
US Army Research Institute	1	0	1	0	0
US Army Test, Measurement and Diagnostic Equipment Activity	1	0	1	0	0
USAE ACWA	1	0	1	0	0
USAMMDA	1	0	1	0	0

USAMRIID	2	0	2	0	0
USARIEM	1	0	1	0	0
USATCES	1	0	1	0	0
USJFCOM	1	0	0	1	0
USMC - PMAAA	1	0	0	1	0
USMC, PEO LS, PM AAA	1	0	0	1	0

Table 10. Job title, by S&T workforce segment

Job title	All	Air Force	Army	Navy	4 <sup>th</sup> Estate
	Count of participants				
0850 Electrical Engineer	1	1	0	0	0
Action Officer	1	1	0	0	0
Administrative Program Manager	1	0	1	0	0
Aerospace Engineer	8	8	0	0	0
Aerospace Engineer/Project Manager	1	1	0	0	0
Analyst	1	0	0	0	1
Assistant Program Mgr	1	0	0	1	0
Associate Computer Scientist	1	1	0	0	0
Associate Electronics Engineer	1	1	0	0	0
Associate Operations Research Analyst	1	1	0	0	0
Associate Research Chemist	1	1	0	0	0
ATEGG Program Manger	1	1	0	0	0
Biosurety Officer	1	1	0	0	0
Branch Chief	13	12	0	0	1
Branch Tech Advisor	1	1	0	0	0
Branch Technical Advisor	2	2	0	0	0
Branch Technology Advisor	2	2	0	0	0
Chief	1	1	0	0	0
Chemical Engineer	1	1	0	0	0
CHEMICAL ENGINEER	2	1	0	0	1
Chemist	2	1	1	0	0
Chief	2	2	0	0	0
Chief Engineer	2	2	0	0	0
Chief Scientist	1	0	0	0	1
Chief Scientist for Energetic Materials	1	0	0	1	0
Chief, Asia Pacific Office	1	0	0	0	1
Chief, Business Plans & Programs	1	0	1	0	0
Chief, Electronic and Optical Materials Branch	1	1	0	0	0
Chief, Electronics Branch	1	1	0	0	0

Chief, Fin Mgmt Div	1	1	0	0	0
Chief, Information Visualization Sectino	1	1	0	0	0
Chief, Instrumentation Development Section	1	0	0	0	1
Chief, Propulsion Branch	1	1	0	0	0
Chief, RD-CBS	1	0	0	0	1
Chief, S&T Office	1	0	1	0	0
Chief, signals Intelligence Programs	1	1	0	0	0
Chief, Solid State Laser Section	1	1	0	0	0
Chief, Strategy and Plans Branch	1	1	0	0	0
Chief, Thermal and Electrochemistry Branch	1	1	0	0	0
Community Planner	1	0	0	1	0
Computer Engineer	4	4	0	0	0
Computer Scientist	2	1	0	1	0
Dep for Program Development	1	0	0	1	0
Deputy Branch Chief	2	2	0	0	0
Deputy Department Head	1	0	0	1	0
Deputy Director	2	1	0	0	0
Deputy Division Chief	1	1	0	0	0
Deputy for Technology	1	1	0	0	0
Deputy Program Manager	1	1	0	0	0
Director	1	1	0	0	0
Director Basic & Applied Sciences	1	0	0	0	1
Director for Basic Research	1	0	1	0	0
director of research	1	0	0	1	0
Director of Technology and Innovation	1	0	0	1	0
Director, International Programs	1	1	0	0	0
Director, Ops and Nuclear Support Directorate	1	1	0	0	0
Director, Sensors	1	1	0	0	0
Director, Warfighter Science, Technology & Applied Research	1	0	1	0	0
Division Chief	6	5	1	0	0
DIVISION DIRECTOR	1	0	1	0	0
Electrical Engineer	3	0	1	2	0
Electronics Engineer	13	8	3	2	0
Electronics Research Engineer	1	1	0	0	0
Engineer	16	13	1	2	0
Engineering Research Psychologist	3	3	0	0	0
Environmental Scientist	1	0	1	0	0
Future Naval Capabilities Program Director	1	0	0	1	0
Gen Eng	1	0	1	0	0
General Engineer	3	3	0	0	0

General Engineer	1	0	1	0	0
Geophysicist	1	0	0	0	1
Head (Acting), X-Department	1	0	0	1	0
Head, Technology Transition Office	1	0	0	1	0
Health Physicist, Supervisory	1	0	0	0	1
Industrial Engineer	1	0	1	0	0
Innovation Technology Program Manager	1	0	0	0	1
JPM TMT	1	0	0	0	0
Lead Weapon Station Engineer	1	0	0	1	0
Lead, Corrosion & Materials Engineer	1	0	0	1	0
Manager	2	0	1	0	1
Materials Engineer	3	3	0	0	0
Materials Research Engineer	1	1	0	0	0
Mathematician/S&T Manager	1	0	0	0	1
Mechanical Engineer	11	9	1	1	0
Mechanical System Technical Lead	1	0	0	1	0
Microbiologist	2	0	0	0	2
Mission Support Section Lead	1	0	0	1	0
NRL Liaison to the DoD Space Test Program	1	0	0	1	0
Operations Research Analyst	2	2	0	0	0
Operations Researcher	1	1	0	0	0
Physical Scientist	8	0	0	0	8
Physicist	1	0	1	0	0
Physicist	3	3	0	0	0
Physicist/Optical Engineer	1	0	1	0	0
Plans and Program Engineer	1	1	0	0	0
Portfolio Integration Branch Chief	1	0	0	0	1
Principal Assistant for Research & Technology	1	0	1	0	0
Principal Chemical Engineer	1	1	0	0	0
Principal Computer Engineer	1	1	0	0	0
Principal Electronics Engineer	1	1	0	0	0
Principal integration Engineer	1	1	0	0	0
Principal Materials Research Engineer	1	1	0	0	0
Principle Electronic Engineer	1	1	0	0	0
Professor	3	0	0	0	3
Program Manager	12	7	2	1	2
Program Officer	4	0	0	4	0
Project Engineer	1	1	0	0	0
Project Manager	1	1	0	0	0
Project Manager	2	2	0	0	0
Project Manager/Engineer	1	0	0	1	0

Research Aerospace Engineer	2	2	0	0	0
Research Audiologist	1	1	0	0	0
research biologist	1	1	0	0	0
Research Biomedical Engineer	1	1	0	0	0
Research Chemist	2	1	1	0	0
Research Electronics Engineer	1	1	0	0	0
research engineer	4	2	1	1	0
Research Physicist	2	2	0	0	0
Research Psychologist	4	3	0	1	0
Research Psychologist	1	0	1	0	0
Research Scientist	4	4	0	0	0
Risk management Director	1	0	1	0	0
S&T Manager	4	0	1	0	3
Science and Technology Manager	2	0	0	0	2
Science and Technology Manager for Individual Protection	1	1	0	0	0
Scientific Advisor	1	0	0	0	1
Scientist	3	1	0	2	0
Section Chief	2	2	0	0	0
Sen. Research Physicist	1	1	0	0	0
Senior Aerospace Engineer	5	5	0	0	0
Senior Aerospace engr	1	1	0	0	0
Senior Aerospace Research Engineer	1	1	0	0	0
Senior Analyst	1	1	0	0	0
Senior Associate, Future Weapons Concepts & Business Development	1	0	1	0	0
Senior Chemical Engineer	1	1	0	0	0
Senior Chemist	1	1	0	0	0
Senior Computer Scientist	1	1	0	0	0
Senior Electronic Engineer	1	1	0	0	0
Senior Electronics Engineer	1	1	0	0	0
Senior Electronics Engr.	1	1	0	0	0
Senior Engineer	4	3	0	0	1
Senior Engineering Psychologist	1	1	0	0	0
Senior Food Technologist	1	0	1	0	0
Senior Integration Engineer	1	1	0	0	0
Senior Mechanical Engineer	1	1	0	0	0
Senior Operations Research Analyst	1	1	0	0	0
Senior Physical Scientist	1	1	0	0	0
Senior Plans & Programs Engineer	3	3	0	0	0
senior program manager	1	1	0	0	0
Senior Research Aerospace Engineer	3	3	0	0	0

Senior Research Chemist	1	1	0	0	0
senior research electronics engineer	1	1	0	0	0
senior research physicist	1	1	0	0	0
Senior Research Psychologist	4	4	0	0	0
Senior Research Scientist	1	1	0	0	0
Senior scientist	1	1	0	0	0
Senior Supervisory Chemist	1	1	0	0	0
Software Specialist	1	0	0	0	1
Sr Electronics Engineer	1	1	0	0	0
sr physicist	1	1	0	0	0
Sr, Electronics Engineer	1	1	0	0	0
Sr. Aerospace Engineer	1	1	0	0	0
Sr. Engineer	1	1	0	0	0
Sr. Industrial Engineer	1	1	0	0	0
Sr. Research Electrical Engineer	1	1	0	0	0
Staff Director, External Collaborations	1	0	0	0	1
STM	1	0	0	0	1
Strategic Planning Team Lead	1	1	0	0	0
Structural Engineer	1	0	0	0	1
Supervisory General Engineer	1	0	0	0	1
Supervisor	1	0	0	1	0
Supervisory Acquisition Program Manager	1	0	0	0	1
Supervisory Aerobiologist	1	0	1	0	0
Supervisory Biological Scientist	1	1	0	0	0
Supervisory Chemist	1	0	1	0	0
Supervisory General Engineer	1	0	0	0	1
Supervisory Operations Research Analyst	1	1	0	0	0
Supervisory Physical Scientist	1	0	0	0	1
Supervisory Principal Physicist	1	1	0	0	0
Supervisory Research Psychologist	1	1	0	0	0
Supervisory Senior Electronics Engineer	1	1	0	0	0
Supervisory Senior Materials Engineer	1	1	0	0	0
Supervisory/Senior Computer Scientist	1	1	0	0	0
Survivability Program Manager	1	0	0	1	0
Team Chief	1	1	0	0	0
Team Leader	1	0	1	0	0
Tech Advisor	1	1	0	0	0
Technical Advisor, Plans and Programs	1	1	0	0	0
Technical Adviser	1	1	0	0	0
Technical Advisor	2	2	0	0	0
Technical Advisor For EO Countermeasures	1	1	0	0	0

TECHNOLOGY TRANSITION MANAGER	1	1	0	0	0
Thrust Manager	1	0	0	0	1
Wargame Technology Lead	1	1	0	0	0

Table 11. Career field, by S&T workforce segment

	All	Air Force	Army	Navy	4 <sup>th</sup> Estate
Career field	Count of participants				
Business, Cost Estimating, & Financial Management (BCEFM)	1	1	0	0	0
I don't know	1	0	0	1	0
Facilities Engineering	1	1	0	0	0
Other	8	5	1	1	0
Other Non-Logistics Related	1	0	1	0	0
Program Management	16	7	1	2	5
Property	1	1	0	0	0
SPRDE Science & Technology	274	189	29	21	35
SPRDE Systems Engineering	33	18	2	9	4
Test and Evaluation	2	0	0	1	1

Table 12. Applicable category, by S&T workforce segment

	All	Air Force	Army	Navy	4 <sup>th</sup> Estate
Category	Count of participants				
Advanced Technology Development	78	45	12	13	7
Applied Research	154	113	13	7	21
Basic Research	56	37	3	5	11
Engineering and Manufacturing Development	22	12	2	5	3
Operations and Support	19	12	3	2	1
Other	6	2	1	1	2
Production and Deployment	4	2	0	2	0

Table 13. Location, by S&T workforce segment

	All	Air Force	Army	Navy	4 <sup>th</sup> Estate
Location	Count of participants				
Aberdeen Proving Ground, MD	1	0	1	0	0
AFRL	1	1	0	0	0
AFRL WPAFB	1	1	0	0	0
AFRL/RYAA	1	1	0	0	0
AFRL/RZTA	1	1	0	0	0
AFRL-Edwards	1	1	0	0	0
APG	1	0	1	0	0
APG, MD	1	0	1	0	0
Arlington	2	1	0	1	0
Arlington VA	1	0	0	1	0
Arlington, VA	4	1	0	3	0
Arlington, VA	1	1	0	0	0
Bethesda MD	1	0	0	1	0
Brooks	1	1	0	0	0
Brooks City Base	1	1	0	0	0
Brooks City-Base	5	5	0	0	0
Brooks City-Base, TX	1	1	0	0	0
CA	2	2	0	0	0
Charleston, SC	1	0	0	1	0
China Lake	1	0	0	1	0
Coastal IPT-San Diego, CA	1	0	0	1	0
Dayton OH	1	1	0	0	0
dayton, oh	1	1	0	0	0
DTRA	1	0	0	0	1
DTRA KAFB NM	1	0	0	0	1
DTRC	1	0	0	0	1
DTRC, Ft. Belvoir, VA	1	0	0	0	1
Edwards	2	2	0	0	0
Edwards AFB	9	9	0	0	0
Edwards afb CA	1	1	0	0	0
Edwards AFB	1	1	0	0	0
EGLIN	2	2	0	0	0
Eglin AFB	8	7	0	0	1
Eglin AFB FL	1	1	0	0	0
Eglin AFB, FL	1	1	0	0	0
Fort Belvoir, VA	1	0	0	0	1
Fort Belvoir	3	1	0	0	2

Fort Belvoir VA	1	0	0	0	1
Fort Belvoir, VA	14	1	4	0	9
Fort Belvoir, VA 22060	1	0	0	0	1
Fort detrick	2	0	2	0	0
Fort Detrick, MD	1	0	1	0	0
Fort Eustis, VA	1	0	1	0	0
Fort Rucker, AL	1	0	1	0	0
Ft Belvoir	4	0	0	0	3
Ft Belvoir VA	1	0	0	0	1
Ft Belvoir, VA	2	1	0	0	1
Ft Belvoir, VA 22060	1	0	0	0	1
Ft Belvoir, Virginia	1	0	0	0	0
Ft. Belvoir	1	0	0	0	1
Ft. Belvoir VA	1	0	0	0	1
Ft. Belvoir, VA	9	0	1	0	8
Ft. Detrick, MD	1	0	1	0	0
Ft. Meade MD	1	1	0	0	0
Ft. Meade, MD	1	1	0	0	0
HAFB	1	1	0	0	0
Hanscom AFB, MA	1	1	0	0	0
here	1	1	0	0	0
HQDA	1	0	1	0	0
Huntsville	1	0	1	0	0
KAFB	1	1	0	0	0
KAFB, NM	2	2	0	0	0
Kirtland	1	1	0	0	0
Kirtland AFB	10	9	0	0	1
Kirtland AFB NM	1	0	0	0	1
Kirtland AFB NM	2	2	0	0	0
Kirtland AFB, NM	3	2	0	1	0
Kirtland Air Force Base	1	1	0	0	0
Kirtland/Peterson AFB	1	1	0	0	0
lackland AFB	1	1	0	0	0
Lakehurst	1	0	0	1	0
McAlester, OK	2	0	2	0	0
Mesa AZ	1	1	0	0	0
Natick	1	0	1	0	0
Natick, MA	2	0	2	0	0
NCR	1	0	0	0	1
nrl washington dc	1	0	0	1	0
NSRDEC	2	0	2	0	0

NSWC IHD	1	0	0	1	0
NSWC, Dahlgren, VA	1	0	0	1	0
ONR	1	0	1	0	0
ONR Arlington	1	0	0	1	0
Ontario, CA	1	0	0	0	1
Orlando, FL	3	0	2	1	0
Panama City, FL	3	0	0	3	0
Pentagon	1	1	0	0	0
Philadelphia	2	0	0	2	0
Picatinny Arsenal, NJ	3	0	3	0	0
PNBC	1	0	0	1	0
Port Hueneme, CA	1	0	0	1	0
Redstone Arsenal AL	1	0	1	0	0
Redstone Arsenal, AL	2	0	2	0	0
RHCVE	1	1	0	0	0
RICHMOND, VA	1	0	0	0	1
Rome	1	1	0	0	0
Rome NY	2	2	0	0	0
ROME, NEW YORK	1	1	0	0	0
Rome, NY	5	5	0	0	0
Rome, NY	1	1	0	0	0
San Antonio, TX	1	1	0	0	0
San Diego	3	0	0	3	0
San Diego, CA	1	0	0	1	0
San Diego, Point Loma	1	0	0	1	0
Scott AFB, IL	1	0	1	0	0
Singapore	1	0	0	0	1
Suffolk, VA	1	0	0	1	0
Sunnyvale, CA	1	0	0	0	1
Tyndall	1	1	0	0	0
Tyndall AFB	2	2	0	0	0
USA	1	1	0	0	0
USJFCOM	1	0	1	0	0
Virginia	1	0	0	0	1
washington	1	0	0	0	1
Washington DC	2	0	0	1	1
WBAFB	1	1	0	0	0
Woodbridge	1	0	0	1	0
Woodbridge VA	1	0	0	1	0
Woodbridge, VA	3	0	0	3	0
WPAFB	68	68	0	0	0

WPAFB OH	6	6	0	0	0
WPAFB Ohio	1	1	0	0	0
WPAFB, OH	8	8	0	0	0
WPAFB, Ohio	3	3	0	0	0
Wright Patterson AFB	13	13	0	0	0
Wright Patterson AFB OH	2	2	0	0	0
Wright-Patt	1	1	0	0	0
Wright-Patterson	2	2	0	0	0
Wright-Patterson AFB	20	20	0	0	0
Wright-Patterson AFB OH	1	1	0	0	0
Wright-Patterson AFB Ohio	1	1	0	0	0
Wright-Patterson AFB, OH	6	6	0	0	0

Table 14. Most applicable PMO acquisition category, by S&T workforce segment

Category	All	Air Force	Army	Navy	4 <sup>th</sup> Estate
	Count of participants				
ACAT IA	3	1	0	1	1
ACAT ID	9	2	2	4	1
ACAT II	4	2	1	0	0
ACAT III	4	1	1	1	1
Not Applicable	266	189	22	21	33
Other	9	5	1	1	2
Pre-ACAT Technology Project	32	15	5	5	7

Table 15. Mentor items, by S&T workforce segment

Segment	Have mentor?		If so, how assigned?			If so, is the mentor beneficial?	
	Yes	No	Assigned by someone else	Self-selected	Other	Yes	No
Air Force	75	148	8	8	59	66	8
Army	6	28	1	0	5	6	
Navy	8	26	2	1	5	7	1
4 <sup>th</sup> Estate	9	36	3	0	6	9	

Table 16. Retirement plan, by S&T workforce segment

Plan	All	Air Force	Army	Navy	4 <sup>th</sup> Estate
	Count of participants				
CSRS (Civil Service Retirement System)	63	42	8	6	7
FERS (Federal Employees Retirement System)	262	171	26	27	36
Not Applicable (No Retirement Plan / Other Retirement Plan)	7	6	0	1	0
Not Sure	7	4	0	1	2

# Glossary

ACAT	Acquisition Category
ACAT IAM/MAIS	Acquisition Category Information Automated Major/Major Automated Information Systems
AT&L	Acquisition, Technology, and Logistics
BCEFM	Property, Cost Estimating, and Financial Management
CADRe	Cost Analysis Data Requirement
CAO	Chief Administration Officer
CDD	Capabilities Development Document
CDR	Critical Design Review
CDRLs	Contract Data Requirements List
CE	Cost Estimating
CLIN	Contract Line Item Number
COTR	Contracting Officer Technical Representative
CSRS	Civil Service Retirement System
DAES	Defense Acquisition Executive Summary
DARPA	Defense Advanced Research Projects Agency
DASWP	Defense Acquisition Strategic Workforce Plan
DAWIA	Defense Acquisition Workforce Improvement Act
DCAA	Defense Contract Audit Agency
DCMA	Defense Contract Management Agency
DeCA	Defense Commissary Agency
DFAS	Defense Finance & Accounting Service
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DMDC	Defense Manpower Data Center
DOD	Department of Defense
DOD IG	Department of Defense Inspector General
DoDEA	Department of Defense Education Activity
DSS	Defense Security Service
DTRA	Defense Threat Reduction Agency
DTRMC	Defense Test Resource Management Center
EP	Expert panel
EVMS	Earned Value Management System
FERS	Federal Employees Retirement System
FM	Financial Management
HCI	Human Capital Initiatives
ICD	Initial Capabilities Document
JCS	Joint Chiefs of Staff
MDA	Missile Defense Agency
NASA	National Aeronautics and Space Administration
NDU	National Defense University
NSPS	National Security Personnel System
OBS	Organizational Breakdown Structure
OPM	Office of Personnel Management
OUSD (AT&L)	Office of the Under Secretary of Defense, Acquisition Technology & Logistics
pBIB	partially balanced incomplete block
PDR	Preliminary Design Review
PFPA	Pentagon Force Protection Agency
PM	Program Management
PMO	Program Management Office

RFP	Requests for Proposal
SMEs	Subject matter expert(s)
SOWs	Statement of work(s)
SPRDE	Systems Planning, Research Development, and Engineering
SPRDE-PSE	Systems Planning, Research Development, and Engineering-Program Systems Engineer
SPRDE-S&TM	Systems Planning, Research Development, and Engineering-Science and Technology Management
SPRDE-SE	Systems Planning, Research Development, and Engineering-Systems Engineering
WBS	Work Breakdown Structure
WHS	Washington Headquarters Services

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