Federal Chief Information Officer's Council
Workforce and Human Capital for IT Committee

Clinger-Cohen Assessment Survey (2003)

For the Governmentwide Information Technology (IT) Workforce

Analysis of Survey Results

May 2004

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Chapter
1 Introduction

Clinger-Cohen Assessment Survey (2003)

Analysis of Survey Results

1.1 Purpose of this Analysis Report

This Analysis Report describes the Clinger-Cohen Assessment (CCA) survey (in **Chapter 1),** summarizes and analyzes the key findings from the CCA survey (in **Chapter 2**), and provides a summary of conclusions, recommendations and lessons learned as a result of the analysis (in **Chapter 3**). Screen captures of the actual survey are provided in **Appendix A**. Listings and definitions (where available) of the competencies, skills, and certifications referenced in the survey are provided in **Appendices B** through **D**, respectively.

It is important to note that while the survey responses came from individual employees representing a large number of Federal agencies, the analysis of the results and the accompanying recommendations are at a Governmentwide (aggregate Federal) level and are not focused on any individual Department or Agency. Upon conclusion of the survey, each Department/Agency was provided their survey data to analyze on their own.

1.2 About the CCA Survey

Purpose of the CCA Survey

The Clinger-Cohen Assessment (CCA) survey is used to satisfy the Clinger-Cohen Act requirement for an annual workforce assessment. Additionally, it satisfies the Office of Management and Budget (OMB) requirement for an information technology (IT) workforce assessment as outlined in agency passbacks for Budget Year 2004. Finally, the CCA survey also addresses Section 209 of the E-Government Act by analyzing the personnel needs of the Federal Government relating to information technology and information resources management.

Survey Background

The Federal Chief Information Officer's Council's (CIOC) Workforce and Human Capital for IT Committee developed the survey to help determine areas of needed competency development, and to initiate the first stages of strategic workforce planning. A CIOC working group evaluated available tools and technologies to perform such a survey. Key goals were to be able to use established, recognized competencies and to develop the

survey quickly with minimal resources to meet the OMB requirement. The working group opted to create the survey based on the competency-based approach of the GS-2210 IT Management occupational series as outlined in the IT Workforce Development Roadmap, a web-based career development tool also produced by the CIOC.

During August 2003, the CIOC worked with the Office of Personnel Management (OPM) and the OMB E-Gov office to develop the survey questions and content areas (competencies, skills, certifications, and specialized job activities). The competencies were a subset of the general and technical competencies developed by OPM for the GS-2210 IT Management occupational series. Subject matter experts from various government agencies chose the skills, certifications and specialized job activities most relevant to Federal work for inclusion on the survey.

Survey Timeframe

The survey was launched on September 2, 2003 and closed on September 29, 2003. The original closing date was September 22, 2003, but was extended one week to accommodate the impact of a two-day Washington D.C. Federal Government shutdown due to Hurricane Isabel.

Coordination of Survey at Federal Level

To ensure the survey gathered information that would be useful in supporting agencies' human capital planning requirements, close coordination was required. Members of the CIOC Workforce and Human Capital for IT Committee worked with OPM and the OMB E-Gov office to develop survey content, and also interfaced with points of contact from each agency, who had specific responsibilities regarding the administration of the survey.

Role of Individual Departments and Agencies

As part of the coordination process, the CIOC working group identified points of contact (POCs) within each Department and/or Agency. These individuals were responsible for:

1) Identifying their IT workforce population to participate in the survey based on occupational series (see **Chapter 1.3**, below).

2) Developing a survey distribution list (typically based on email) for their department or agency.

3) Disseminating information about the survey to their IT workforce, announcing the commencement of the survey, providing instructions on how to access the survey via the survey web address, and sending reminders to complete the survey.

4) Tracking their IT population's usage of the survey via a separate tracking website to ensure their organization captured a sufficient sample size.

Methodology

The CCA survey was conducted via the Internet, with participants notified by the designated POC from their respective agency. Agency POCs were advised to notify their IT workforce to complete the survey based on their occupational series and IT-related job duties (everyone in the traditional IT-related series such as GS-2210 IT Management, GS-

391 Telecommunications, and GS-1550 Computer Science as well as those individuals in non-traditional IT-related series such as GS-301 Miscellaneous Program and Administration, GS-340 Program Management, and GS-343 Management and Program Analysis, but only if they perform IT-related work).

Once notified that the survey commenced, respondents visited the survey website, selected and submitted the most appropriate answers to questions organized in five major parts: Demographics, Competencies, Skills, Certifications, and Specialized Job Activities.

Respondents generally took between 15 and 20 minutes to complete the survey. A dynamically generated set of frequently asked questions helped respondents with a variety of technical and survey-related issues.

Only "valid" survey responses, defined as those responses where the individual completed all five sections and submitted the survey via the 'Submit' button, were analyzed in this report. It should be noted that a number of users attempted to take the survey but, for a variety of reasons, failed to complete it. These responses were not included in the analysis. "Valid" survey responses were stored in a centralized database and agency POCs were provided responses for their respective agency shortly after the survey closed.

Again, the survey was open to the entire Federal IT workforce. Because the survey was voluntary, the sample collected was self-selecting, not random. In addition, the survey was anonymous. No information regarding the identity of the actual user was collected. This was done to ensure maximum participation.

1.3 Survey Scope

Intended Audience

The survey was intended to be completed only by Federal civilian employees occupying IT and IT-related positions. While they are a critical and highly valued part of the IT workforce, due to resource and time constraints, military and contractor personnel were not included in the survey at this time.

Occupational Series

The Federal civilian IT workforce generally falls into multiple occupational series. For purposes of the survey, applicable series in both the General Schedule (GS) and Foreign Service (FS) systems were included. Agency POCs were asked to estimate their IT workforce population based to a large extent on traditional IT-related series:

- GS-2210 Information Technology Management
- GS-334 Computer Specialist[1]
- GS-391 Telecommunications
- GS-1550 Computer Science

[1] The GS-334 Computer Specialist occupational series was cancelled by OPM, but not all agencies have converted their Computer Specialists to other appropriate series. Therefore, this option was included for survey respondents.

- GS-854 Computer Engineering
- FS-2880 Information Management
- FS-2882 Information Management Technical
- FS-2884 Information Technology Management

Agency POCs were also asked to include in their estimate of IT workforce population other occupational series not typically associated with but which could nonetheless be considered part of the IT workforce based on their job title or function. These included:

- GS-301 Miscellaneous Administration and Program
- GS-340 Program Management
- GS-343 Management and Program Analysis
- GS-855 Electronics Engineering

Pay Bands and Occupational Series Equivalents

It was recognized that certain respondents might not fit into a specific occupational series or pay band. Individuals that fell into this category were asked to select the most appropriate response, or select "other" if there was no equivalent match.

Grade Levels

Table 1.1 lists the GS and FS grade levels that were included in the survey.

General Schedule (GS)	Foreign Service
GS-5	FS-1
GS-7	FS-2
GS-9	FS-3
GS-11	FS-4
GS-12	Senior Foreign Service (SFS)
GS-13	
GS-14	
GS-15	
Senior Executive Service (SES)	

• Table 1.1: Grade levels included in the CCA Survey.

1.4 Assumptions and Survey Design Constraints

Assumptions

The following is a list of basic assumptions that the CIOC documented as part of the design and administration of the CCA survey:

- The survey would be web-based.

- The survey would require a relational database to store responses.
- There could be a potential for up to 70,000 participants based on data available in the Central Personnel Data File (CPDF) at OPM.
- The survey website would be compliant with Section 508 of the Rehabilitation Act. This law ensures that reasonable accommodations are provided to those individuals with disabilities.
- Any participant should be able to complete the survey in 20 minutes or less.
- The survey would be hosted by a commercial service provider with a .gov domain.
- Only Federal Government civilian employees should complete the survey.
- Frequently asked questions would be developed to assist in answering participant's questions about the survey.
- There would be no requirement for OMB clearance because the survey does not present a burden to the public.

Design Constraints

Because the CCA survey represented the first attempt to survey the Governmentwide IT workforce, certain design constraints should be noted. Some constraints have been alluded to previously, but merit repeating.

1. The survey results do not identify "gaps" between what the Government currently has and what it requires in terms of competencies, skills and certifications. To perform a gap analysis, for example, one must derive both the current ("as is") and the required ("to be") states. The CCA survey only identified current information (e.g., competency and skill proficiency levels, numbers of certifications) of the Governmentwide IT workforce and not what is required; therefore a gap cannot be calculated. As such, the CCA survey did not constitute "workforce planning," which relies on such gap analyses. Further, it is impractical to identify the required state at a Governmentwide level, since each Department or Agency must identify requirements based on its IT mission. It was assumed as part of the survey design, that individual Departments/Agencies could use its own survey data, paired with other indicators (such as OMB Business Case data, Federal Information Security Management Act data, and/or the Certification and Accreditation process). The individual Departments/Agencies would consider issues unique to the organization (such as the degree of outsourcing certain IT functions) to conduct workforce planning in support of broader human capital management processes.

2. The survey was voluntary. Due to a number of constraints (time required, difficulty in identifying and notifying the federal IT workforce, need for clearance from unions), a purely random sample was not feasible. It was decided that the voluntary responses would be reasonably representative of the workforce as a whole depending upon the overall response rate.

3. Only civilian members of the IT workforce were included in the survey. The CIOC recognizes that the IT workforce comprises both civilians as well as contractor

support, and in some cases, uniformed military members. In fact, many government agencies may outsource or have entire IT functions performed by military members. The CIOC did not intend to devalue the support that contractor or military members perform, but due to time and resource constraints, chose to focus the survey on the civilian members of the IT workforce.

Chapter
2 Key Findings

Clinger-Cohen Assessment Survey (2003)

Analysis of Survey Results

2.1 Introduction

This Chapter presents the key findings from the survey, including the total number of responses at a Governmentwide level as well as for each department or agency, and provides an analysis of the raw survey data. Due to the amount of data collected, only summary information and illustrative data are provided in this Chapter.

2.2 General Quantitative Results

Survey Responses and Response Rate

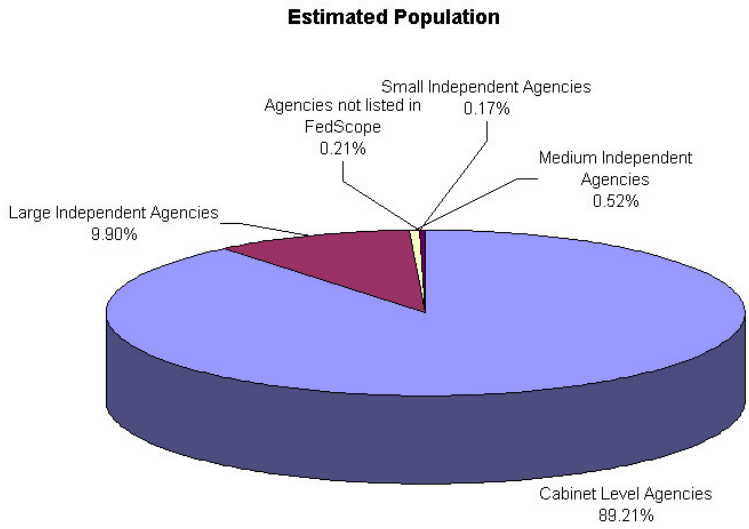
The total number of responses at a Governmentwide level, along with the estimated Federal IT workforce population[2] (as described in **Chapter 1.3**) and response rate, are provided in Table 2.1.

Estimated Federal IT Population Size	Number of Responses	Overall Survey Response Rate
76,363	19,827	25.96%

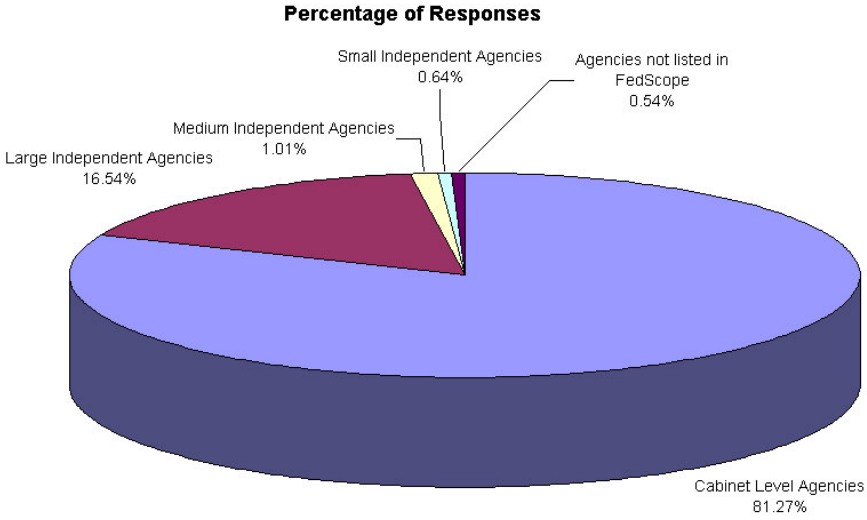
• Table 2.1: Survey Responses – Governmentwide (CCA Survey 2003)

Figure 2.1 illustrates the percentage of the estimated IT workforce population across the Government, including cabinet-level agencies; large, medium and small independent agencies; and those agencies not listed in the OPM Fedscope database[3]. Figure 2.2 shows the overall percentage of Governmentwide responses (an aggregate of all Departments/Agencies).

[2] The estimated Federal IT population size is based on the sum of individual Agency estimates.
[3] The OPM Fedscope database (http://www.fedscope.opm.gov) contains a central personnel data file that supports statistical analysis of Federal personnel programs. Its coverage is limited to Federal civilian employees and does not include all Departments or Agencies. Therefore, the survey analysis groups those agencies, not part of the Fedscope database, in a separate category.



• Figure 2. 1 – Governmentwide estimate of total IT workforce population by percentage

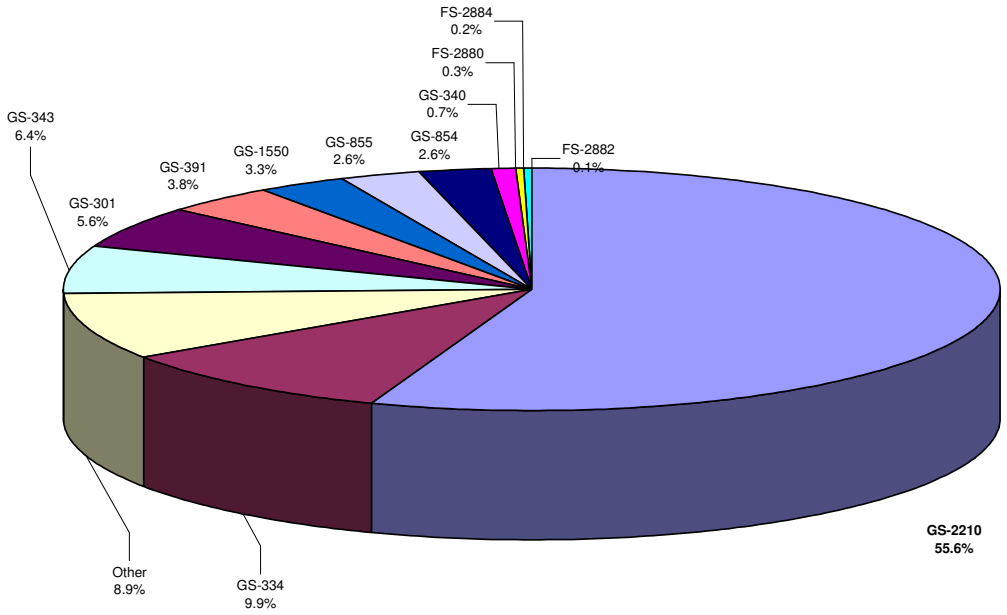


• Figure 2. 2 – Governmentwide total number of responses by percentage

Combined, the Cabinet-level agencies have by far the largest proportion of the IT workforce. However, as can be seen from these illustrations, large independent agencies responded at a proportionally higher rate that the Cabinet-level agencies.

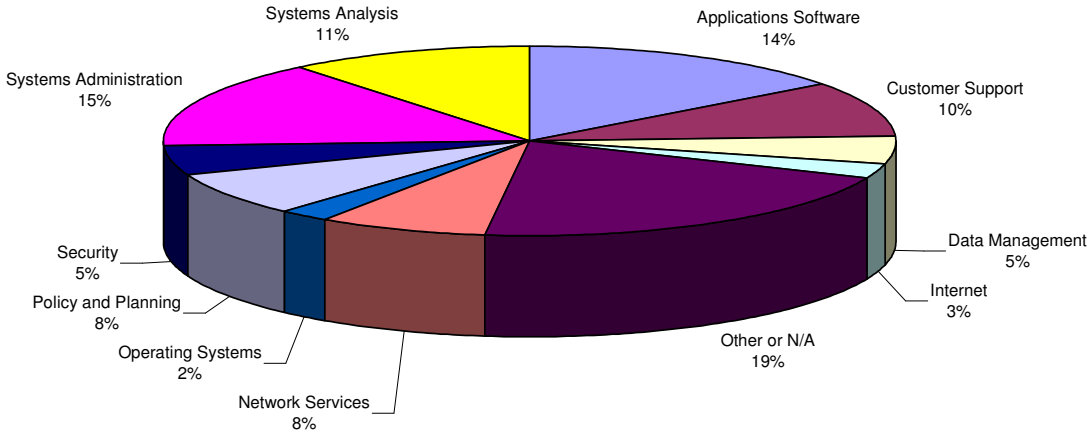
Breakout of Responses by Occupational Series

Figure 2.3 shows the proportion of survey responses by occupational series. Not surprisingly, the GS-2210 IT Management series represented more than half of all survey responses. Of note were the 1,966 responses that represented the GS-334 Computer Specialist series. This series was cancelled in May 2001 and these positions should be reclassified in the GS-2210 occupational series.



• Figure 2.3 – Responses by Occupational Series

Those respondents who chose GS-2210 as their occupational series were also asked to provide up to two parenthetical (specialty) titles that reflect the type of functions they perform. There was no parenthetical title that included a majority of responses; in fact, the response "Other or N/A" was most frequent. Most likely, this is due to individuals who do not have an assigned parenthetical title, or who have functional responsibilities in more than two areas. Figure 2.4 shows the detailed breakout of responses for GS-2210s by parenthetical title.



• Figure 2.4 – Responses by GS-2210 Parenthetical Title

2.3 Demographic Findings

Profile of the "Typical" IT Worker

Based on the frequency of responses to the demographic survey questions, a profile of the "typical" IT worker emerges. This profile represents the most frequent number of responses (mode) for each pertinent question, the summary results of which are provided in this section.

The "Typical" IT Worker most often…
…is between 46 and 50 years of age
…is a GS-13 (or FS-3 for Foreign Service)
…has over 20 years of Federal Government experience
…has little to no private sector experience
…is likely to retire in the next 10 to 20 years
…may leave their organization in the next 3 years
…holds a Bachelor's Degree

Age Findings

The most frequently chosen age range (chosen by approximately 21% of respondents) was between 46 and 50 years of age. Roughly 37% responded that they were older and 41% reported that they were younger than the 46 to 50 years of age range.

Some differences can be found when looking at responses to the age question by occupational series. Some occupational series (GS-301, GS-334, GS-340, GS-343, GS-391) have more employees who are older, while others (GS-1550, GS-854, GS-855) have more employees who are younger.

Grade Level Findings

The most frequently chosen grade level of respondents was GS-13 or equivalent (approximately 28% of all responses). However, there was a substantial number of responses in the GS-12 or equivalent range (taken together, GS-12 and GS-13 account for over 54% of all responses).

Education Level Findings

The most frequently chosen education level of respondents was a Bachelor's Degree (approximately 41% of all responses). Almost 23% of the respondents had a post-Baccalaureate Degree (Masters Degree or Ph.D.).

Experience (Years of Service) Findings

The survey asked three separate questions to gauge respondents' experience in terms of years of service in the Federal Government in general, and in information technology specifically. The three questions were:

- Please indicate the number of years of Federal service
- Please indicate the number of years of public sector experience in information technology
- Please indicate the number of years of private sector experience in information technology

Most respondents (43.46%) have "21+ years" of Federal service, indicating a very experienced workforce. Also, most respondents (25.77%) have "11-20 years" of public sector IT experience. However, the respondents have a lack of private sector IT experience, in that nearly half (48.36%) indicated "None or Not sure" (for the number of years of experience). Of those who did indicate some private sector IT experience, the most frequent response (21.61%) was "1-3 years."

Retirement and Longevity Findings

The survey included questions on retirement eligibility, as well as retirement estimations. In addition, the survey asked respondents to indicate their plans for remaining in IT-related employment (i.e., their "longevity") with the Federal Government in general, and with their respective Department/Agency specifically. The questions asked were as follows:

- How soon are you eligible for full retirement?

- How soon do you plan on retiring?
- How long do you expect to continue to work for the Federal Government in IT-related work?
- How long do you expect to continue to work for your current agency in IT-related work?

The most frequent response for both retirement-related questions (when respondents are eligible to retire, and when they plan on retiring) was the same, or "11-20 years" (30.42% for "eligible to retire" and 29.39% for "plan on retiring"). There is consistent agreement between when respondents are eligible to retire and when they plan on retiring, except in the short term (0-3 years), where more (19.03%) respondents are eligible to retire than plan to (11.51%).

Respondents in certain occupational series (GS-391, GS-334 and to some extent GS-2210) indicate they are more likely to retire over the next ten years than other occupational series. In addition, retirement estimates generally relate to grade level; i.e., the higher the grade level, the more imminent the possibility for retirement (estimated).

In terms of longevity, respondents indicate that they are likely to change their organization soon, but may not necessarily leave government service soon. While the responses varied greatly, 23.39% (the mode) of respondents indicated that they would expect to remain in their organization for the next 1-3 years.

2.4 Competency Findings

Background

The survey asked respondents to provide a self-assessment of their current proficiency in a set of general and technical competencies. The competencies were a subset of those developed by OPM for the GS-2210 and other IT occupational series. The competencies included 16 general and 53 technical competencies and were chosen by a focus group of Subject Matter Experts (SMEs) based on their relative importance in Federal IT work. Please see **Appendix B** for a listing and definition of all competencies used in the survey. The rating scale used for the self-assessment was:

0. None – do not possess proficiency
1. Basic – capable of handling only the simplest assignments, but will need significant assistance beyond the easiest situations
2. Foundational – capable of handling some assignments, but will need assistance beyond routine situations
3. Intermediate – capable of handling many day-to-day assignments, but may seek assistance in difficult situations
4. Advanced – capable of handling most day-to-day assignments, though may seek expert assistance with particularly difficult situations

5. Expert – capable of handling all assignments and may serve as a role model and/or coach others on this competency

Technical Competencies Summary

Technical competencies address job-specific functions, in this case information technology functions. Tables 2.2 and 2.3 list the ten highest and lowest-rated technical competencies, respectively, based on the combined percentage of responses in the Intermediate, Advanced and Expert proficiency levels[4].

Technical Competency	% Intermediate or Greater Proficiency	Rank
Hardware	66.93%	1
Configuration Management	64.87%	2
Operating Systems	64.04%	3
Technical Documentation	58.48%	4
Data Management	58.25%	5
Knowledge Management	58.07%	6
Technology Awareness	58.02%	7
Project Management	57.92%	8
Computer Languages	56.11%	9
Standards	55.60%	10

• Table 2.2 – Ten Highest-Rated Technical Competencies

Technical Competency	% Intermediate or Greater Proficiency	Rank
Telecommunications	37.24%	44
Capital Planning and Investment Assessment	37.07%	45
Logical Systems Design	36.88%	46
Computer Forensics	36.13%	47
Human Factors	35.61%	48
Encryption	34.98%	49
Object Technology	32.56%	50
Modeling and Simulation	27.96%	51
Artificial Intelligence	24.74%	52
Embedded Computers	16.18%	53

• Table 2.3 – Ten Lowest-Rated Technical Competencies

[4] Throughout this report, various tables will provide a column for "% Intermediate or Greater Proficiency." For tables that summarize competencies, this column represents the combined percentage of all responses in the Intermediate, Advanced, and Expert proficiency levels. For tables that summarize skills, this column represents the combined percentage of all responses in the Intermediate and Advanced proficiency levels.

General Competencies Summary

General competencies are cross-functional in nature, meaning that they are needed by most members of the workforce regardless of the function they perform. Table 2.4 orders all general competencies, based on the combined percentage of responses in the Intermediate, Advanced and Expert proficiency levels. Because only 16 general competencies were included in the survey, all of them are described in the table.

General Competency	% Intermediate or Greater Proficiency	Rank
Interpersonal Skills	90.46%	1
Problem Solving	89.35%	2
Customer Service	84.41%	3
Decision Making	84.36%	4
Oral Communication	83.98%	5
Leadership	80.99%	6
Planning and Evaluation	80.45%	7
Organizational Awareness	79.52%	8
Influencing/Negotiating	71.30%	9
Administration and Management	60.57%	10
Managing Human Resources	60.02%	11
Strategic Thinking	58.89%	12
Financial Management	49.58%	13
Public Safety and Security	48.21%	14
Legal, Government and Jurisprudence	47.44%	15
Contracting/Procurement	44.57%	16

• Table 2.4 – General Competencies

Competencies Subject to Impact via Retirement

Tables 2.5 and 2.6 list the ten highest rated technical and general competencies, respectively, based on the combined percentage of responses in the Intermediate, Advanced and Expert proficiency levels for those who plan on retiring within the next three years. This analysis indicates which competencies might be impacted (or "lost") once this segment of the population retires.

Technical Competency	% Intermediate or Greater Proficiency	Rank
Configuration Management	61.96%	1
Hardware	59.38%	2
Project Management	57.23%	3
Operating Systems	56.44%	4
Knowledge Management	56.13%	5
Technical Documentation	55.87%	6
Data Management	55.30%	7
Requirements Analysis	53.72%	8
Standards	52.63%	9
Computer Languages	52.59%	10

• Table 2.5 – Ten Highest-Rated Technical Competencies Subject to Impact via Retirement

General Competency	% Intermediate or Greater Proficiency	Rank
Interpersonal Skills	89.35%	1
Problem Solving	88.17%	2
Oral Communication	84.14%	3
Decision Making	84.01%	4
Customer Service	82.69%	5
Planning and Evaluation	81.81%	6
Organizational Awareness	80.76%	7
Leadership	80.37%	8
Influencing/Negotiating	72.13%	9
Managing Human Resources	65.56%	10

• Table 2.6 – Ten Highest-Rated General Competencies Subject to Impact via Retirement

2.5 Skill Findings

Background

The survey asked respondents to provide a self-assessment of their current proficiency in a set of IT-related skills. The skills were chosen by subject matter expert focus groups facilitated by OPM, based on relevance to Federal IT work. Care was taken to identify "vendor-neutral" skills, to the extent possible. A total of 80 skills were identified. The rating

scale[5] used (differing slightly from the one used for competencies) for the self-assessment was:

0. None
1. Basic
2. Intermediate
3. Advanced

Please see **Appendix C** for a listing of all skills used in the survey.

Skills Summary

Tables 2.7 and 2.8 order the ten highest and lowest-rated IT skills, respectively, based on the combined percentage of responses in the Intermediate and Advanced proficiency levels.

Skill	% Intermediate or Greater Proficiency	Rank
Word Processing Software	78.39%	1
Electronic Mail	73.12%	2
Spreadsheet Software	59.73%	3
Internet Browsers	54.44%	4
File systems	54.15%	5
Flowcharting	53.07%	6
Browsers	52.84%	7
Client-Server	50.86%	8
Understanding and translating user requirements	50.35%	9
Desktop Services	48.86%	10

• Table 2.7 – Ten Highest-Rated IT Skills

Skill	% Intermediate or Greater Proficiency	Rank
SEI Capability Maturity Models	13.43%	71
Enterprise Portal Development	13.24%	72
Video Imaging	12.76%	73
Animation	11.92%	74
Portal Development	11.50%	75
Sound Editing	9.46%	76
Joint Application Development (JAD)	9.46%	77
Biometrics	8.95%	78
Unified Modeling Language (UML)	8.60%	79
Virtual Reality	6.84%	80

• Table 2.8 – Ten Lowest-Rated IT Skills

[5] Definitions of the rating scale were provided for the competencies, but not the skills.

Skills Subject to Impact via Retirement

Table 2.9 describes the ten highest rated skills based on the combined percentage of responses in the Intermediate and Advanced proficiency levels for those who plan on retiring within the next three years. This analysis indicates which skills might be impacted (or "lost") once this segment of the population retires.

Skill	% Intermediate or Greater Proficiency	Rank
Word Processing Software	70.95%	1
Electronic Mail	64.29%	2
Spreadsheet Software	52.28%	3
Flowcharting	49.96%	4
Understanding and translating user requirements	45.53%	5
File systems	45.18%	6
Data Analysis	44.61%	7
Data Flow Diagrams	44.43%	8
Programming Concepts	42.55%	9
Desktop Services	41.19%	10

• Table 2.9 – Ten Highest-Rated Skills Subject to Impact via Retirement

2.6 Certification Findings

Background

The survey asked respondents to indicate broad certification areas in which they currently possess a recent (within the past three years) certification or certificate. The survey avoided asking for specific certifications and instead focused on certification areas (for example, "Cisco" as an area versus "Cisco Certified Network Professional" as a discrete certification). This approach was chosen because it would be difficult to compile a current, comprehensive and reliable list of certifications.

The survey distinguished between certifications validated by an independent authority, which included experience as part of the certification requirements, and certificate programs generally offered by vendors upon completion of a given set of coursework. It was deemed preferable to collect responses on the former rather than the latter because it was judged that such certifications generally required more effort to achieve. Therefore, respondents were instructed to indicate only certification areas that included experience as part of the certification criteria.

Please see **Appendix D** for a listing of the certification areas and examples of certifications or certificates within each area.

Certification Summary

Tables 2.9 and 2.10 list the ten most and least frequently selected certification areas, based on the total number of responses and the resulting percentage of the total IT workforce. A total of 44 certification areas were identified.

Certification Area	# Certified	%	Rank
IT Related Technical Certificates from accredited Technical Schools (military or commercial)	1960	9.89%	1
Microsoft	1897	9.57%	2
Comp TIA	869	4.38%	3
Cisco	729	3.68%	4
Novell	653	3.29%	5
Information Systems Security	633	3.19%	6
Project Management	542	2.73%	7
Network Security	391	1.97%	8
Oracle	385	1.94%	9
Information Systems	350	1.77%	10

- Table 2.9 – Ten Most Frequent Certification Areas (n = 19,826)

Certification Area	# Certified	%	Rank
Check Point	90	0.45%	33
Compaq	64	0.32%	34
IDNX Certification	59	0.30%	35
Healthcare	48	0.24%	36
Lucent	45	0.23%	37
USDA Graduate School Webmaster Certification	42	0.21%	38
Red Hat	41	0.21%	38
SCO	36	0.18%	40
Document Imaging	31	0.16%	41
Evidence Collection	22	0.11%	42
Mechanical	10	0.05%	43
DGC Mux Certification	9	0.05%	43

- Table 2.10 Ten Least Frequent Certification Areas (n = 19,826)

2.7 Specialized Job Activity Findings

Background

The survey asked respondents to estimate the amount of time they spend on a daily basis (as part of their normal duties and responsibilities) on ten different "specialized job activities." The rating scale used was:

- Extensive
- Moderate
- Minimal or none

Each activity is identified and defined alphabetically below:

- **Capital Planning and Investment** - this activity involves using a systematic approach to designing or selecting, implementing, managing, and evaluating information technology investments for maximizing the value and assessing the risks of the information technology acquisitions for your particular agency.

- **E-Government** - this activity involves all Federal initiatives that play an integral role in streamlining and improving procedures for moving Federal employees through the employment lifecycle. E-Government initiatives should seek to remove redundancies, reduce response times, eliminate paperwork, and improve coordination among Federal agencies.

- **Enterprise Architecture (EA)** - this activity links the business mission, strategy, and processes of an organization to its IT strategy. It is documented using multiple architectural models or views that show how the current and future needs of an organization will be met. By focusing on strategic differentiators and working across the enterprise, there is a unique opportunity to create leverage and synergies and avoid duplication and inconsistencies across the enterprise.

- **IT Project Management** - this refers to work that involves directly managing information technology projects to provide a unique service or product.

- **IT Security/Information Assurance** - this area ensures the integrity, availability, and confidentiality of information systems through the planning, analysis, development, implementation, maintenance, and enhancement of systems, programs, policies, procedures, and tools.

- **IT Workforce Management/Development** - this activity involves identifying, creating and promoting human resource management systems to recruit and retain a productive information technology workforce. In addition, this activity includes providing training and developmental opportunities to ensure future workforce needs are met.

- **Knowledge Management** - this is the process through which organizations generate value from their intellectual and knowledge-based assets. Most often, generating value from such assets involves sharing them among employees, departments and even with other companies in an effort to devise best practices.

- **Privacy** - this activity involves identifying secure and private information and regulating access to authorized users.

- **Records Management** - this includes the creation, retention and scheduled destruction of an agency's paper and film documents. Records management can include document imaging and document scanning, indexing and online document hosting. Completing document conversions from paper, microfilm scanning and large microfiche are also part of records management.

- **Solutions Architecture** - this activity is generally concerned primarily with studying and defining solutions for a single system, department or solution area within an agency. The Solutions Architect is primarily concerned with issues including fundamental business and technology issues: alignment with core agency business strategies, business process simplification and the

implementation of information technology that enables the realization of key business objectives but on a small scale and within the scope of a single project or system.

The survey was designed to allow respondents to indicate a combination of activities that they spend time on as part of their job. Table 2.11 ranks the ten specialized job activities based on the proportion of responses for each time variable (the sum of the percentages for the extensive and moderate time variables).

Activity Name	Time Variable	% of Responses	# Responses	Rank
IT Project Management	Extensive	22.37%	4436	1
	Moderate	36.98%	7332	
	Minimal or none	40.64%	8058	
IT Security/Information Assurance	Extensive	14.64%	2903	2
	Moderate	33.91%	6723	
	Minimal or none	51.45%	10200	
Knowledge Management	Extensive	8.47%	1679	3
	Moderate	32.28%	6400	
	Minimal or none	59.25%	11747	
IT Workforce Management/Development	Extensive	11.89%	2358	4
	Moderate	27.06%	5364	
	Minimal or none	61.05%	12104	
Records Management	Extensive	7.54%	1495	5
	Moderate	26.96%	5345	
	Minimal or none	65.50%	12986	
Privacy	Extensive	5.64%	1118	6
	Moderate	23.27%	4613	
	Minimal or none	71.09%	14095	
Enterprise Architecture (EA)	Extensive	6.35%	1259	7
	Moderate	20.73%	4110	
	Minimal or none	72.92%	14457	
Solutions Architecture	Extensive	6.99%	1385	8
	Moderate	19.83%	3931	
	Minimal or none	73.19%	14510	
E-Government	Extensive	4.74%	939	9
	Moderate	20.80%	4123	
	Minimal or none	74.47%	14764	
Capital Planning and Investment	Extensive	5.66%	1123	10
	Moderate	19.33%	3832	
	Minimal or none	75.01%	14871	

• Table 2.11 – Specialized Job Activity Responses

Relationship of Competencies, Skills and Certifications to Specialized Job Activities

As previously noted, the survey collected respondents' estimates and/or self-assessment of:

- The amount of time spent on specialized job activities
- Current proficiency in general and technical competencies
- Current proficiency in IT-related skills
- Certification areas where current certifications were held

By aligning competencies, skills and certifications to the amount of time individuals spend on specialized job activities, one can infer that there appears to be adequate skills/competencies given the workload (inferred by time spent) or that there are gaps in specific areas – especially for the activities ranked highest overall in terms of time spent on the activity (e.g., IT Project Management, IT Security/Information Assurance).

In order to define the relationships between activities and competencies, skills and certification areas, the Federal CIO Council Workforce and Human Capital for IT Committee formed focus groups comprised of subject matter experts from various Departments/Agencies. The subject matter experts were selected based on their expertise with and knowledge of various IT functions embodied by the specialized job activities.

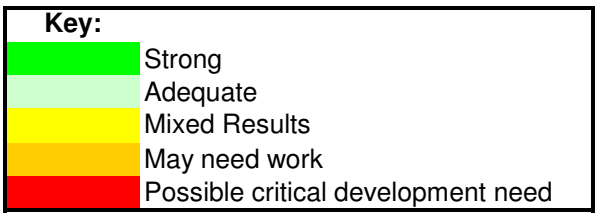
The subject matter experts were asked, for each specialized job activity, to identify no more than 5 to 6 competencies, skills, and certifications considered most important for successful performance. For example, for the IT Project Management specialized job activity, the subject matter experts chose no more than 5 to 6 competencies, skills and certifications that they considered to be important for successful performance of IT project management duties. The relationships of competencies skills and certifications to specialized job activities established by subject matter experts were considered to apply to the Federal-wide IT workforce; it was assumed that individual Departments/ Agencies, through their own analyses, could identify different relationships to reflect their environment or mission needs.

Next, inputs from each subject matter expert were consolidated into a final list. This involved comparing all individual inputs and identifying which competencies, skills and certifications were most frequently selected. This final list was used as part of the analysis contained in the subsequent sections of this analysis report. The analysis, described in more detail below, involved identifying, for a particular specialized job activity, the proficiencies for related competencies and skills, and the number of respondents with current related certifications. This was done for each of the time variables (extensive, moderate, and minimal or none) to determine the relative "strength" of competencies, skills and certifications across the aggregate Federal IT workforce.

Figure 2.5 provides a high level overview, color-coded for ease of reading, of the results of this analysis. The analysis was mainly concerned with identifying patterns indicated by proficiency scores or number of individuals with related certifications. It is important to note that the analysis does not intend to indicate quantifiable gaps in competencies, skills or certifications, because there are currently no established criteria or targets in terms of

required proficiencies or desired percentages of certified individuals. Therefore, the criteria outlined below are subjective in nature.

The color-coded key that accompanies the graphic (depicted below) uses the following guidelines to evaluate the relationship of **competency** proficiency to specialized job activities:



–"Strong" – met the criteria for Adequate (see below) and exceeded in more than one competency (for example, Expert proficiency was most frequently selected by participants performing the activity an Extensive amount of time or Advanced proficiency as the most frequently selected proficiency level for participants performing the activity a Moderate amount of time)

–"Adequate" – respondents performing this activity an Extensive amount of time most frequently selected the advanced or higher proficiency level for each competency, while respondents performing this activity a Moderate amount of time most frequently selected an Intermediate or higher proficiency level for each competency

–"Mixed Results" – results were not clear enough to provide a solid conclusion; proficiency for some competences was "strong" while others potentially need work

–"May need work" – competency proficiency was Basic or below (in either the Extensive or Moderate time variable) for one or more of the related competencies

–"Possible critical development need" – competency proficiency was Basic or below (in either the Extensive or Moderate time variable) for more than half of the related competencies

The color-coded key uses the following guidelines to evaluate the relationship of **skill** proficiency to specialized job activities:

–"Strong" – met the criteria for Adequate (see below) and exceeded in at least one skill (Advanced proficiency was selected most by respondents performing the activity a Moderate amount of time)

–"Adequate" – respondents performing this activity an Extensive amount of time most frequently selected the advanced or higher proficiency level for each skill, while respondents performing this activity a Moderate amount of time most frequently selected the Intermediate or higher proficiency level for each skill

–"Mixed" – results were not clear enough to provide a solid conclusion; proficiency for some skills was "strong" while others potentially need work

–"May need work" – skill proficiency was Basic or below (in either the Extensive or Moderate time variable) for one or more of the related skills

–"Possible critical development need" – skill proficiency was Basic or below (in either the Extensive or Moderate time variable) for more than half of the related skills

The third column of the graphic lists the percent of participants who perform the activity an Extensive amount of time who currently possess a certification in that area. No color-coding similar to what was done for certifications and skills was provided for certifications.

Following the graphic, summary-level information for each of the specialized job activities in terms of the established relationships is provided.

Specialized Job Activity	*Competencies*	*Skills*	*Certifications*
IT Project Management	Adequate	May need work	8% for extensive
IT Security/Information Assurance	Adequate	May need work	13% for extensive
Knowledge Management	Strong	May need work	N/A
IT Workforce Development/Management	Strong	Adequate	N/A
Records Management	Strong	Adequate	4% for extensive
Privacy	Strong	May need work	12% for extensive
Enterprise Architecture (EA)	Strong	May need work	N/A
Solutions Architecture	Strong	May need work	5% for extensive
eGovernment	Strong	Needs work	5% for extensive
Capital Planning and Investment	Strong	Possible critical development need	N/A

- Figure 2.5: Relative "Strength" of Competencies, Skills and Certifications for each Specialized Job Activity

IT Project Management Summary

Table 2.12 lists the competencies related to the IT Project Management specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. It appears that there is sufficient level of proficiency for the competencies for their related time variable.

IT Project Management			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Project Management	89.31%	68.99%	30.58%
Information Resources Strategy and Planning	77.93%	25.44%	25.44%
Contracting and Procurement	72.52%	24.45%	24.45%
Cost-Benefit Analysis	71.91%	26.04%	26.04%
Risk Management	72.54%	22.49%	22.49%
Information Assurance	71.62%	33.18%	33.18%

- Table 2.12 – IT Project Management Competency Summary

Table 2.13 lists the skills related to the IT Project Management specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that skill in Federal/OMB Enterprise Architecture is lacking when compared with time spent on the activity.

IT Project Management			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Development Systems Analysis	62.58%	45.68%	19.62%
Federal/OMB Enterprise Architecture	33.63%	15.17%	3.80%
Understanding and translating user requirements	71.28%	58.65%	31.27%
Project Management Software	69.25%	43.02%	13.40%

- Table 2.13 – IT Project Management Skills Summary

Table 2.14 lists the certification area(s) related to the IT Project Management specialized job activity, and shows the percentage of individuals within an indicated time variable (extensive, moderate, minimal or none) that possess a relevant certification. For example, in this table, which applies to all subsequent certification tables in this section, 341 individuals who spend an Extensive amount of time on this activity are certified. This represents 7.69% of all of those who spend an Extensive amount of time on this activity.

IT Project Management						
	Time Spent					
Related Certifications	Extensive	%	Moderate	%	Minimal or none	%
Project Management Certificate	341	7.69%	155	2.11%	46	0.57%

- Table 2.14 – IT Project Management Certification Area Summary

Finally, Table 2.15 orders the percentage of responses in the moderate or extensive time variables for each occupational series. Only civil service (GS) series are included (excluding any foreign service responses). As would be expected, both the GS-2210 (IT Management) and GS-340 (Program Management) rank near the top.

Occupational Series	Total % Moderate or Extensive
GS-2210 Information Technology Management	66.46%
GS-340 Program Management	62.77%
GS-391 Telecommunications	61.70%
GS-334 Computer Specialist	60.17%
GS-1550 Computer Science	56.97%
GS-854 Computer Engineering	56.47%
GS-301 Miscellaneous Administration and Program	46.41%
GS-855 Electronics Engineering	45.42%
Other	40.93%
GS-343 Management and Program Analysis	39.02%

- Table 2.15 – Percentage of Extensive and Moderate Activity for IT Project Management by Occupational Series (n = 19,701)

IT Security/Information Assurance Summary

Table 2.16 lists the competencies related to the IT Security/Information Assurance specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. It appears that the competencies are generally rated fairly high in terms of proficiency.

IT Security/Information Assurance			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Information Assurance	90.73%	69.88%	29.71%
Information Systems/Network Security	86.94%	58.93%	18.08%
Information Technology Architecture	78.02%	60.14%	27.30%
Information Systems Security Certification	83.60%	54.89%	17.20%
Risk Management	78.68%	55.53%	26.54%

• Table 2.16 – IT Security/Information Assurance Competency Summary

Table 2.17 lists the skills related to the IT Security/Information Assurance specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that some skills (Federal/OMB Enterprise Architecture, Cryptology and PKI) are rated relatively low when compared to time spent on this activity.

IT Security/Information Assurance			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Systems Security Applications	78.64%	47.36%	10.98%
Federal/OMB Enterprise Architecture	34.58%	19.32%	5.95%
Firewalls	65.31%	39.30%	11.80%
Cryptology	46.16%	21.91%	5.91%
PKI	55.53%	25.27%	5.85%

• Table 2.17 – IT Security/Information Assurance Skills Summary

Table 2.18 lists the certification area related to the IT Security/Information Assurance specialized job activity, and shows the percentage of individuals within an indicated time variable (extensive, moderate, minimal or none) that possess the relevant certification.

IT Security/Information Assurance						
	Time Spent					
Related Certifications	Extensive	%	Moderate	%	Minimal or none	%
Information Systems Security	390	13.43%	185	2.75%	58	0.57%

• Table 2.18 – IT Security/Information Assurance Certification Area Summary

Finally, Table 2.19 orders the percentage of responses in the moderate or extensive time variables for each occupational series. Only civil service (GS) series are included (excluding any foreign service responses).

Occupational Series	Total % Moderate or Extensive
GS-2210 Information Technology Management	56.64%
GS-334 Computer Specialist	49.34%
GS-340 Program Management	44.53%
GS-391 Telecommunications	44.28%
GS-854 Computer Engineering	41.18%
GS-1550 Computer Science	40.40%
GS-301 Miscellaneous Administration and Program	35.28%
GS-855 Electronics Engineering	34.54%
Other	33.66%
GS-343 Management and Program Analysis	23.29%

- Table 2.19 – Percentage of Extensive and Moderate Activity for IT Security/Information Assurance by Occupational Series (n = 19,701)

Knowledge Management

Table 2.20 lists the competencies related to the Knowledge Management specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. It appears the competency proficiencies are fairly strong for this specialized job activity.

Knowledge Management			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Knowledge Management	91.36%	76.36%	43.34%
Information Technology Architecture	73.56%	59.00%	34.75%
Organizational Awareness	96.37%	89.67%	71.58%
Strategic Thinking	88.33%	74.75%	46.04%
Business Process Engineering	73.02%	57.97%	32.30%

• Table 2.20 – Knowledge Management Competency Summary

Table 2.21 lists the skills related to the Knowledge Management specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that other than the Portal Development and possible Groupware skills, the proficiencies are adequate.

Knowledge Management			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Understanding/translating user reqts.	73.97%	63.42%	39.85%
Records Management	62.89%	41.17%	17.34%
Document Management	76.24%	61.34%	31.70%
Portal Development	34.90%	16.84%	5.24%
Groupware	44.19%	29.14%	11.42%

• Table 2.21 – Knowledge Management Skills Summary

No certification area(s) were related to this specialized job activity.

Finally, Table 2.22 orders the percentage of responses in the moderate or extensive time variables for each occupational series.

Occupational Series	Total % Moderate or Extensive
GS-2210 Information Technology Management	43.38%
GS-340 Program Management	42.34%
GS-301 Miscellaneous Administration and Program	42.19%
GS-343 Management and Program Analysis	40.91%
GS-391 Telecommunications	38.16%
GS-334 Computer Specialist	37.59%
GS-1550 Computer Science	34.83%
Other	34.39%
GS-854 Computer Engineering	33.73%
GS-855 Electronics Engineering	31.87%

- Table 2.22 – Percentage of Extensive and Moderate Activity for Knowledge Management by Occupational Series (n = 19,701)

IT Workforce Management/Development

Table 2.23 lists the competencies related to the IT Workforce Management/Development specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. The competency proficiencies appear to be very strong in this case, with the possible exception of the Human Factors competency.

IT Workforce Development/Management			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Managing Human Resources	88.63%	77.26%	46.81%
Organizational Awareness	94.40%	89.99%	71.98%
Administration & Management	89.44%	78.04%	47.21%
Legal, Government & Jurisprudence	72.09%	59.62%	37.24%
Human Factors	61.24%	47.71%	25.26%

• Table 2.23 – IT Workforce Management/Development Competency Summary

Table 2.24 lists the skill related to the IT Workforce Management/Development specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). This skill appears to have an adequate proficiency level.

IT Workforce Development/Management			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Data Analysis	68.07%	57.51%	39.77%

• Table 2.24 – IT Workforce Management/Development Skills Summary

No certification area(s) were related to this specialized job activity.

Finally, Table 2.25 orders the percentage of responses in the moderate or extensive time variables for each occupational series.

Occupational Series	Total % Moderate or Extensive
GS-340 Program Management	54.01%
GS-2210 Information Technology Management	43.73%
GS-391 Telecommunications	37.50%
GS-334 Computer Specialist	36.83%
GS-1550 Computer Science	36.07%
GS-301 Miscellaneous Administration and Program	35.46%
GS-854 Computer Engineering	33.33%
GS-855 Electronics Engineering	28.24%
GS-343 Management and Program Analysis	27.22%
Other	25.64%

• Table 2.25 – Percentage of Extensive and Moderate Activity for IT Workforce Management/Development by Occupational Series (n = 19,701)

Unexpectedly high numbers of respondents indicated that they spend moderate to extensive amount of time on this particular specialized job activity. One explanation may be that respondents interpreted that managerial and/or supervisory duties should be factored in to their response. In addition, a majority of Program Managers, GS-340 (as shown in Table 2.25) indicate they spend moderate or greater amounts of time on IT Workforce Management/ Development. This could be attributed to the typically greater personnel management responsibilities inherent in this position.

Records Management

Table 2.26 lists the competencies related to the Records Management specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. It appears that the level of competency proficiency is more than adequate for this activity.

Records Management			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Data Management	78.33%	70.38%	50.95%
Knowledge Management	82.74%	73.62%	48.82%
Legal, Government & Jurisprudence	70.57%	62.02%	38.78%
Database Management Systems	79.40%	68.61%	47.47%
Information Assurance	72.51%	66.17%	44.21%
Organizational Awareness	91.84%	89.02%	74.20%

• Table 2.26 – Records Management Competency Summary

Table 2.27 lists the skills related to the Records Management specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that the level of skill proficiency is adequate for the various time variables for this activity; however, the skill "Development Systems Analysis" would ideally be higher for the Extensive time variable.

Records Management			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Records Management	76.25%	51.64%	14.08%
Document Management	76.05%	63.61%	33.83%
Development Systems Analysis	58.66%	49.02%	32.41%
File Systems	77.32%	67.48%	46.00%
Understanding/translating user reqts.	66.89%	60.97%	44.07%
E-Mail	83.48%	82.19%	68.20%

• Table 2.27 – Records Management Skills Summary

Table 2.28 lists the certification area related to the Records Management specialized job activity, and shows the percentage of individuals within an indicated time variable (extensive, moderate, minimal or none) that possess the relevant certification.

Records Management						
	Time Spent					
Related Certifications	Extensive	%	Moderate	%	Minimal or none	%
Business Applications	60	4.01%	109	2.04%	137	1.05%

• Table 2.28 – Records Management Certification Area Summary

Finally, Table 2.29 orders the percentage of responses in the moderate or extensive time variables for each occupational series.

Occupational Series	Total % Moderate or Extensive
GS-340 Program Management	40.88%
GS-343 Management and Program Analysis	40.68%
GS-301 Miscellaneous Administration and Program	39.77%
GS-391 Telecommunications	38.03%
GS-2210 Information Technology Management	35.16%
GS-334 Computer Specialist	34.94%
Other	32.69%
GS-1550 Computer Science	21.98%
GS-854 Computer Engineering	20.00%
GS-855 Electronics Engineering	18.32%

- Table 2.29 – Percentage of Extensive and Moderate Activity for Records Management by Occupational Series (n = 19,701)

Privacy

Table 2.30 lists the competencies related to the Privacy specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. It appears that the level of competency proficiency is more than adequate for the various time variables for this activity

Privacy			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Legal, Government & Jurisprudence	79.61%	64.69%	39.25%
Information Assurance	87.48%	75.37%	41.91%
Information Systems/Network Security	79.96%	65.19%	31.42%
Data Management	83.09%	74.77%	50.88%
Organizational Awareness	95.80%	91.29%	74.38%

• Table 2.30 – Privacy Competency Summary

Table 2.31 lists the skills related to the Privacy specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that the level of proficiency for the skills "Cryptology" and "Biometrics" is low for the Extensive and Moderate time frames, and may require further development.

Privacy			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Understanding/translating user reqts.	74.15%	66.68%	43.11%
Document Management	76.39%	63.28%	36.59%
Systems security and user administration	80.05%	65.97%	31.88%
Authentication	64.94%	44.89%	17.96%
Cryptology	47.58%	28.72%	11.06%
Biometrics	31.31%	15.93%	4.89%

• Table 2.31 – Privacy Skills Summary

Table 2.32 lists the certification area related to the Privacy specialized job activity, and shows the percentage of individuals within an indicated time variable (extensive, moderate, minimal or none) that possess the relevant certification.

Privacy						
	Time Spent					
Related Certifications	Extensive	%	Moderate	%	Minimal or none	%
Information Systems Security	133	11.90%	253	5.48%	247	1.75%

• Table 2.32 – Privacy Certification Area Summary

Finally, Table 2.33 orders the percentage of responses in the moderate or extensive time variables for each occupational series.

Occupational Series	Total % Moderate or Extensive
GS-2210 Information Technology Management	32.77%
GS-340 Program Management	30.66%
GS-334 Computer Specialist	28.79%
GS-301 Miscellaneous Administration and Program	25.67%
GS-391 Telecommunications	25.13%
GS-343 Management and Program Analysis	22.82%
Other	22.57%
GS-1550 Computer Science	19.04%
GS-855 Electronics Engineering	17.94%
GS-854 Computer Engineering	16.86%

- Table 2.33 – Percentage of Extensive and Moderate Activity for Privacy by Occupational Series (n = 19,701)

Enterprise Architecture

Table 2.34 lists competencies related to the Enterprise Architecture specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of priority as determined by subject matter experts. It appears that the level of competency proficiency is more than adequate for the various time variables for this activity.

Enterprise Architecture			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Information Technology Architecture	88.48%	71.48%	34.87%
Information Resources Strategy and Planning	86.18%	75.91%	39.05%
Organizational Awareness	94.68%	91.73%	74.73%
Technology Awareness	89.75%	81.46%	48.59%
Infrastructure Design	81.41%	70.05%	38.71%

• Table 2.34 – Enterprise Architecture Competency Summary

Table 2.35 lists the skills related to the Enterprise Architecture specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that the level of proficiency for the skill "Reusable Modules" is low for the Extensive and Moderate time frames, and may require further development.

Enterprise Architecture			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Federal/OMB Enterprise Architecture	62.43%	32.92%	5.33%
Development Systems Analysis	71.96%	57.86%	30.59%
Reusable Modules	45.19%	32.75%	14.53%
Network Architecture and Design	69.58%	54.60%	23.87%

• Table 2.35 – Enterprise Architecture Skills Summary

No certification area(s) were related to this specialized job activity.

Finally, Table 2.36 orders the percentage of responses in the moderate or extensive time variables for each occupational series.

Occupational Series	Total % Moderate or Extensive
GS-340 Program Management	32.85%
GS-2210 Information Technology Management	30.62%
GS-854 Computer Engineering	27.65%
GS-334 Computer Specialist	27.31%
GS-1550 Computer Science	26.16%
GS-391 Telecommunications	23.94%
GS-855 Electronics Engineering	22.71%
GS-301 Miscellaneous Administration and Program	22.62%
Other	17.34%
GS-343 Management and Program Analysis	16.92%

- Table 2.36 – Percentage of Extensive and Moderate Activity for Enterprise Architecture by Occupational Series (n = 19,701)

Solutions Architecture

Table 2.37 lists the competencies related to the Solutions Architecture specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. It appears that the level of competency proficiency is more than adequate for the various time variables for this activity.

Solutions Architecture			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Information Technology Architecture	86.14%	73.19%	34.62%
Information Resources Strategy and Planning	82.45%	74.15%	39.92%
Infrastructure Design	81.08%	71.13%	38.46%
Systems Life Cycle	88.45%	78.81%	44.87%
Requirements Analysis	88.45%	80.01%	45.33%

• Table 2.37 – Solutions Architecture Competency Summary

Table 2.38 lists the skills related to the Solutions Architecture specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that the level of proficiency for the skills "Federal/OMB Enterprise Architecture" and "Reusable Modules" is low for the Extensive and Moderate time frames, and may require further development.

Solutions Architecture			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Federal/OMB Enterprise Architecture	46.35%	31.34%	7.14%
Development Systems Analysis	78.27%	63.93%	28.32%
Reusable Modules	56.03%	37.17%	12.25%
Network Architecture and Design	69.89%	56.75%	23.24%
Network Configuration and Design	68.95%	57.47%	26.75%

• Table 2.38 – Solutions Architecture Skills Summary

Table 2.39 lists the certification area related to the Solutions Architecture specialized job activity, and shows the percentage of individuals within an indicated time variable (extensive, moderate, minimal or none) that possess the relevant certification.

Solutions Architecture						
	Time Spent					
Related Certifications	Extensive	%	Moderate	%	Minimal or none	%
Information Systems	76	5.49%	115	2.93%	159	1.10%

• Table 2.39 – Solutions Architecture Certification Area Summary

Finally, Table 2.40 orders the percentage of responses in the moderate or extensive time variables for each occupational series.

Occupational Series	Total % Moderate or Extensive
GS-854 Computer Engineering	32.16%
GS-2210 Information Technology Management	30.48%
GS-1550 Computer Science	29.10%
GS-334 Computer Specialist	27.67%
GS-855 Electronics Engineering	27.29%
GS-391 Telecommunications	26.73%
GS-340 Program Management	23.36%
Other	17.79%
GS-301 Miscellaneous Administration and Program	17.68%
GS-343 Management and Program Analysis	11.33%

- Table 2.40 – Percentage of Extensive and Moderate Activity for Solutions Architecture by Occupational Series (n = 19,701)

E-Government

Table 2.41 lists the competencies related to the E-Government specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. It appears that the level of competency proficiency is adequate for the various time variables for this activity.

E-Government			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
eCommerce	79.55%	66.19%	35.08%
Information Technology Architecture	67.73%	60.71%	40.33%
Technology Awareness	80.30%	73.83%	52.19%
Information Resources Strategy and Planning	75.29%	66.99%	43.22%

• Table 2.41 – E-Government Competency Summary

Table 2.42 lists the skills related to the E-Government specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that the level of proficiency for the skills "Portal Development" and to some extent "Federal/OMB Enterprise Architecture" is fairly low for the Extensive and Moderate time frames, and may require further development.

E-Government			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Development Systems Analysis	71.96%	57.86%	30.59%
Federal/OMB Enterprise Architecture	62.43%	32.92%	5.33%
Portal Development	42.57%	22.63%	5.62%
Understanding and translating user requirements	78.63%	68.66%	42.68%

• Table 2.42 – E-Government Skills Summary

Table 2.43 lists the certification area(s) related to the E-Government specialized job activity, and shows the percentage of individuals within an indicated time variable (extensive, moderate, minimal or none) that possess a relevant certification.

eGovernment						
	Time Spent					
Related Certifications	Extensive	%	Moderate	%	Minimal or none	%
CIO	61	4.85%	85	2.07%	81	0.56%
Project Management	65	5.16%	202	4.91%	275	1.90%

• Table 2.43 – E-Government Certification Area Summary

Finally, Table 2.44 orders the percentage of responses in the moderate or extensive time variables for each occupational series.

Occupational Series	Total % Moderate or >
GS-340 Program Management	42.34%
GS-301 Miscellaneous Administration and Program	30.61%
GS-343 Management and Program Analysis	28.32%
GS-2210 Information Technology Management	26.17%
GS-334 Computer Specialist	25.43%
Other	23.14%
GS-391 Telecommunications	21.41%
GS-1550 Computer Science	19.81%
GS-854 Computer Engineering	18.82%
GS-855 Electronics Engineering	15.84%

- Table 2.44 – Percentage of Extensive and Moderate Activity for E-Government by Occupational Series (n = 19,701)

Capital Planning and Investment

Table 2.45 lists the competencies related to the Capital Planning and Investment specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate, Advanced, and Expert) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Competencies are listed in order of their priority or relevance as determined by subject matter experts. It appears that the level of competency proficiency is more than adequate for the various time variables for this activity.

Capital Planning and Investment			
	% Intermediate or Greater Proficiency		
Related Competencies	Extensive	Moderate	Minimal or none
Capital Planning and Investment	91.90%	68.82%	24.75%
Information Resources Strategy and Planning	85.04%	73.90%	40.77%
Systems Life Cycle	84.95%	76.17%	46.80%
Financial Management	91.01%	82.18%	38.05%

- Table 2.45 – Capital Planning and Investment Competency Summary

Table 2.46 lists the skills related to the Capital Planning and Investment specialized job activity, and shows the percentage of responses for the intermediate or greater (e.g., Intermediate and Advanced) proficiency levels for the indicated time variable (extensive, moderate, minimal or none). Skills are listed in order of their priority or relevance. It appears that the level of proficiency for the skill "Federal/OMB Enterprise Architecture" is fairly low for the Extensive and Moderate time frames, and may require further development.

Capital Planning and Investment			
	% Intermediate or Greater Proficiency		
Related Skills	Extensive	Moderate	Minimal or none
Federal/OMB Enterprise Architecture	54.59%	30.90%	7.48%

- Table 2.46 – Capital Planning and Investment Skills Summary

No certification area(s) were related to this specialized job activity.

Finally, Table 2.47 orders the percentage of responses in the moderate or extensive time variables for each occupational series.

Occupational Series	Total % Moderate or Extensive
GS-340 Program Management	47.45%
GS-391 Telecommunications	34.84%
GS-301 Miscellaneous Administration and Program	31.24%
GS-855 Electronics Engineering	28.44%
GS-343 Management and Program Analysis	25.89%
GS-854 Computer Engineering	25.88%
GS-2210 Information Technology Management	24.60%
GS-1550 Computer Science	22.76%
GS-334 Computer Specialist	21.31%
Other	19.95%

- Table 2.47 – Percentage of Extensive and Moderate Activity for Capital Planning and Investment by Occupational Series (n = 19,701)

Chapter
3 Summary

Clinger-Cohen Assessment Survey (2003)

Analysis of Survey Results

3.1 Introduction

This Chapter summarizes high-level conclusions based on the key survey findings and presents a set of recommendations and lessons learned.

3.2 Conclusions

Demographic Conclusions

There appears to be an aging IT workforce with few younger individuals to replace the older ones. For example, approximately 76% of the IT workforce responded that they are older than 40, while roughly 5% indicated they were under 30 years old. Although the workforce is aging, it appears that some of those closest to retirement (0 – 3 years) do not plan on retiring when they are eligible.

Respondents indicate that they have very little private sector experience. To the extent that certain private sector experiences are desirable in the Federal IT workforce, exchanges between government and industry should be fostered. Such exchanges also could go beyond skill development to improving partnering between the private and public sector.

There seems to be a fair amount of mobility between public sector organizations, but not between the public and private sector.

The grade level profile appropriately reflects the management-oriented nature of Government IT work. For example, over 75% of respondents indicate they are GS-12s or higher. While it cannot be assumed that all of these respondents have supervisory duties, a large number of these individuals are involved in project management activities, according to survey results.

SES is the only grade level where the impact of retirements could be felt more imminently. For example, nearly half of SES respondents indicated they would be likely to retire in the next six years.

Competency and Skill Conclusions

Based on self-assessments, competency proficiencies were rated higher than skill proficiencies. This could reflect that the workforce, in general, is equipped to handle complex jobs/activities without the need to understand how a particular technology works. It could also mean that the work is less operationally-focused, so skills may not be as central to the job as competencies. It is also possible that the workforce has not been given the opportunity (through training, certification, etc.) to stay abreast of skills related to rapidly changing technologies, or the skills may be related to functions that are typically outsourced.

Certain competencies (Capital Planning and Investment Assessment, Contracting/Procurement, and Financial Management) and skills (Federal/OMB Enterprise Architecture, Biometrics, Portal Development) that relate to high priority specialized job activities, as well as the evolving mission needs of the Federal Government, may need development.

General competencies were rated somewhat higher than technical competencies. This is not unexpected given that these competencies are required across jobs over a longer period, allowing for increased proficiency to develop.

Certification Conclusions

Very few respondents were certified in any given area. Generally, more respondents are certified in "holistic" areas (e.g., Project Management, CIO) versus technology-specific areas (e.g., DCG Mux, Lucent, Linux).

Specialized Job Activity Conclusions

The amount of time respondents spend on IT Project Management and IT Security/Information Assurance is commensurate with the high priority placed on them. While Solutions Architecture, Enterprise Architecture, Capital Planning and Investment, and E-Government are high priority activities, the amount of time respondents spend on these activities is relatively low. Relatively high numbers of respondents indicated that they spend a moderate to extensive amount of time on IT Workforce Management/ Development.

The two most important specialized job activity areas (IT Project Management and IT Security/Information Assurance) have adequate levels of proficiency in competencies, but may need focus to on developing the skills and certifications needed to perform these activities successfully.

3.3 Recommendations

1. Perform Governmentwide Strategic Human Capital Planning

The CIOC Workforce and Human Capital for IT Committee should work with the OPM Human Capital Leadership and Merit System Accountability (HCLMSA) Division and the Chief Human Capital Officer's (CHCO) Council to develop a Governmentwide IT workforce Strategic Human Capital Plan to build capacity and fill skills gaps, understanding that the CCA survey results form the "as is" state. A "to be" state would need to be identified to allow for comparisons between the two, resulting in a "gap analysis" and the formulation of gap mitigation strategies.

Agencies should engage in systematic workforce planning efforts to identify mission critical IT occupations, the associated mission critical competencies, and the proficiency levels required today and in the future, based on strategic priorities. Each agency's assessment of their current workforce should identify skills imbalances, as well as areas where strategic competencies may lack the depth necessary to attain agency priorities.

2. Incorporate Human Capital Elements into the Federal Enterprise Architecture

The CIOC Workforce and Human Capital for IT Committee should work with the CIOC Federal Architecture and Infrastructure Committee (AIC) to incorporate human capital elements into the Federal Enterprise Architecture (FEA). The FEA is a business-based framework for Governmentwide improvement. It is composed of several models: a Performance Reference Model, Business Reference Model, Service Component Reference Model, Data and Information Reference Model, and a Technical Reference Model. Human capital elements should be added to the Business Reference Model as an enhancement to the Human Resource Management activity. This will focus agencies on this critical aspect of resource planning and management.

3. Continue to Develop the IT Workforce

Career Development

The CIOC Workforce and Human Capital for IT Committee, working with OPM, should further develop an integrated IT workforce career development program. There are pieces of this program already developed or in process, including the IT Workforce Development Roadmap, the IT Exchange Program, and mentoring programs. The parts should be integrated into a more cohesive "whole." Implementing targeted incentive programs that would facilitate mobility between the public and private sector should also be considered.

Guidelines for Experience, Credentials and Certification

The CIOC Workforce and Human Capital for IT Committee should evaluate the need for and consider providing structure and potential guidelines for the types of experience, credentials and certification important for successful performance in certain mission critical IT occupations.

Training & Education

Agencies should utilize Government-funded central resources (e.g., the Gov Online Learning Center) as a way to create economies of scale in providing training opportunities for the IT Workforce.

4. Devise Knowledge Management Strategies

Agencies should identify pockets of expertise (e.g., IT Project Management) and devise knowledge management strategies and methods to capture and share knowledge of the current and departing IT workforce within and between agencies.

5. Convert Remaining Computer Specialists, GS-0334

Agencies should convert all remaining Computer Specialists, GS-0334s, to the Information Technology Management, GS-2210 series. The Computer Specialist GS-0334 series was abolished in May 2001 and replaced by the IT Management GS-2210 series, a part of the Job Family Position Classification Standard for Administrative Work in the Information Technology Group, GS-2200. Converting the remaining Computer Specialists to the appropriate parenthetical titles within the IT Management series will provide a more accurate reflection of the Federal IT workforce.

3.4 Lessons Learned

Because this was the first administration of the CCA survey, many lessons were learned regarding its content, timing, presentation and administration. This section presents a summary of lessons learned that should be considered for incorporation into future CCA surveys.

General

1. Include a management perspective. In the future, the survey will include a management assessment of what competency and skill proficiencies are needed as well as what the workforce currently has, rather than relying solely on respondents' self-assessments. Also, that perspective could include identifying which certification areas are required, and the amount of time the IT workforce needs to spend on specialized job activities. This will help to paint a more realistic picture of the workforce profile, and will inform workforce planning efforts.

2. Consider a "total workforce" approach that includes military members and contractors. Some Departments utilize members of the military to perform certain IT functions, and most (if not all) Departments outsource certain IT functions. By including these critical members of the IT workforce in the assessment process, a more complete analysis of the current activity of the workforce can be conducted. However, the logistics, legality, and other issues pertaining to this recommendation might be difficult to overcome and may warrant analyzing these facets separately.

3. Expand communications and outreach via a formal marketing plan. Considering the short time frame involved in designing, developing, and informing the workforce about the 2003

survey, the efforts to market and/or communicate (via posters and other incentives) were quite effective. However, other outreach opportunities that could have been taken advantage of, may have been missed. For future surveys, a formal marketing plan should be developed that outlines the audience, message, and media to be used to ensure maximum participation and understanding of the survey's relevance to various stakeholders.

Survey Administration

1. Explore options to more effectively identify the IT workforce. Ideally, the IT workforce is classified in traditional IT-related occupational series such as GS-2210 IT Management, GS-0854 Computer Engineer, and GS-1550 Computer Scientist. Often, however, it is difficult to associate workers in other occupational series performing IT-related duties as part of the IT workforce. Identifying and tracking the IT workforce is in the best interests of each individual Department/Agency because of its workforce planning and human capital management responsibilities. Because each Department/Agency has differing IT-related missions (and thus different approaches to "classifying" its IT workforce), tracking the IT workforce centrally would be difficult and thus should ultimately be each agency's individual responsibility. The CIOC, the Chief Human Capital Officers, and OPM should work together to explore options to more effectively identify the IT workforce (such as issuing guidance to the Departments, examining changes to the classification system, or studying the feasibility of a centralized data source).

2. Make it easier for individual Departments/Agencies to work with raw survey data. Individual Department/Agency points of contact were provided raw survey data in Microsoft Access database that included a large set of preformatted queries. It was assumed that these points of contact would have the necessary skills to open the database and navigate the queries, but this was not universally true. Provisions should therefore be made to ensure points of contact are supported through training, assistance or other help desk-type activities.

3. Time the survey earlier in the year to avoid the end of the Government fiscal year. As the survey was administered during the month of September, many employees who may have otherwise responded were immersed in end-of-fiscal-year activities. This particularly impacted those employees involved in capital planning activities. Therefore, timing the survey to occur at a time of relative workload stability (if such a time actually exists) would allow for maximum participation.

4. Allow for a longer time frame (perhaps two months) to administer the survey. The original time frame for the survey to be open was three weeks; this was expanded to four after the Government shut down due to Hurricane Isabel. Many Departments/Agencies asked for more time for their employees to complete the survey, which was not feasible due to deadlines for data submission. In retrospect, having more time would most certainly have increased the number of survey responses and, by extension, the response rate. While not as much of a factor at the Government level, this would have improved individual Department/Agency response rates and permitted more robust analyses.

5. Allow the user to print out a copy of their survey responses. This will increase users' satisfaction by giving them a tangible outcome for their efforts. In addition, it may help them track personal skill and competency progression, especially if the printout encourages them to take the same information and apply it to the IT Workforce Development Roadmap.

Demographics

1. Improve method through which Departments/Agencies are identified to participate in the survey. As mentioned in Chapter 2, the list of Departments/Agencies was derived from OPM's Fedscope database. Although it was a valuable resource, this database did not include all organizations that participated in the survey, and did not list (other than at the Cabinet level) second and third layers of an organization. The CIOC worked with Department/Agency points of contact to determine the layers of organization, with mixed results. A more efficient means of outlining organizational structure and refining the list of organizations is needed.

2. Consider adding race and gender to the set of demographic questions. Adding such demographic questions may help to provide a different perspective of analysis of survey results, and could help in determining intervention strategies based on such factors.

Competencies and Skills

1. Add frequency of use and importance dimensions to competencies and skills. In addition to asking respondents to provide an assessment of their current proficiency in competencies and skills, it would be useful to have them rate how often (frequency of use) they use the competency/skill and how important it is to successful job performance, both today and in the future. This will improve how the results can be used for workforce planning efforts.

2. Define and refine skills. The survey included a list of 80 skills, but did not include definitions for the skills as was done for the competencies. Including skill definitions will greatly aid respondents when determining their level of proficiency. In addition, the list could be pared down by including only those skills that are central to the Government's IT mission.

3. Limit the list of competencies and skills. Some respondents indicated that the length of the lists of competencies and skills were too long. In fact, the amount of time it took to complete the self-assessment of proficiencies caused "time outs" in some users' browser sessions, causing them to lose their inputs. Limiting the list (as was explained above) to only the most critical competencies and skills would most likely decrease resistance to completing the survey and result in fewer lost sessions.

4. Provide definitions for the proficiency level rating scale used, as was done for the competencies. Such definitions could actually be a subset of those used for competencies. This will help respondents provide a more accurate self-assessment.

Certifications

1. Include the wording "or equivalent" to cover unspecified certification examples. When designing the certification section of the survey, it was recognized that it would be nearly impossible to accurately identify all possible certifications, so certification "areas" with illustrative examples were used. It is possible that respondents had certifications that were not listed as part of the examples and thus did not indicate they have a certification in that respective area. More clarification is needed that indicates the list is not all-inclusive, and that respondents should consider certifications of an equivalent nature.

2. Include Department of Defense (DoD)-specific certifications as examples that relate to certification areas. DoD has specific certifications that were not included as examples,

especially in the area of project management. This may have resulted in fewer responses for certain certifications. Including DoD-specific certification examples would ensure more accurate results.

Specialized Job Activities

1. Define the relationship of competencies, skills and certifications to specialized job activities as part of survey design. Such relationships were defined after the survey was completed, and involved a different set of subject matter experts than those who formulated the content areas. The relationships should be included as part of the more formalized survey design to ensure that the appropriate relationships are established and that they are comprehensive.

2. Ensure that users understand that the Enterprise Architecture specialized job activity applies to their organization, not just at the Federal level. As noted in the conclusions above, respondents indicated that they spent relatively little time in the "Enterprise Architecture" specialized job activity. This may reflect a perception or assumption that this meant Enterprise Architecture activities only are conducted at the Federal level; however, it should include activities conducted for their organization. Guidance to that effect should be made clearer to respondents.

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Appendix

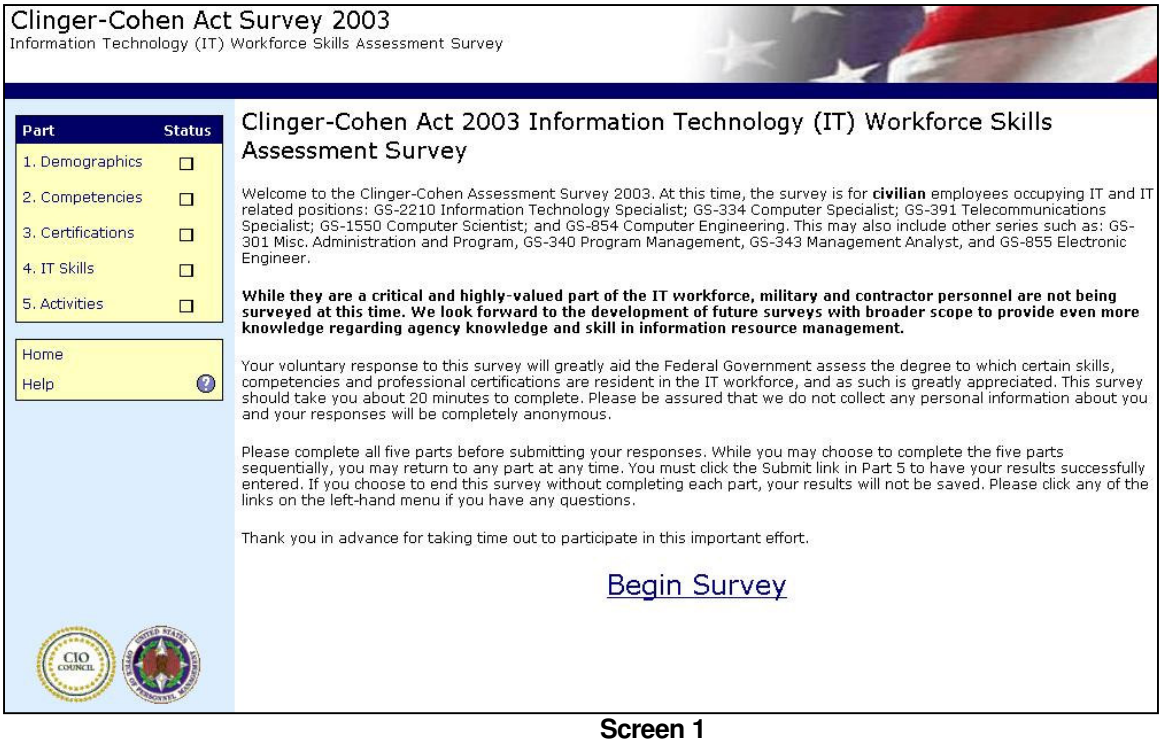
A Survey Information

Clinger-Cohen Assessment Survey (2003)

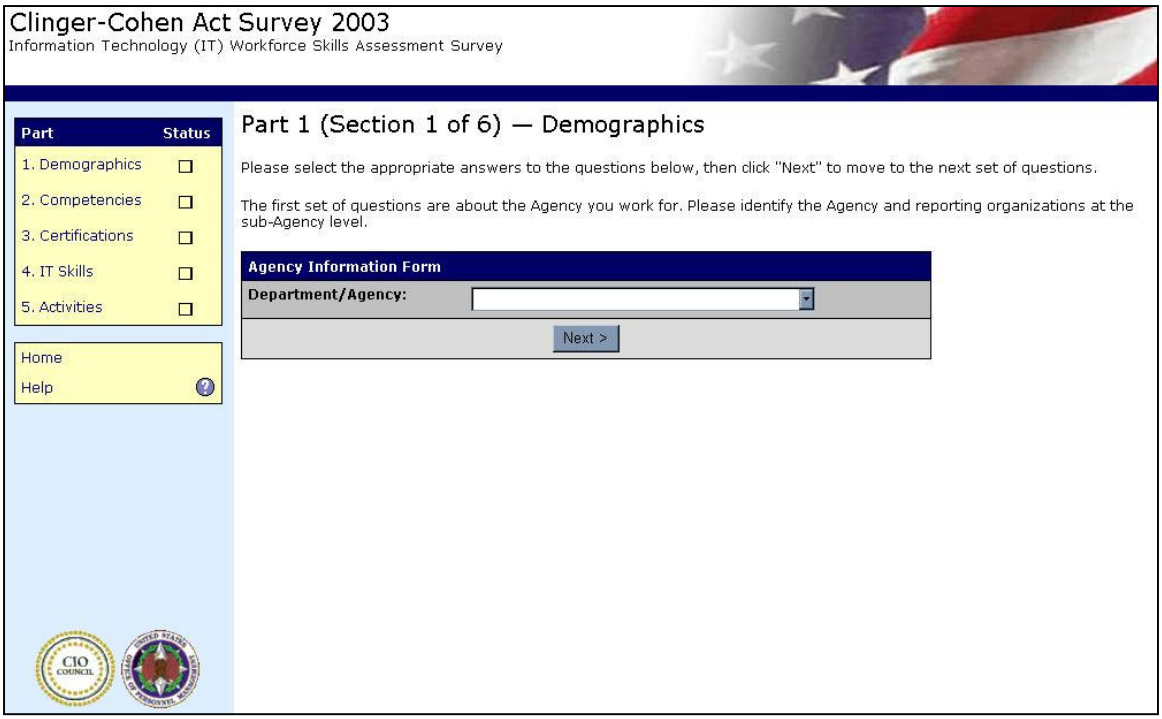
Analysis of Survey Results

A.1 Survey Screen Captures

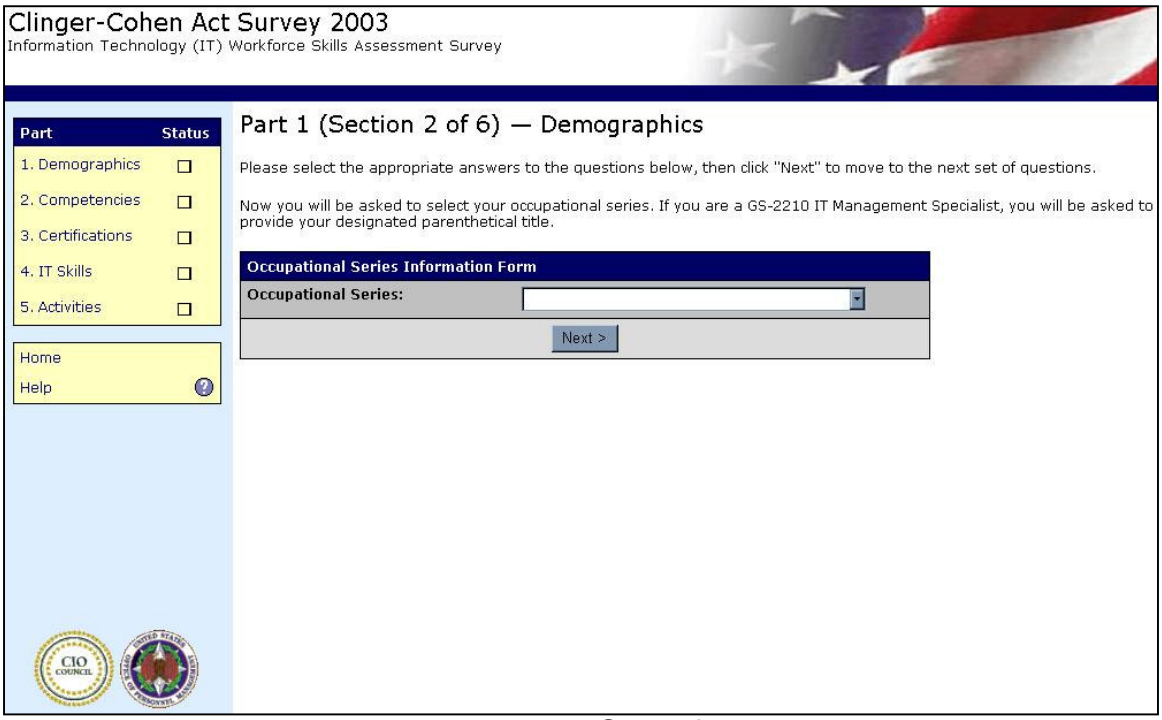
This Appendix provides screen captures of the actual survey. The screen captures are presented chronologically based on how a user would complete the survey.



Screen 1



Screen 2



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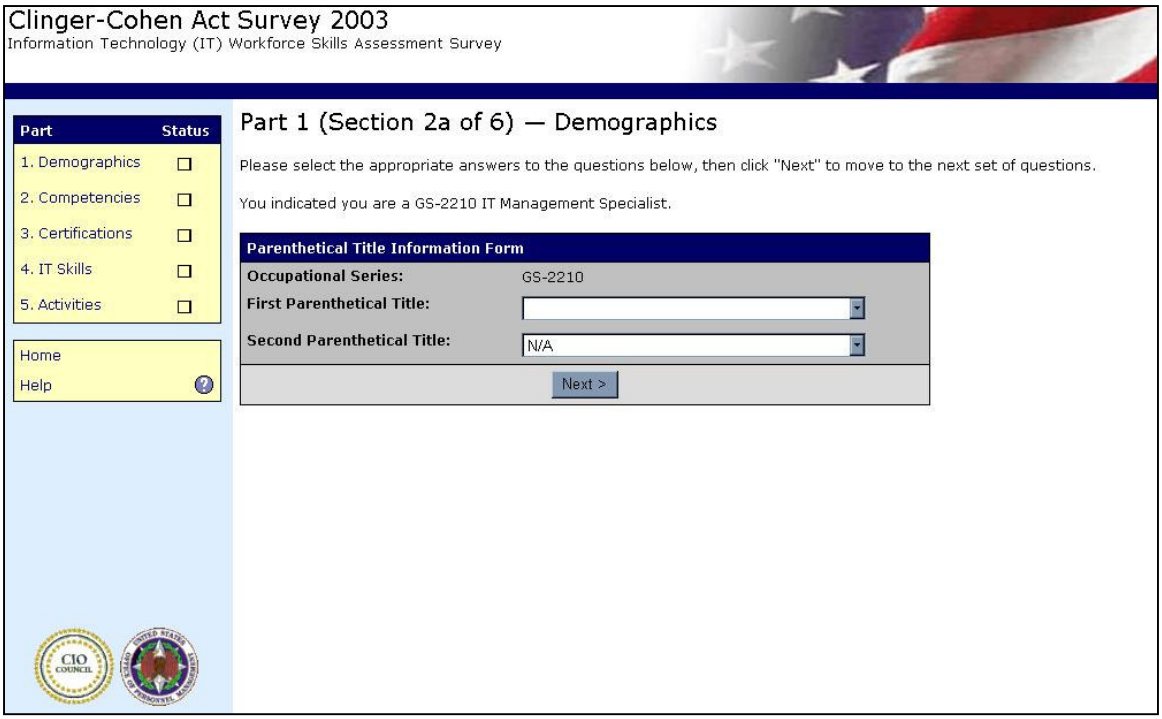

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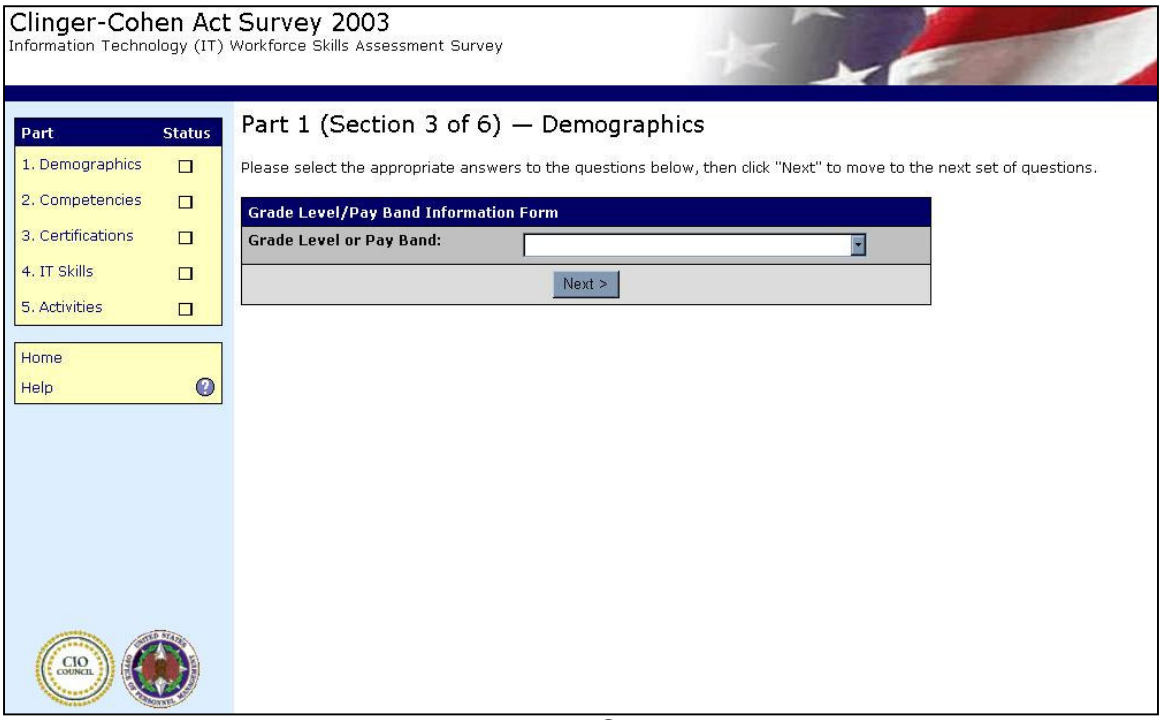
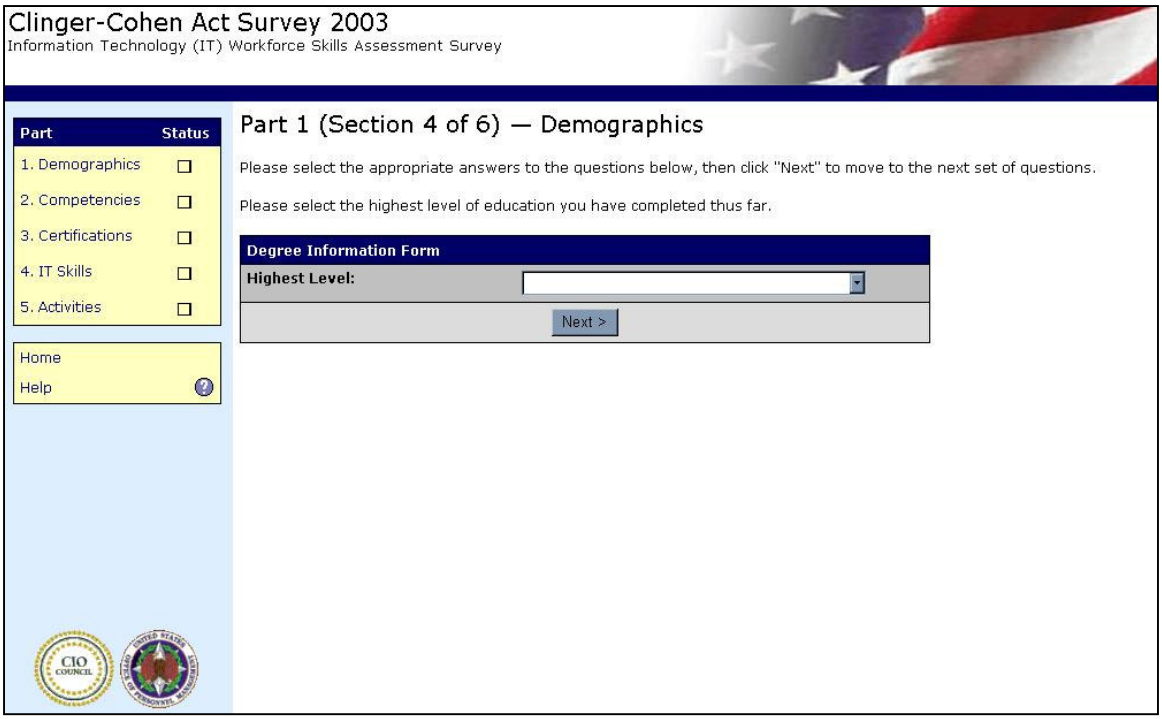
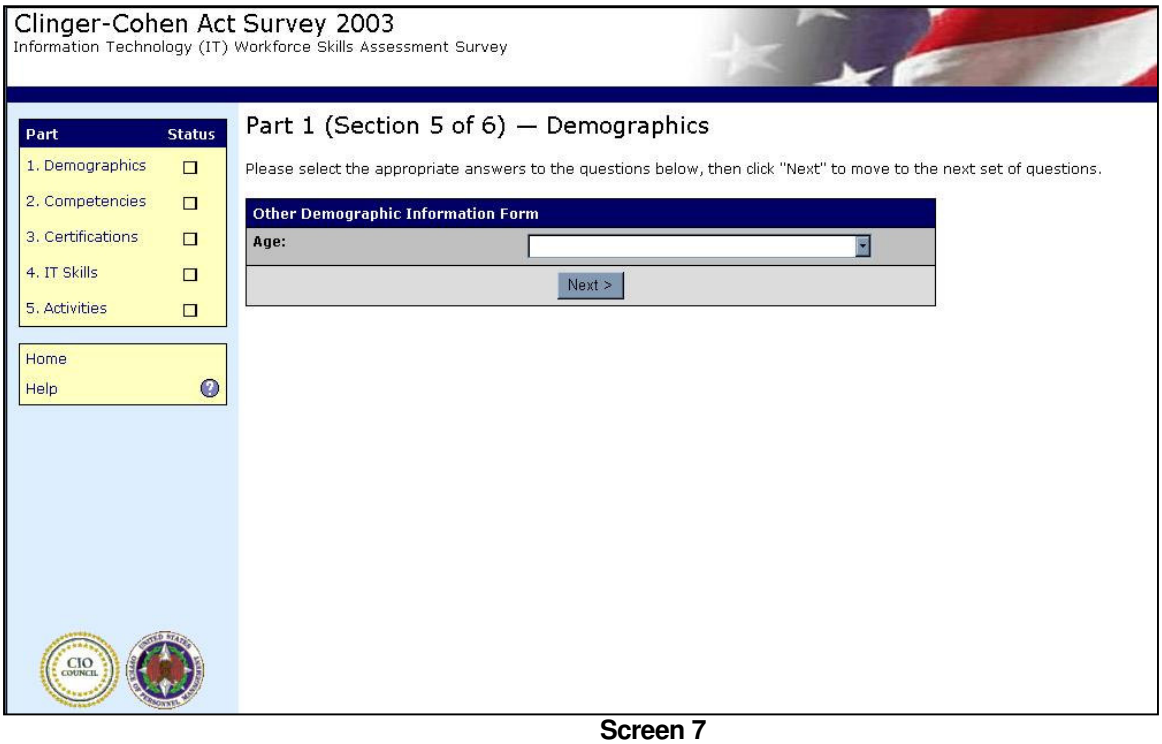


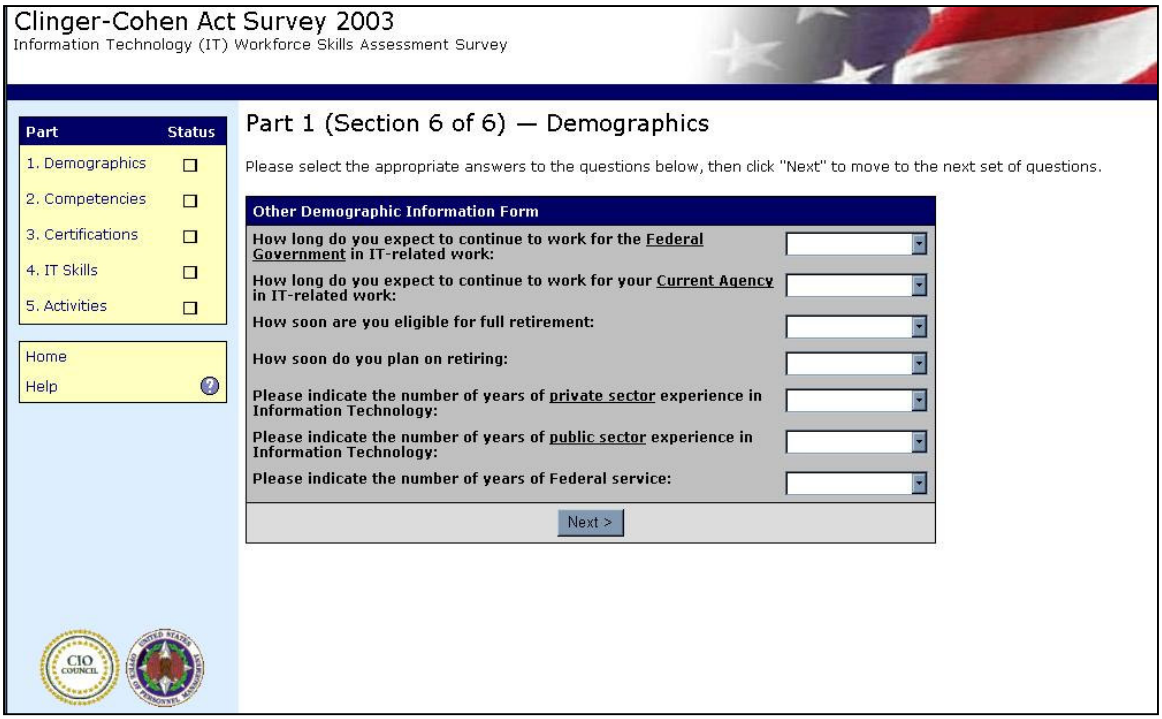
Screen 5



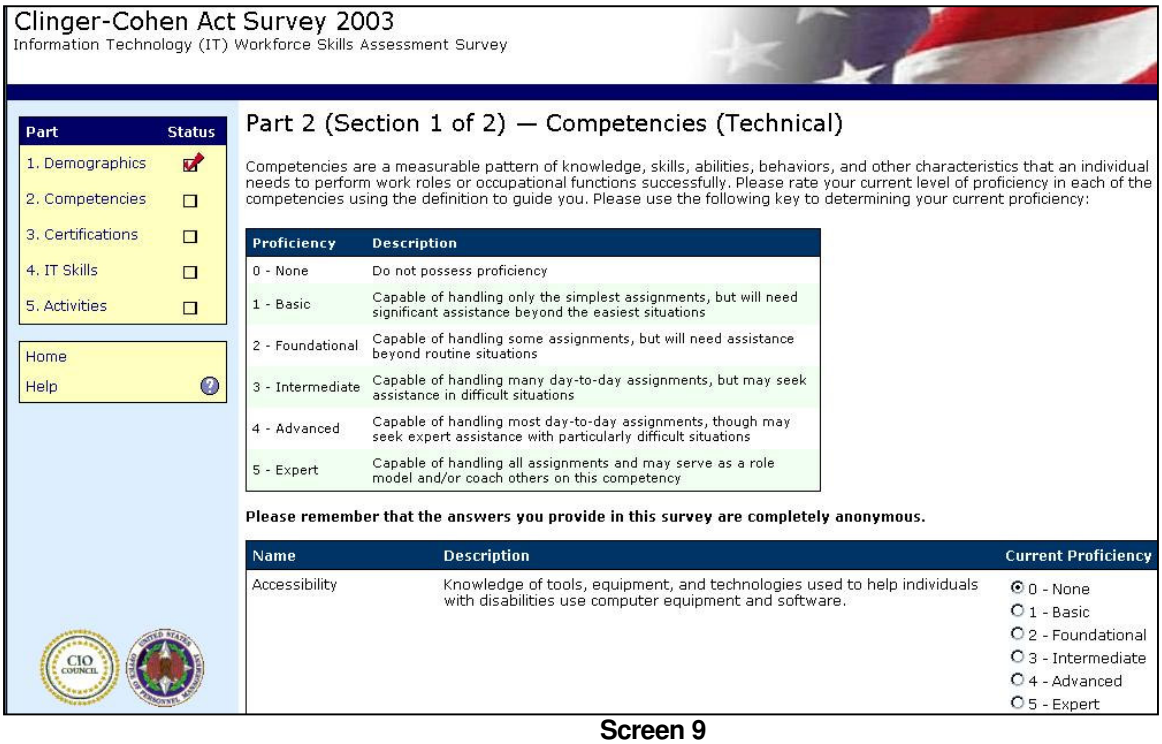
Screen 6



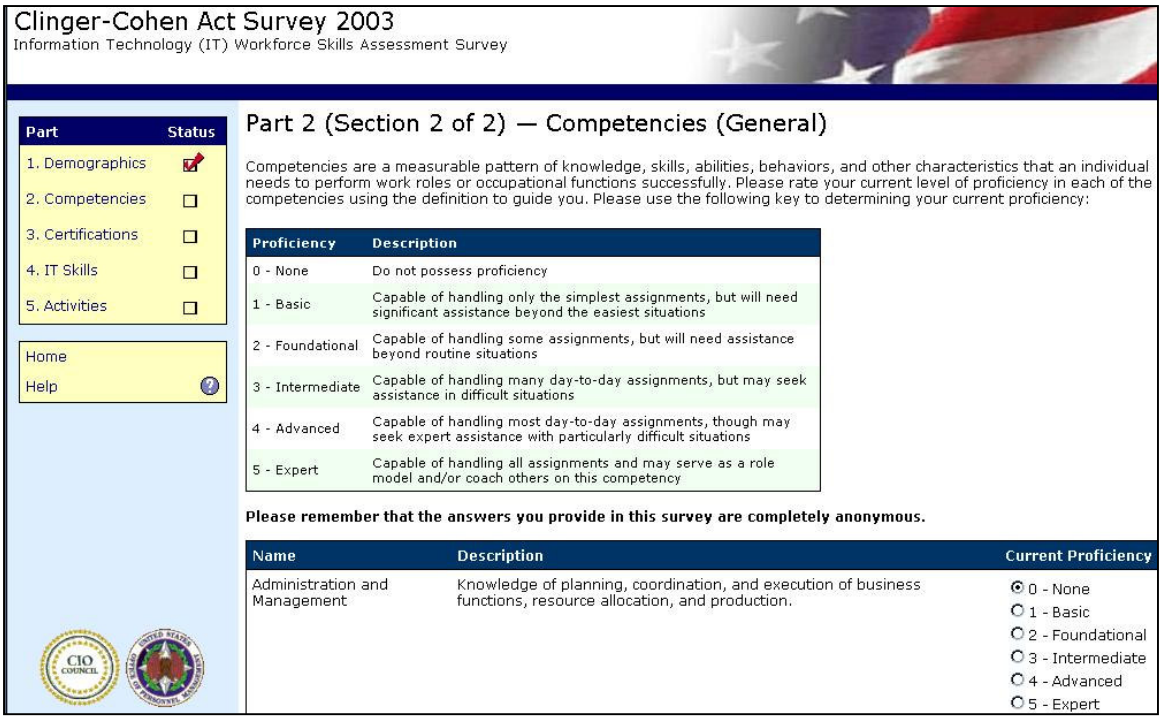
Screen 7



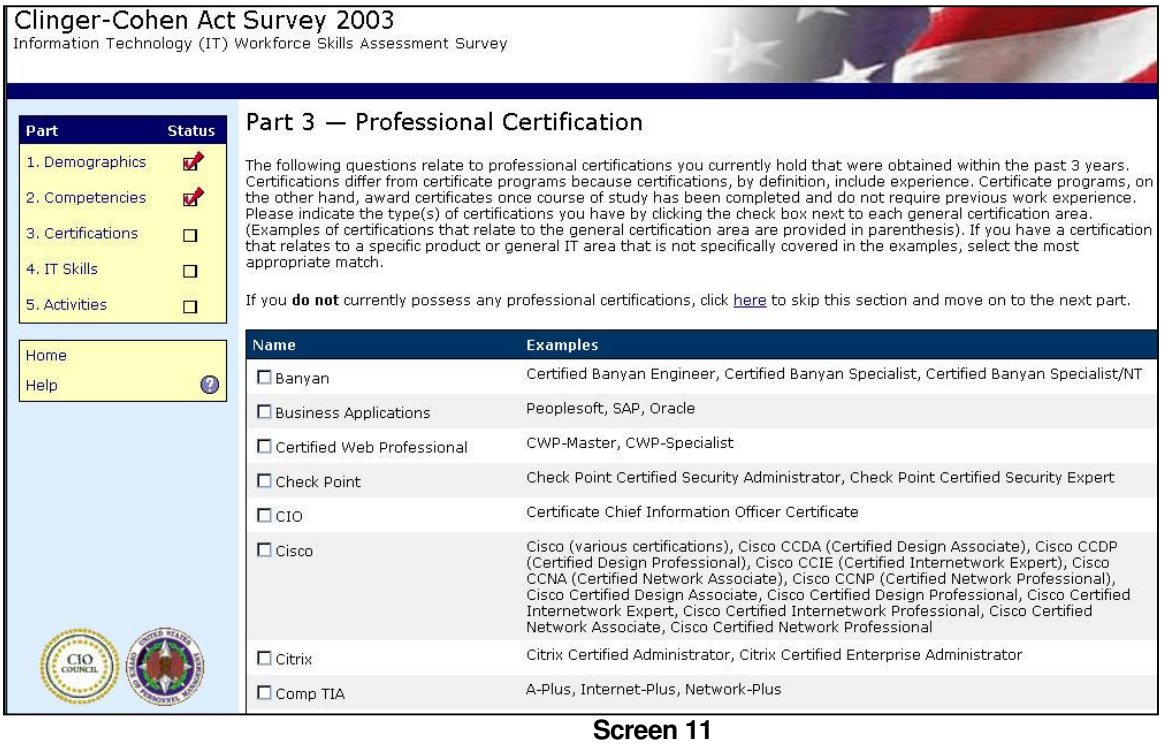
Screen 8



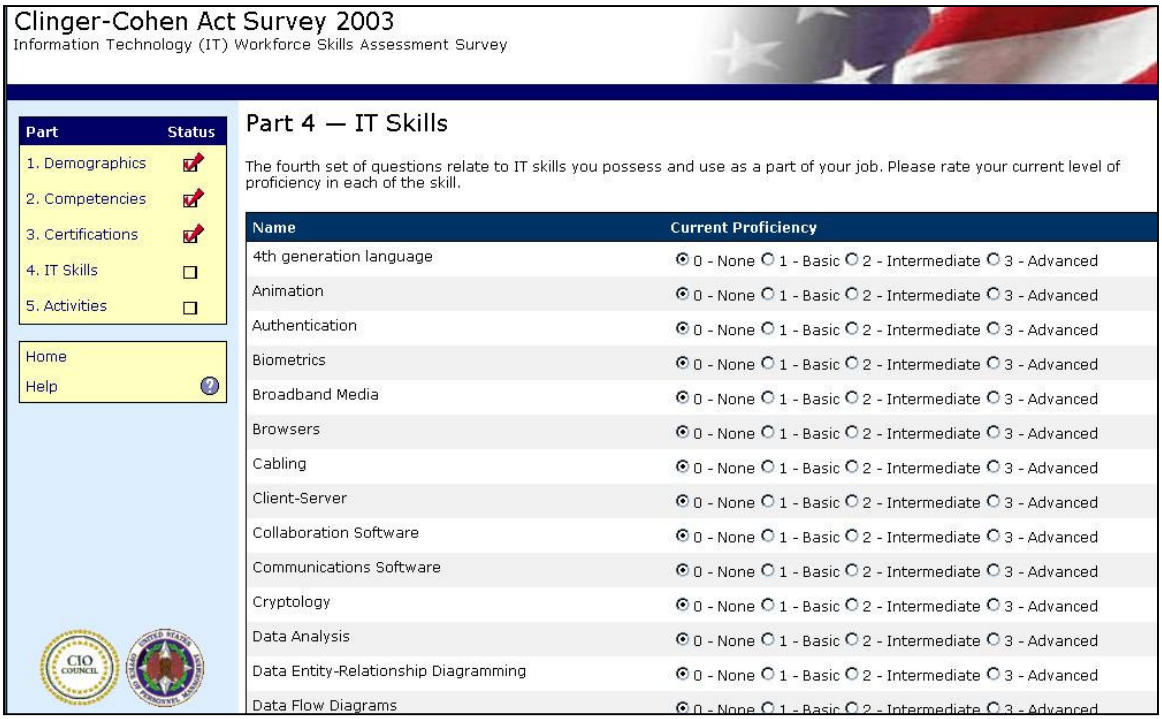
Screen 9



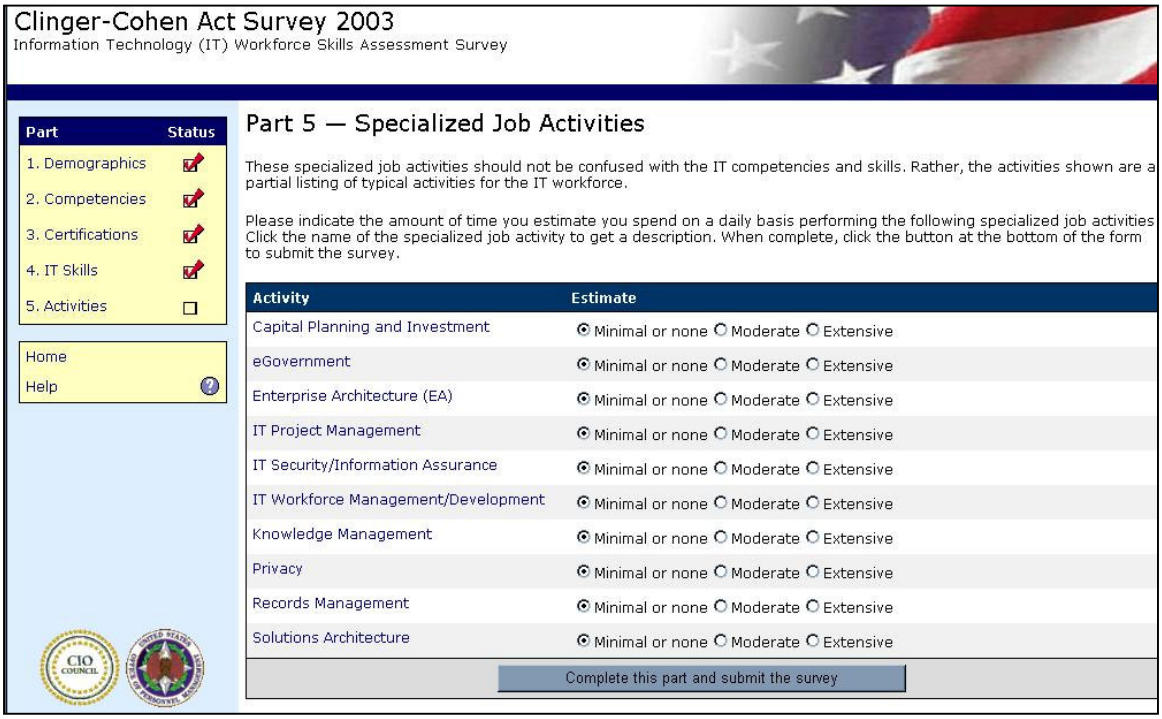
Screen 10



Screen 11



Screen 12



Screen 13

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Appendix

B Competencies

Clinger-Cohen Assessment Survey (2003)

Analysis of Survey Results

B.1 List of General Competencies and Their Definitions

1. **Administration and Management** - Knowledge of planning, coordination, and execution of business functions, resource allocation, and production.
2. **Contracting/Procurement** - Knowledge of various types of contracts, techniques for contracting or procurement, and contract negotiation and administration.
3. **Customer Service** - Works with clients and customers (that is, any individuals who use or receive the services or products that your work unit produces, including the general public, individuals who work in the agency, other agencies, or organizations outside the Government) to assess their needs, provide information or assistance, resolve their problems, or satisfy their expectations; knows about available products and services; is committed to providing quality products and services.
4. **Decision Making** - Makes sound, well-informed, and objective decisions; perceives the impact and implications of decisions; commits to action, even in uncertain situations, to accomplish organizational goals; causes change.
5. **Financial Management** - Prepares, justifies, and/or administers the budget for program areas; plans, administers, and monitors expenditures to ensure cost-effective support of programs and policies; assesses financial condition of an organization.
6. **Influencing/Negotiating** - Persuades others to accept recommendations, cooperate, or change their behavior; works with others towards an agreement; negotiates to find mutually acceptable solutions.
7. **Interpersonal Skills** - Shows understanding, friendliness, courtesy, tact, empathy, concern, and politeness to others; develops and maintains effective relationships with others; may include effectively dealing with individuals who are difficult, hostile, or distressed; relates well to people from varied backgrounds and different situations; is sensitive to cultural diversity, race, gender, disabilities, and other individual differences.
8. **Leadership** - Influences, motivates, and challenges others; adapts leadership styles to a variety of situations.
9. **Legal, Government and Jurisprudence** - Knowledge of laws, legal codes, court procedures, precedents, legal practices and documents, government regulations,

executive orders, agency rules, government organization and functions, and the democratic political process.

10. **Managing Human Resources** - Plans, distributes, coordinates, and monitors work assignments of others; evaluates work performance and provides feedback to others on their performance; ensures that staff are appropriately selected, utilized, and developed, and that they are treated in a fair and equitable manner.
11. **Oral Communication** - Expresses information (for example, ideas or facts) to individuals or groups effectively, taking into account the audience and nature of the information (for example, technical, sensitive, controversial); makes clear and convincing oral presentations; listens to others, attends to nonverbal cues, and responds appropriately.
12. **Organizational Awareness** - Knows the organization's mission and functions, and how its social, political, and technological systems work and operates effectively within them; this includes the programs, policies, procedures, rules, and regulations of the organization.
13. **Planning and Evaluation** - Organizes work, sets priorities, and determines resource requirements; determines short- or long-term goals and strategies to achieve them; coordinates with other organizations or parts of the organization to accomplish goals; monitors progress and evaluates outcomes.
14. **Problem Solving** - Identifies problems; determines accuracy and relevance of information; uses sound judgment to generate and evaluate alternatives, and to make recommendations.
15. **Public Safety and Security** - Knowledge of the military, weaponry, and intelligence operations; public safety and security operations; occupational health and safety; investigation and inspection techniques; or rules, regulations, precautions, and prevention techniques for the protection of people, data, and property.
16. **Strategic Thinking** - Formulates effective strategies consistent with the business and competitive strategy of the organization in a global economy. Examines policy issues and strategic planning with a long-term perspective. Determines objectives and sets priorities; anticipates potential threats or opportunities.

B.2 List of Technical Competencies and Their Definitions

1. **Accessibility** - Knowledge of tools, equipment, and technologies used to help individuals with disabilities use computer equipment and software.
2. **Artificial Intelligence** - Knowledge of the principles, methods, and tools used to design systems that perform human intelligence functions.
3. **Business Process Reengineering** - Knowledge of methods, metrics, tools, and techniques of Business Process Reengineering.
4. **Capacity Management** - Knowledge of the principles and methods for monitoring, estimating, or reporting actual performance or the performance capability of information systems or components.
5. **Capital Planning and Investment Assessment** - Knowledge of the principles and methods of capital investment analysis or business case analysis, including return on investment analysis.
6. **Computer Forensics** - Knowledge of tools and techniques used in data recovery and preservation of electronic evidence.
7. **Computer Languages** - Knowledge of computer languages and their applications to enable a system to perform specific functions.
8. **Configuration Management** - Knowledge of the principles and methods for planning or managing the implementation, update, or integration of information systems components.
9. **Cost-Benefit Analysis** - Knowledge of the principles and methods of cost-benefit analysis, including the time value of money, present value concepts, and quantifying tangible and intangible benefits.
10. **Data Management** - Knowledge of the principles, procedures, and tools of data management, such as modeling techniques, data backup, data recovery, data dictionaries, data warehousing, data mining, data disposal, and data standardization processes.
11. **Database Administration** - Knowledge of the principles, methods, and tools for automating, developing, implementing, or administering database systems.
12. **Database Management Systems** - Knowledge of the uses of database management systems and software to control the organization, storage, retrieval, security, and integrity of data.
13. **Distributed Systems** - Knowledge of the principles, theoretical concepts, and tools underlying distributed computing systems, including their associated components and communication standards.
14. **Electronic Commerce (e-Commerce)** - Knowledge of the principles, methods, and tools for conducting business online, including electronic data interchange.
15. **Embedded Computers** - Knowledge of specifications and uses of specialized computer systems used to control devices (for example, automobiles, helicopters), including the appropriate programming languages.

16. **Encryption** - Knowledge of procedures, tools, and applications used to keep data or information secure, including public key infrastructure, point-to-point encryption, and smart cards.
17. **Hardware** - Knowledge of specifications, uses, and types of computer or computer-related equipment.
18. **Hardware Engineering** - Knowledge of the principles, methods, and tools for designing, developing, and testing computer or computer-related equipment.
19. **Human Factors** - Knowledge of the principles, methods, and tools used to identify and apply information about human behavior, abilities, limitations, and other characteristics to the design of tools, machines, systems, tasks, jobs, and environments for effective human use.
20. **Information Assurance** - Knowledge of methods and procedures to protect information systems and data by ensuring their availability, authentication, confidentiality, and integrity.
21. **Information Resources Strategy and Planning** - Knowledge of the principles, methods, and techniques of information technology (IT) assessment, planning, management, monitoring, and evaluation, such as IT baseline assessment, interagency functional analysis, contingency planning, and disaster recovery.
22. **Information Systems Security Certification** - Knowledge of the principles, methods, and tools for evaluating information systems security features against a set of specified security requirements. Includes developing security certification and accreditation plans and procedures, documenting deficiencies, reporting corrective actions, and recommending changes to improve the security of information systems.
23. **Information Systems/Network Security** - Knowledge of methods, tools, and procedures, including development of information security plans, to prevent information systems vulnerabilities, and provide or restore security of information systems and network services.
24. **Information Technology Architecture** - Knowledge of architectural methodologies used in the design and development of information systems, including the physical structure of a system's internal operations and interactions with other systems.
25. **Information Technology Performance Assessment** - Knowledge of the principles, methods, and tools (for example, surveys, system performance measures) to assess the effectiveness and practicality of information technology systems.
26. **Information Technology Research & Development** - Knowledge of scientific principles, methods, and tools of basic and applied research used to conduct a systematic inquiry into a subject matter area.
27. **Infrastructure Design** - Knowledge of the architecture and typology of software, hardware, and networks, including LANS, WANS, and telecommunications systems, their components and associated protocols and standards, and how they operate and integrate with one another and with associated controlling software.
28. **Knowledge Management** - Knowledge of the value of collected information and

the methods of sharing that information throughout an organization.

29. **Logical Systems Design** - Knowledge of the principles and methods for designing business logic components, system processes and outputs, user interfaces, data inputs, and productivity tools (for example, CASE).
30. **Modeling and Simulation** - Knowledge of mathematical modeling and simulation tools and techniques to plan and conduct test and evaluation programs, characterize systems support decisions involving requirements, evaluate design alternatives, or support operational preparation.
31. **Multimedia Technologies** - Knowledge of the principles, methods, tools, and techniques of developing or applying technology using text, audio, graphics, or other media.
32. **Network Management** - Knowledge of the operation, management, and maintenance of network and telecommunication systems and linked systems and peripherals.
33. **Object Technology** - Knowledge of the principles, methods, tools, and techniques that use object-oriented languages, analysis, and design methodologies.
34. **Operating Systems** - Knowledge of computer network, desktop, and mainframe operating systems and their applications.
35. **Operations Support** - Knowledge of procedures to ensure production or delivery of products and services, including tools and mechanisms for distributing new or enhanced software.
36. **Organizational Development** - Knowledge of the principles of organizational development and change management theories, and their applications.
37. **Process Control** - Knowledge of the principles, methods, and procedures used for the automated control of a process, including the design, development, and maintenance of associated software, hardware, and systems.
38. **Product Evaluation** - Knowledge of methods for researching and analyzing external products to determine their potential for meeting organizational standards and business needs.
39. **Project Management** - Knowledge of the principles, methods, or tools for developing, scheduling, coordinating, and managing projects and resources, including monitoring and inspecting costs, work, and contractor performance.
40. **Quality Assurance** - Knowledge of the principles, methods, and tools of quality assurance and quality control used to ensure a product fulfills functional requirements and standards.
41. **Requirements Analysis** - Knowledge of the principles and methods to identify, analyze, specify, design, and manage functional and infrastructure requirements; includes translating functional requirements into technical requirements used for logical design or presenting alternative technologies or approaches.
42. **Risk Management** - Knowledge of methods and tools used for risk assessment and mitigation of risk.
43. **Software Development** - Knowledge of the principles, methods, and tools for designing, developing, and testing software in a given environment.

44. **Software Engineering** - Knowledge of software engineering design and development methodologies, paradigms, and tools; the software life cycle; software reusability; and software reliability metrics.
45. **Software Testing and Evaluation** - Knowledge of the principles, methods, and tools for analyzing and developing software test and evaluation procedures.
46. **Standards** - Knowledge of standards that either are compliant with or derived from established standards or guidelines.
47. **System Testing and Evaluation** - Knowledge of the principles, methods, and tools for analyzing and developing systems test and evaluation procedures and technical characteristics of IT systems, including identifying critical operational issues.
48. **Systems Integration** - Knowledge of the principles, methods, and procedures for installing, integrating, and optimizing information systems components.
49. **Systems Life Cycle** - Knowledge of systems life cycle management concepts used to plan, develop, implement, operate, and maintain information systems.
50. **Technical Documentation** - Knowledge of procedures for developing technical and operational support documentation.
51. **Technology Awareness** - Knowledge of developments and new applications of information technology (hardware, software, telecommunications), emerging technologies and their applications to business processes, and applications and implementation of information systems to meet organizational requirements.
52. **Telecommunications** - Knowledge of transmissions, broadcasting, switching, control, and operation of telecommunications systems.
53. **Web Technology** - Knowledge of the principles and methods of web technologies, tools, and delivery systems, including web security, privacy policy practices, and user interface issues.

Appendix
C Skills

Clinger-Cohen Assessment Survey (2003)

Analysis of Survey Results

C.1 List of Skills

1. 4th generation language
2. Animation
3. Authentication
4. Biometrics
5. Broadband Media
6. Browsers
7. Cabling
8. Client-Server
9. Collaboration Software
10. Communications Software
11. Cryptology
12. Data Analysis
13. Data Entity-Relationship Diagramming
14. Data Flow Diagrams
15. Debugging tools
16. Desktop Publishing Software
17. Desktop Services
18. Develop Functional Specifications
19. Development System Analysis
20. Development Toolkits
21. Document Management

22. Electronic Mail
23. Encryption/Decryption algorithms
24. Enterprise Directory Services
25. Enterprise Portal Development
26. Enterprise Resource Planning
27. Federal/OMB Enterprise Architecture
28. File systems
29. Firewalls
30. Flowcharting
31. FTP servers
32. Groupware
33. HTML
34. HTTP (generic)
35. Internet Browsers
36. JAD
37. Low-level language
38. Mainframe
39. Mid-level language
40. Network Architecture and Design
41. Network Configuration and Implementation
42. Network Protocols
43. Network Troubleshooting
44. Network Voice/Data Integration
45. Network Topology (general)
46. Object-Oriented Languages
47. Personal Digital Assistants
48. PKI
49. Portal Development
50. Process Design
51. Programming Concepts
52. Project Management Software
53. Prototyping
54. RAD

55. Records Management
56. Reusable Modules
57. Scripting
58. SEI Capability Maturity Models
59. Sound Editing
60. Spreadsheet Software
61. SQL (generic)
62. Statistical Software
63. Storage Devices
64. Structured Analysis
65. Structured Design
66. Systems Security and User Administration
67. Systems Security Applications
68. Telephony
69. Test Acceptance Testing
70. UML
71. Understanding and translating user requirements
72. UNIX (generic)
73. Video Imaging
74. Virtual Reality
75. Web Design
76. Web Editing Software
77. Web Graphics Design
78. Web Site Management
79. Wireless Technologies
80. Word Processing Software

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Appendix

D Certifications

Clinger-Cohen Assessment Survey (2003)

Analysis of Survey Results

D.1 List of Certification Areas and Examples

1. **Banyan** - Certified Banyan Engineer, Certified Banyan Specialist, Certified Banyan Specialist/NT
2. **Business Applications** - Peoplesoft, SAP, Oracle
3. **Certified Web Professional** - CWP-Master, CWP-Specialist
4. **Check Point** - Check Point Certified Security Administrator, Check Point Certified Security Expert
5. **CIO** - Chief Information Officer Certificate
6. **Cisco** - Cisco (various certifications), Cisco CCDA (Certified Design Associate), Cisco CCDP (Certified Design Professional), Cisco CCIE (Certified Internetwork Expert), Cisco CCNA (Certified Network Associate), Cisco CCNP (Certified Network Professional), Cisco Certified Design Associate, Cisco Certified Design Professional, Cisco Certified Internetwork Expert, Cisco Certified Internetwork Professional, Cisco Certified Network Associate, Cisco Certified Network Professional
7. **Citrix** - Citrix Certified Administrator, Citrix Certified Enterprise Administrator
8. **Comp TIA** - A-Plus, Internet-Plus, Network-Plus
9. **Compaq** - Compaq ASE Accredited Systems Engineer
10. **Computing** - ICCP Certified Computing Professional, Computer Service Technician, Certified Forensic Computer Examiner, Certified Computing Professional
11. **Data Base** - Certified Professional Database Administrator
12. **Data Processing** - Certified Data Processor
13. **Dell** - Dell DCSE (Certified System Expert)
14. **DGC Mux Certification**
15. **Document Imaging** - Certified Document Imaging Architect

16. **Engineering** - Licensed Engineer
17. **Evidence Collection** - Certified Electronic Evidence Collection Specialist Certification
18. **GIAC** - GIAC Certified Information Security Officer (GISO), GIAC Certified Windows Security Administrator (GSWN), GIAC Security Engineer (GSE), GIAC Security Essential Certification (GSEC), GIAC Systems and Network Auditor (GSNA)
19. **GSA 1000 by 2000 Certification**
20. **Healthcare** - Certified Professional in Healthcare Information and Management Systems
21. **IBM** - IBM AASA Certified Advanced AIX System Admin., IBM AASP Certified Advanced AIX Support Prof., IBM ASA Certified AIX System Administrator, IBM ASP Certified AIX Support Professional, IBM AU Certified AIX User, IBM Certified OS/2 Engineer, IBM DB2 Application Developer, IBM DB2 Database Administrator
22. **IDNX Certification**
23. **Information Systems** - CISA (Certified Information Systems Auditor), Certified System Professional, Certified Information Systems Security Professional, Certified Administrator, Certified Systems Engineer, Certified Solutions Architect
24. **Information Systems Security** - Information Systems Security Professional (CISSP), Information Systems Security Associate (ISSA), Systems Security Certified Practitioner (SSCP), Systems Security Professional NTSSI No. 4001 Certificate (NDU)
25. **IT Related Technical Certificates from accredited technical schools (military or commercial)**
26. **Java** - Sun Certified Developer for the Java Platform, Sun Certified Programmer for the Java Platform, Certified Java Developer
27. **Linux** - Certified Linux Technician/Engineer/Administrator, Linux Professional Institute Certification
28. **Lotus** - Lotus CLI Certified Lotus Instructor, Lotus CLP (Professional) cc:Mail System Admin., Lotus CLP (Professional) Domino Messaging Admin., Lotus CLP (Professional) Notes Application Dev., Lotus CLP (Professional) Notes System Admin., Lotus CLP Application Developer, Lotus CLP cc:Mail Specialist, Lotus CLP Principal Application Developer, Lotus CLP Principal System Administrator, Lotus CLP System Administrator, Lotus CLS (Specialist) cc:Mail System Admin., Lotus CLS (Specialist) Domino Messaging Admin., Lotus CLS (Specialist) Domino Web Dev/Admin, Lotus CLS (Specialist) Lotus Script and 123, Lotus CLS (Specialist) Notes Application Dev., Lotus CLS (Specialist) Notes System Admin., Lotus CNAD Certified Notes Application Developer, Lotus CNC Certified Notes Specialist, Lotus CNSA Certified Notes System Administrator, Lotus PCLP (Principal) Notes App. Developer, Lotus PCLP (Principle Prof.) Notes System Admin, Certified Lotus Professional, Certified Lotus Specialist
29. **Lucent** - Lucent Certified Technical Expert
30. **Mechanical** - Certified Mechanical Inspector

31. **Microsoft** - Microsoft MCDBA (Certified Database Administrator), Microsoft MCP (Certified Professional), Microsoft MCP+I (Certified Prof.+Internet), Microsoft MCP+Site Builder (Certified Prof.), Microsoft MCSD (Certified Solutions Developer), Microsoft MCSE (Certified Systems Engineer), Microsoft MCSE+I (Certified Sys. Eng.+Internet), Microsoft MCT (Certified Trainer), Microsoft Certified Database Administrator, Microsoft Certified Professional, Microsoft Certified Professional + Internet, Microsoft Certified Systems Administrator, Microsoft Certified Solution Developer, Microsoft Certified Systems Engineer, Microsoft Certified Systems Engineer Windows 2000, Microsoft Certified Trainer, Microsoft Office User Specialist
32. **Netware** - Certified Netware Engineer
33. **Network Security** - CISSP, Security Certified Network Architect, Security Certified Network Professional, Certified Network Support/Administration, Certified Firewall Analyst, Certified Intrusion Analyst, Certified Incident Handler, Certified Windows Security Administrator, Certified UNIX Security Administrator
34. **Network Support** - Certified Professional, Certified Call Center Manager, Certified Help Desk Director, Certified Help Desk Manager, Certified Help Desk Professional, Certified Network Administrator
35. **Novell** - Novell (various certifications), Novell CDE (Certified Directory Engineer), Novell CIP (Certified Internet Professional), Novell CNA (Certified Novell Administrator), Novell CNE (Certified Novell Engineer), Novell CNI (Certified Novell Instructor), Novell Master CNE (Master Cert. Novell Engineer)
36. **Oracle** - Oracle Certified Database Administrator, Oracle Master Application Developer, Oracle Master Applications IT Professional, Oracle Master Designer, Systems Engineer, Oracle Master Enterprise DBA, Oracle OCP (Certified Professional) Java, Oracle OCP (Certified) App Developer Rel 1, Oracle OCP (Certified) App Developer Rel 2, Oracle OCP (Certified) DB Operator (DBO), Oracle OCP (Certified) Financials R11 Consult., Oracle OCP (Certified) Oracle7.3 DBA, Oracle OCP (Certified) Oracle8 DBA, Oracle Certified Professional, Oracle8i Certified Professional Database Administrator, Oracle9i Database Administrator Certified Associate, Oracle9i Database Administrator Certified Professional, Oracle9i Database Administrator Certified Master, Oracle9iAS Web Administrator Certified Associate, Oracle9i PL/SQL Developer Certified Associate, Oracle9i Forms Developer Certified Professional, CM Manager, CM Specialist
37. **Project Management** - Project Management Institute (PMI)
38. **Quality** - Certified Quality Auditor, Certified Quality Auditor - Hazard Analysis Critical Control Point, Certified Quality Engineer, Certified Quality Improvement Associate, Certified Quality Technician, Certified Reliability Engineer, Certified Software Quality Engineer, Strategic & Tactical Advocates for Results
39. **Red Hat** - Red Hat Certified Engineer
40. **SCO** - SCO ACE OpenServer Rel 5 SCO, SCO ACE Server SCO, SCO ACE UnixWare 2.1
41. **Software Development** - Certified Software Development Professional
42. **Training** - Certified Technology Trainer

43. **USDA Graduate School Webmaster Certification**

44. **Web** - HyCurve Web Design Specialist, Prosoft CIW (Certified Internet Webmaster), Master Certified Webmaster