# OPM Federal Workforce Competency Initiative (FWCI) Framework and Handbook for Information Technology Management, 2210


U.S. Office of Personnel Management

APRIL 2026

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## Introduction

The Federal Workforce Competency Initiative (FWCI) is a governmentwide effort led by the US Office of Personnel Management (OPM) that built upon and updated a subset of the general competencies used in OPM's MOSAIC (Multipurpose Occupational Systems Analysis Inventory—Closed-ended) studies. In September 2023, OPM released the FWCI General Competencies and Competency Models for 80 occupational series. OPM continued this work with phase 2 of the FWCI to update Governmentwide competency models for the 2210 IT Management occupational series. This new study supplements the general competency information gathered in the original FWCI study with additional competency frameworks which include technical competency and task information specific to the 2210 IT Management workforce.

Agencies may use the competencies and tasks within the competency frameworks to support key workforce efforts such as workforce planning, training and development, performance management, recruitment, and selection. These competencies support the expanding use of skills-based hiring across the Federal Government with the increased use of valid assessments that carefully measure candidates' ability to perform the job. For more information on assessments, please visit OPM's Assessment and Selection website.

Agencies are responsible for conducting job analyses when using these competencies for selection and for work responsibilities outside the identified series and grades in this Handbook. Similarly, agencies must determine the applicability of these competencies to positions that do not perform the full range of work within the identified series. Please refer to OPM's Delegated Examining Operations Handbook for more information on conducting a job analysis. When used for selection, competencies must be used in conjunction with the appropriate OPM Qualification Standards. Additional information about qualifications can be found in the General Schedule Qualifications Operating Manual. Agencies are required to use assessments consistent with the Merit Hiring Plan, and the competencies included in the Framework may be used for assessment, hiring, and other human resources activities.

OPM presents the FWCI Framework and Handbook for Information Technology Management, 2210. This Handbook includes a discussion of the current and future state of work followed by general and technical competency frameworks for the 2210 occupational series by banded grade levels. The frameworks are organized by clusters of work that require similar skills, beginning with a table showing the general and technical competencies which were found to be important. The following tables present the general and technical competencies that have been confirmed as important on a governmentwide basis for the 2210 series at the bands indicated. Current and future importance rankings are presented for both general and technical competencies. Finally, there are occupational profile tables showing important technical competencies and the top 20 most important tasks for IT specializations.

## Background

OPM is taking the lead in moving our country towards a stronger and more innovative workplace by investing in fully integrated skills-based hiring. This work began with Executive Order 13932, Modernizing and Reforming the Assessment and Hiring of Federal Job Candidates and was further strengthened with the Chance to Compete Act 2024 and the Merit Hiring Plan. A key element of the Merit Hiring Plan is implementing skills-based hiring, eliminating unnecessary degree requirements, and requiring the use of rigorous, job-related assessments to ensure candidates are selected based on their merit and competence. Though OPM has already done work to align some assessments to skills-based hiring principles, there remains a need to realign overall hiring to skills-based principles through the integration of classification, qualifications and assessment practices and policy. The FWCI studies and resulting competency frameworks act as the foundation to developing skills-based classification and qualifications policies and support the development of assessments.

The FWCI IT 2210 occupational study had 4 steps: drafting, reviewing, and revising competency and task content through environmental scan, conducting SME review panels, designing and administering online surveys, and analyzing survey response data. The environmental scan included identifying competencies and tasks from previous occupational studies on the 2210 series, including the MOSAIC study focused on IT. In addition, OPM identified tasks from other materials from both the public and private sector including existing frameworks such as the National Institute of Standards and Technology's NICE Workforce Framework for Cybersecurity and the Department of Defense Cyber Exchange Workforce Framework, position descriptions (PDs), and job opportunity announcements (JOAs). Natural Language Processing was used to help consolidate and organize the information which was finalized using SME review. Draft competencies and tasks were reviewed in SME panels which were then finalized into a survey.

In 2021, OPM conducted a governmentwide survey of over 90,000 Federal employees and supervisors from more than 300 job series to identify critical general competencies for 214 occupational series as part of this process. This survey provided opportunities for SMEs to participate in the development of general competency models in the first phase of the FWCI. Additionally, in 2024, over 24,000 Federal employees and supervisors from the IT 2210 series participated in a governmentwide survey to identify important technical competencies specific to the 2210 IT job series. Survey data was analyzed to create the FWCI technical competency frameworks which reflect the state of IT work in the Federal government.

Rapid changes in technology and the structure of IT positions were the biggest themes in the environmental scan and SME feedback. Many SMEs remarked they now "wear multiple hats" and work across several specializations which is supported by agencies reporting an increasing number of IT Specialists without a specialization. The evolution of IT work has been shaped by rapid technological advancements, changing business needs, and the increasing reliance on technology in the workplace. Initially, IT roles were primarily focused on hardware, mainframe operation, and basic data processing. Over time, IT roles have expanded to include work such as IT modernization, systems integration, and cybersecurity. Agencies are moving away from

on-premise servers to cloud environments which require emerging skillsets and learning new technologies. IT roles are increasingly blended with roles outside traditional IT work and now include artificial intelligence, data science, digital work and agile methodologies. These have led to more collaborative, iterative, and strategic approaches to IT work.

With the nature of IT roles changing, OPM policies must adapt to this new landscape of work. The FWCI technical competency framework includes 14 new competencies with new focus on skillsets such as cloud services, continuous integration/continuous deployment, data architecture, and migration and modernization. During the study, it became apparent that the existing titling practices in the IT 2210 series were artificially restrictive. Agencies have different needs based on their mission, organization, and position management. To allow agencies the greatest flexibility, the competency framework includes clusters of IT work based on their shared competencies.

Using evidence from OPM's study including the analysis of work performed by 2210 Federal employees, three distinct clusters of IT work emerged.

In this release, previously identified specializations of work have been updated and clustered to allow greater flexibility for use. This will allow agencies the ability to create additional specializations as new technologies or business needs emerge and identify shared competencies between new and existing work.

## IT Clusters of Work Model

The new model of IT work includes IT clusters aligning classification policy and the structure of IT work. The clusters include three defined clusters of IT work including specializations aligned with each cluster. The three clusters of information technology work are: IT Operations and Security, IT Development and Analysis, and IT Strategy and Planning.

**IT Operations and Security**

**IT Operations and Security**: involves the planning, installation, operation, and maintenance of hardware and software systems, as well as ensuring the security and integrity of systems, networks, and data. It includes functions such as system administration, network services, customer support, and information security. Employees in this cluster establish and sustain the confidentiality, integrity, and availability of systems, networks, and data through the development and implementation of security programs, policies, procedures, and tools.

Types of work may include but are not limited to:

- the planning, analysis, design, development, testing, quality assurance, configuration, installation, implementation, integration, maintenance, management, or administration of network systems used for the transmission and exchange of information and resources in digital communication formats and platforms;

- ensuring the confidentiality, integrity, and availability of systems, networks, and data through the planning, analysis, development, implementation, maintenance, and enhancement of information systems security programs, policies, procedures, and tools;
- planning and coordinating the installation, testing, operation, troubleshooting, and maintenance of hardware and software systems;
- the planning and delivery of customer support services, including installation, configuration, troubleshooting, customer assistance, and/or training, in response to customer requirements; and/or
- the planning, installation, configuration, testing, implementation, and management of the systems environment in support of the organization's IT architecture and business needs.

**IT Development and Analysis**

**IT Development and Analysis**: focuses on the design, development, testing, and implementation of new and improved information systems. This includes application software development, systems analysis, data management, and internet/web services. Employees in this cluster perform needs analyses, consult with customers to identify specific system needs, develop overall functional and systems requirements, conduct business process reengineering, and prepare business cases for the application of IT solutions.

Types of work may include but are not limited to:

- the review and evaluation of information technology processes and procedures to support the planning, design, and implementation of new or improved technology systems to meet business requirements;
- the requirements analysis, design, documentation, development, modification, testing, deployment, and maintenance of new or existing software and applications;
- the planning, development, collection, implementation, security, storage, maintenance, utilization, and administration of systems for the acquisition, storage, and retrieval of data throughout its lifecycle; and/or
- the technical planning, design, development, testing, implementation, and management of internet, intranet, and extranet activities, including systems/applications development and technical management of websites.

**IT Strategy and Planning**

**IT Strategy and Planning**: encompasses strategic planning, policy development, and enterprise architecture. This involves aligning IT strategies with organizational goals and objectives,

setting the overall direction and vision for IT within the organization. Employees in this cluster develop and maintain strategic plans, assess policy needs, provide policy guidance, prepare IT budgets, manage IT investment portfolios, and conduct audits of IT programs and projects.

Types of work may include but are not limited to:

- the strategic research, analysis, planning, design, implementation, documentation, assessment, and management of the enterprise structural framework to align IT strategy, plans, and systems with the mission, goals, structure, and business processes of the organization; and/or
- a broad spectrum of IT management activities that typically extends and applies to an entire organization or major components of an organization. This includes strategic planning, capital planning and investment control, workforce planning, policy and standards development, resource management, knowledge management, auditing, and information security management.

## Information Technology Management Competency Framework Results

The Information Technology Management Competency Framework results are listed within this section. Through job analysis (5 CFR § 300.103), agencies must determine the applicability of these competencies to their positions. Please refer to OPM's Delegated Examining Operations Handbook for more information on conducting a job analysis. When used for selection, competencies must be used in conjunction with the appropriate OPM Qualification Standards.

### Information Technology Management Competency List

The table below lists the general and technical competencies found to be important for performing information technology management work in one or more specialties.

| General Competencies | Technical Competencies |
|---|---|
| • Attention to Detail<br>• Conflict Management<br>• Creative Thinking<br>• Customer Service<br>• Decision Making<br>• Digital Collaboration<br>• External Awareness<br>• Flexibility<br>• Influencing/Negotiating<br>• Information Management<br>• Integrity/Honesty<br>• Interpersonal Skills<br>• Leadership<br>• Learning<br>• Memory<br>• Oral Communication<br>• Organizational Awareness<br>• Partnering<br>• Planning and Evaluating<br>• Problem Solving<br>• Project Management<br>• Reading Comprehension<br>• Reasoning<br>• Resilience<br>• Self-Management<br>• Teaching Others<br>• Teamwork<br>• Technical Competence<br>• Technology Application<br>• Writing | • Accessibility<br>• Business Process Reengineering<br>• Change Management<br>• Cloud Services<br>• Communications Security Management<br>• Compliance<br>• Computer Network Defense<br>• Configuration Management<br>• Education and Training<br>• Encryption<br>• Enterprise Architecture<br>• Hardware<br>• Identity Management<br>• Information Assurance<br>• Information Systems and Network Security<br>• Information Systems Security Certification<br>• Information Technology Architecture<br>• Information Technology Continuity of Operations (COOP)<br>• Information Technology Laws and Guidelines<br>• Information Technology Performance Monitoring<br>• Information Technology Program Management<br>• Information Technology Resources Strategy and Planning |

| General Competencies | Technical Competencies |
| --- | --- |
| | • Infrastructure Design<br>• Internal Controls<br>• Logical Systems Design<br>• Migration and Modernization<br>• Operating Systems<br>• Operations Support<br>• Physical Security<br>• Quality Assurance<br>• Requirements Analysis and Management<br>• Risk Management<br>• Security<br>• Security Incident Management<br>• Security Models<br>• Service Incident Management<br>• Systems Design<br>• Systems Life Cycle<br>• Systems Testing and Evaluation<br>• Technical Documentation<br>• Technology Awareness<br>• Vulnerabilities Assessment<br>• Web Technology |

## Information Technology Management General Competencies by Band

The following table lists the general competencies that have been confirmed as important on a governmentwide basis for all information technology management work at the bands indicated.

| Entry Level* | Intermediate Level* | Journey Level* | Senior Level* |
|---|---|---|---|
| • Attention to Detail<br>• Creative Thinking<br>• Customer Service<br>• Decision Making<br>• Digital Collaboration<br>• Flexibility<br>• Information Management<br>• Integrity/Honesty<br>• Interpersonal Skills<br>• Learning<br>• Memory<br>• Oral Communication<br>• Problem Solving<br>• Reading Comprehension<br>• Reasoning<br>• Resilience<br>• Self-Management<br>• Teamwork<br>• Technical Competence<br>• Technology Application<br>• Writing | • Attention to Detail<br>• Conflict Management<br>• Creative Thinking<br>• Customer Service<br>• Decision Making<br>• Digital Collaboration<br>• Flexibility<br>• Influencing/Negotiating<br>• Information Management<br>• Integrity/Honesty<br>• Interpersonal Skills<br>• Leadership<br>• Learning<br>• Memory<br>• Oral Communication<br>• Organizational Awareness<br>• Partnering<br>• Planning and Evaluating<br>• Problem Solving<br>• Project Management<br>• Reading Comprehension<br>• Reasoning<br>• Resilience<br>• Self-Management<br>• Teaching Others<br>• Teamwork | • Attention to Detail<br>• Conflict Management<br>• Creative Thinking<br>• Customer Service<br>• Decision Making<br>• Digital Collaboration<br>• External Awareness<br>• Flexibility<br>• Influencing/Negotiating<br>• Information Management<br>• Integrity/Honesty<br>• Interpersonal Skills<br>• Leadership<br>• Learning<br>• Memory<br>• Oral Communication<br>• Organizational Awareness<br>• Partnering<br>• Planning and Evaluating<br>• Problem Solving<br>• Project Management<br>• Reading Comprehension<br>• Reasoning<br>• Resilience<br>• Self-Management<br>• Teaching Others | • Attention to Detail<br>• Conflict Management<br>• Creative Thinking<br>• Customer Service<br>• Decision Making<br>• Digital Collaboration<br>• External Awareness<br>• Flexibility<br>• Influencing/Negotiating<br>• Information Management<br>• Integrity/Honesty<br>• Interpersonal Skills<br>• Leadership<br>• Learning<br>• Memory<br>• Oral Communication<br>• Organizational Awareness<br>• Partnering<br>• Planning and Evaluating<br>• Problem Solving<br>• Project Management<br>• Reading Comprehension<br>• Reasoning<br>• Resilience<br>• Self-Management<br>• Teaching Others |

| Entry Level* | Intermediate Level* | Journey Level* | Senior Level* |
|---|---|---|---|
| | • Technical Competence<br>• Technology Application<br>• Writing | • Teamwork<br>• Technical Competence<br>• Technology Application<br>• Writing | • Teamwork<br>• Technical Competence<br>• Technology Application<br>• Writing |

**Note:* Entry Level = Grades 5 – 7; Intermediate Level = Grades 9 – 11; Journey Level = Grades 12 – 13; Senior Level = Grades 14 – 15.

## Information Technology Management Technical Competencies by Cluster and Band

The following tables list the technical competencies that have been confirmed as important governmentwide for information technology management work at the bands indicated. Research revealed many overlapping IT management competencies across multiple IT specialties. To assist in expanding agencies' organizational design, these competencies are presented as clusters. The three clusters provide a framework for workforce planning.

In addition to clustering IT specialty areas by functional similarities, competencies are presented in bands, rather than grade levels. We grouped the General Schedule (GS) grade levels into four distinct career bands: Entry Level (GS-5 to GS-7), Intermediate Level (GS-9 to GS-11), Journey Level (GS-12 to GS-13), and Senior Level (GS-14 to GS-15). The bands provide alignment with private sector work roles or structures of work.

## Information Technology Management Technical Competencies for IT Operations and Security

The following table lists the technical competencies that have been confirmed as important governmentwide for information technology management work in IT Operations and Security at the bands indicated.

| **IT Operations and Security** | | | |
|---|---|---|---|
| **Competency** | **Intermediate Level** | **Journey Level** | **Senior Level** |
| Asset Management | X | X | X |
| Change Management | X | X | X |
| Communications Security Management | X | X | X |
| Compliance | X | X | X |
| Computer Network Defense | X | X | X |
| Configuration Management | X | X | X |
| Education and Training | X | X | X |
| Encryption | X | X | X |
| Hardware | X | X | X |
| Identity Management | X | X | X |
| Information Assurance | X | X | X |
| Information Systems Security Certification | X | X | X |
| Information Systems and Network Security | X | X | X |
| Information Technology Continuity of Operations (COOP) | X | X | X |
| Information Technology Laws and Guidelines | X | X | X |

| IT Operations and Security | | | |
|---|---|---|---|
| **Competency** | **Intermediate Level** | **Journey Level** | **Senior Level** |
| Information Technology Resources Strategy and Planning | X | X | X |
| Infrastructure Design | X | X | X |
| Internal Controls | X | X | X |
| Operating Systems | X | X | X |
| Operations Support | X | X | X |
| Physical Security | X | X | X |
| Risk Management | X | X | X |
| Security | X | X | X |
| Security Incident Management | X | X | X |
| Security Models | X | X | X |
| Service Incident Management | X | X | X |
| Technical Documentation | X | X | X |
| Technology Awareness | X | X | X |
| Vulnerabilities Assessment | X | X | X |
| Accessibility | X | X | ** |
| Business Process Reengineering | | X | X |
| Cloud Services | | X | X |
| Enterprise Architecture | | X | X |
| Information Technology Architecture | | X | X |
| Information Technology Performance Assessment | | X | X |
| Information Technology Performance Monitoring | | X | X |
| Information Technology Program Management | | X | X |
| Logical Systems Design | | X | X |
| Migration and Modernization | | X | X |
| Network Engineering | | X | X |
| Network Management | | X | X |
| Quality Assurance | | X | X |
| Requirements Analysis and Management | | X | X |
| Systems Design | | X | X |
| Systems Integration | | X | X |
| Systems Life Cycle | | X | X |
| Systems Testing and Evaluation | | X | X |
| Web Technology | | X | X |

| IT Operations and Security | | | |
|---|---|---|---|
| **Competency** | **Intermediate Level** | **Journey Level** | **Senior Level** |
| Cloud Administration | | | X |
| Cloud Engineering | | | X |
| Data Management | | | X |
| Process Control | | | X |
| Product Evaluation | | | X |
| Software Testing and Evaluation | | | X |
| Systems Engineering | | | X |

*Note:* X indicates that competency is important. Intermediate Level = Grades 9 – 11; Journey Level = Grades 12 – 13; Senior Level = Grades 14 – 15.

***Note:* The competency Accessibility was found to be important at the intermediate and journey levels but not at the senior level, likely reflecting the shift from technical, hands-on work at earlier stages to more strategic responsibilities at senior levels.

## Information Technology Management Technical Competencies for IT Development and Analysis

The following table lists the technical competencies that have been confirmed as important governmentwide for information technology management work in IT Development and Analysis at the bands indicated.

| IT Development and Analysis | | | |
|---|---|---|---|
| **Competency** | **Intermediate Level** | **Journey Level** | **Senior Level** |
| Application Development | X | X | X |
| Logical Systems Design | X | X | X |
| Quality Assurance | X | X | X |
| Requirements Analysis and Management | X | X | X |
| Software Development | X | X | X |
| Software Testing and Evaluation | X | X | X |
| Web Technology | X | X | X |
| Accessibility | | X | X |
| Business Process Reengineering | | X | X |
| Change Management | | X | X |
| Compliance | | X | X |
| Configuration Management | | X | X |
| Data Analysis | | X | X |
| Data Extraction and Transformation | | X | X |
| Data Management | | X | X |
| Database Management Systems | | X | X |
| Education and Training | | X | X |
| Information Assurance | | X | X |
| Information Systems and Network Security | | X | X |
| Information Technology Resources Strategy and Planning | | X | X |
| Migration and Modernization | | X | X |
| Programming Languages | | X | X |
| Risk Management | | X | X |
| Security | | X | X |
| Software Engineering | | X | X |
| Systems Design | | X | X |
| Systems Life Cycle | | X | X |
| Systems Testing and Evaluation | | X | X |
| Technical Documentation | | X | X |
| Technology Awareness | | X | X |

| IT Development and Analysis | | | |
|---|---|---|---|
| **Competency** | **Intermediate Level** | **Journey Level** | **Senior Level** |
| User Interface/User Experience Design (UI/UX) | | X | X |
| Cloud Services | | | X |
| Continuous Integration/Continuous Deployment (CI/CD) | | | X |
| Data Architecture | | | X |
| Data Visualization | | | X |
| Encryption | | | X |
| Enterprise Architecture | | | X |
| Identity Management | | | X |
| Information Technology Architecture | | | X |
| Information Technology Continuity of Operations (COOP) | | | X |
| Information Technology Laws and Guidelines | | | X |
| Information Technology Performance Assessment | | | X |
| Information Technology Performance Monitoring | | | X |
| Information Technology Program Management | | | X |
| Infrastructure Design | | | X |
| Internal Controls | | | X |
| Modeling and Simulation | | | X |
| Object-Oriented Technology | | | X |
| Operating Systems | | | X |
| Operations Support | | | X |
| Process Control | | | X |
| Product Evaluation | | | X |
| Security Incident Management | | | X |
| Security Models | | | X |
| Service Incident Management | | | X |
| Systems Engineering | | | X |
| Systems Integration | | | X |

*Note:* X indicates that competency is important. Intermediate Level = Grades 9 – 11; Journey Level = Grades 12 – 13; Senior Level = Grades 14 – 15.

## Information Technology Management Technical Competencies for IT Strategy and Planning

The following table lists the technical competencies that have been confirmed as important governmentwide for information technology management work in IT Strategy and Planning at the bands indicated.

| IT Strategy and Planning | | | |
|---|---|---|---|
| **Competency** | **Intermediate Level** | **Journey Level** | **Senior Level** |
| Business Process Reengineering | X | X | X |
| Change Management | X | X | X |
| Compliance | X | X | X |
| Education and Training | X | X | X |
| Information Assurance | X | X | X |
| Information Technology Continuity of Operations (COOP) | X | X | X |
| Information Technology Laws and Guidelines | X | X | X |
| Information Technology Program Management | X | X | X |
| Information Technology Resources Strategy and Planning | X | X | X |
| Infrastructure Design | X | X | X |
| Quality Assurance | X | X | X |
| Requirements Analysis and Management | X | X | X |
| Risk Management | X | X | X |
| Security | X | X | X |
| Systems Life Cycle | X | X | X |
| Technical Documentation | X | X | X |
| Technology Awareness | X | X | X |
| Asset Management | X | X | ** |
| Hardware | X | X | ** |
| Physical Security | X | X | ** |
| Acquisition Strategy | | X | X |
| Budget Administration | | X | X |
| Cloud Services | | X | X |
| Communications Security Management | | X | X |
| Computer Network Defense | | X | X |
| Configuration Management | | X | X |
| Contracting/ Procurement | | X | X |
| Enterprise Architecture | | X | X |

| IT Strategy and Planning | | | |
|---|---|---|---|
| **Competency** | **Intermediate Level** | **Journey Level** | **Senior Level** |
| Information Systems Security Certification | | X | X |
| Information Systems and Network Security | | X | X |
| Information Technology Architecture | | X | X |
| Information Technology Capital Planning and Investment Assessment | | X | X |
| Information Technology Performance Assessment | | X | X |
| Information Technology Performance Monitoring | | X | X |
| Internal Controls | | X | X |
| Logical Systems Design | | X | X |
| Migration and Modernization | | X | X |
| Operating Systems | | X | X |
| Operations Support | | X | X |
| Product Evaluation | | X | X |
| Security Incident Management | | X | X |
| Security Models | | X | X |
| Systems Design | | X | X |
| Accessibility | | | X |
| Data Analysis | | | X |
| Data Architecture | | | X |
| Data Management | | | X |
| Data Visualization | | | X |
| Identity Management | | | X |
| Process Control | | | X |
| Systems Engineering | | | X |
| Systems Integration | | | X |
| Systems Testing and Evaluation | | | X |
| Web Technology | | | X |

*Note:* X indicates competency is important. Intermediate Level = Grades 9 – 11; Journey Level = Grades 12 – 13; Senior Level = Grades 14 – 15.

***Note:* The competencies Asset Management, Hardware, and Physical Security were found to be important at the intermediate and journey levels but not at the senior level, likely reflecting the shift away from hands-on analysis to using that information to guide decisions at the senior level.

## Information Technology Management General Competency Importance Rankings

The table below lists the current and future importance rank order of the general competencies for all information technology management work based on supervisor and employee ratings.

| Competency | Current Importance | Future Importance |
|---|---|---|
| Integrity/Honesty | 1 | 1 |
| Attention to Detail | 2 | 3 |
| Customer Service | 3 | 4 |
| Technology Application | 4 | 2 |
| Teamwork | 5 | 6 |
| Interpersonal Skills | 6 | 9 |
| Problem Solving | 7 | 5 |
| Reading Comprehension | 8 | 11 |
| Self-Management | 9 | 8 |
| Learning | 10 | 16 |
| Technical Competence | 11 | 10 |
| Decision Making | 12 | 12 |
| Reasoning | 13 | 13 |
| Digital Collaboration | 14 | 7 |
| Flexibility | 15 | 15 |
| Information Management | 16 | 17 |
| Oral Communication | 17 | 14 |
| Creative Thinking | 18 | 18 |
| Resilience | 19 | 19 |
| Writing | 20 | 20 |
| Planning and Evaluating | 21 | 21 |
| Organizational Awareness | 22 | 22 |
| Memory | 23 | 24 |
| Conflict Management | 24 | 25 |
| Teaching Others | 25 | 23 |
| Partnering | 26 | 26 |
| Influencing/Negotiating | 27 | 29 |
| Project Management | 28 | 28 |
| Leadership | 29 | 27 |
| External Awareness | 30 | 30 |

## Information Technology Management Technical Competency Importance Rankings

The table below presents the current and future importance rank order of the technical competencies for all information technology management work based on supervisor and employee ratings.

| IT Operations and Security | | |
|---|---|---|
| **Competency** | **Current Importance** | **Future Importance** |
| Operating Systems | 1 | 9 |
| Information Systems and Network Security | 2 | 1 |
| Security | 3 | 3 |
| Computer Network Defense | 4 | 2 |
| Information Assurance | 5 | 4 |
| Information Technology Resources Strategy and Planning | 6 | 20 |
| Security Incident Management | 7 | 5 |
| Compliance | 8 | 6 |
| Physical Security | 9 | 14 |
| Hardware | 10 | 28 |
| Encryption | 11 | 8 |
| Infrastructure Design | 12 | 36 |
| Change Management | 13 | 26 |
| Technology Awareness | 14 | 7 |
| Risk Management | 15 | 11 |
| Requirements Analysis and Management | 16 | 35 |
| Configuration Management | 17 | 25 |
| Identity Management | 18 | 12 |
| Communications Security Management | 19 | 15 |
| Vulnerabilities Assessment | 20 | 10 |
| Internal Controls | 21 | 18 |
| Service Incident Management | 22 | 19 |
| Security Models | 23 | 13 |
| Information Technology Continuity of Operations (COOP) | 24 | 24 |
| Systems Design | 25 | 39 |
| Technical Documentation | 26 | 22 |
| Information Systems Security Certification | 27 | 21 |
| Education and Training | 28 | 23 |
| Operations Support | 29 | 27 |
| Information Technology Laws and Guidelines | 30 | 17 |
| Asset Management | 31 | 29 |
| Systems Life Cycle | 32 | 32 |
| Network Management | 33 | 37 |
| Quality Assurance | 34 | 40 |

| IT Operations and Security | | |
|---|---|---|
| **Competency** | **Current Importance** | **Future Importance** |
| Enterprise Architecture | 35 | 38 |
| Accessibility | 36 | NR* |
| Information Technology Architecture | 37 | 41 |
| Information Technology Performance Monitoring | 38 | 31 |
| Information Technology Program Management | 39 | 30 |
| Cloud Services | 40 | 16 |
| Systems Testing and Evaluation | 41 | 44 |
| Network Engineering | 42 | 43 |
| Cloud Administration | NR* | 33 |
| Migration and Modernization | NR* | 34 |
| Web Technology | NR* | 42 |
| Systems Integration | NR* | 45 |

**Note*: NR = Not Ranked.

| IT Development and Analysis | | |
|---|---|---|
| **Competency** | **Current Importance** | **Future Importance** |
| Requirements Analysis and Management | 1 | 1 |
| Quality Assurance | 2 | 2 |
| Software Development | 3 | 5 |
| Logical Systems Design | 4 | 14 |
| Information Technology Resources Strategy and Planning | 5 | 13 |
| Systems Design | 6 | 9 |
| Software Testing and Evaluation | 7 | 4 |
| Change Management | 8 | 8 |
| Application Development | 9 | 10 |
| Software Engineering | 10 | 16 |
| Data Management | 11 | 6 |
| Web Technology | 12 | 12 |
| Configuration Management | 13 | 24 |
| Technical Documentation | 14 | 20 |
| Business Process Reengineering | 15 | 26 |
| Systems Testing and Evaluation | 16 | 18 |
| User Interface/User Experience Design (UI/UX) | 17 | 19 |
| Technology Awareness | 18 | 7 |
| Data Analysis | 19 | 11 |
| Programming Languages | 20 | 27 |
| Systems Life Cycle | 21 | 29 |
| Compliance | 22 | 25 |
| Database Management Systems | 23 | 22 |
| Data Extraction and Transformation | 24 | 15 |
| Accessibility | 25 | 35 |
| Information Assurance | 26 | 23 |
| Security | 27 | 34 |
| Migration and Modernization | 28 | 17 |
| Cloud Services | 29 | 3 |
| Risk Management | 30 | 31 |
| Information Systems and Network Security | 31 | 33 |
| Education and Training | 32 | 28 |
| Data Visualization | 33 | 21 |
| Continuous Integration/Continuous Deployment (CI/CD) | NR* | 30 |
| Data Architecture | NR* | 32 |
| Artificial Intelligence/ Machine Learning | NR* | 36 |

**Note*: NR = Not Ranked.

| IT Strategy and Planning | | |
|---|---|---|
| **Competency** | **Current Importance** | **Future Importance** |
| Information Technology Resources Strategy and Planning | 1 | 1 |
| Requirements Analysis and Management | 2 | 3 |
| Change Management | 3 | 6 |
| Compliance | 4 | 4 |
| Technology Awareness | 5 | 2 |
| Information Technology Program Management | 6 | 5 |
| Business Process Reengineering | 7 | 16 |
| Risk Management | 8 | 7 |
| Enterprise Architecture | 9 | 9 |
| Information Technology Laws and Guidelines | 10 | 8 |
| Security | 11 | 11 |
| Systems Life Cycle | 12 | 14 |
| Configuration Management | 13 | 19 |
| Information Systems and Network Security | 14 | 13 |
| Quality Assurance | 15 | 23 |
| Education and Training | 16 | 15 |
| Systems Design | 17 | 32 |
| Infrastructure Design | 18 | 39 |
| Information Assurance | 19 | 12 |
| Technical Documentation | 20 | 24 |
| Information Technology Continuity of Operations (COOP) | 21 | 20 |
| Cloud Services | 22 | 10 |
| Information Technology Performance Monitoring | 23 | 25 |
| Information Technology Architecture | 24 | 28 |
| Acquisition Strategy | 25 | 22 |
| Computer Network Defense | 26 | 17 |
| Internal Controls | 27 | 29 |
| Information Technology Capital Planning and Investment Assessment | 28 | 21 |
| Migration and Modernization | 29 | 18 |
| Security Models | 30 | 26 |
| Communications Security Management | 31 | 27 |
| Security Incident Management | 32 | 33 |
| Physical Security | 33 | 45 |
| Logical Systems Design | 34 | NR* |
| Product Evaluation | 35 | 38 |
| Contracting/ Procurement | 36 | 35 |
| Budget Administration | 37 | 34 |
| Operations Support | 38 | 42 |

| IT Strategy and Planning | | |
|---|---|---|
| **Competency** | **Current Importance** | **Future Importance** |
| Operating Systems | 39 | NR* |
| Asset Management | 40 | NR* |
| Information Technology Performance Assessment | 41 | 36 |
| Identity Management | NR* | 30 |
| Artificial Intelligence/ Machine Learning | NR* | 31 |
| Information Systems Security Certification | NR* | 37 |
| Data Management | NR* | 40 |
| Data Visualization | NR* | 41 |
| Data Analysis | NR* | 43 |
| Encryption | NR* | 44 |
| Cloud Administration | NR* | 46 |
| Vulnerabilities Assessment | NR* | 47 |
| Artificial Intelligence Values-Driven Design | NR* | 48 |

**Note*: NR = Not Ranked.

## Occupational Profiles

OPM developed sample tasks and competency profiles for work in the 2210 IT Management series. The sample occupational profiles highlight the general and technical competencies, as well as the top 20 tasks associated with 2210 work. These occupational profiles align with the work described in the IT 2210 Position Classification Standard. The occupational profiles supports skills-based hiring initiatives. Agencies may use the competencies and tasks within these occupational profiles to support key workforce efforts such as workforce planning, training and development, performance management, recruitment, and selection. Through job analysis (5 CFR § 300.103), agencies must determine the applicability of the competencies and tasks to their positions. Please refer to OPM's Delegated Examining Operations Handbook for more information on conducting a job analysis. When used for selection, competencies must be used in conjunction with the appropriate OPM Qualification Standards.

### Occupational Profile for all Information Technology Management

The table below presents the important general competencies and top 20 important tasks for all information technology management work.

**Important General Competencies and Tasks**

| Important General Competencies | | |
|---|---|---|
| Attention to Detail | Integrity/Honesty | Project Management |
| Conflict Management | Interpersonal Skills | Reading Comprehension |
| Creative Thinking | Leadership | Reasoning |
| Customer Service | Learning | Resilience |
| Decision Making | Memory | Self-Management |
| Digital Collaboration | Oral Communication | Teaching Others |
| External Awareness | Organizational Awareness | Teamwork |
| Flexibility | Partnering | Technical Competence |
| Influencing/Negotiating | Planning and Evaluating | Technology Application |
| Information Management | Problem Solving | Writing |

| Important General Tasks |
|---|
| Adapts to changes in work environment, technology and tools, organizational structure, or leadership. |
| Adjusts work activities in response to changing needs and priorities. |
| Analyzes or interprets data or other information. |
| Collaborates with others or works on teams to accomplish work-related activities. |
| Collects, compiles, and organizes information. |

| Important General Tasks |
| --- |
| Composes simple correspondence or other written work (for example, emails, meeting notes). |
| Contacts others in writing to obtain information. |
| Contacts others orally to obtain information. |
| Defines or diagnoses problems. |
| Follows instructions to complete assignments. |
| Identifies possible solutions. |
| Informs supervisor or other official of issues or problems. |
| Makes improvements, solves problems, or takes corrective action when problems arise. |
| Promotes or develops and maintains good working relationships with key individuals or groups. |
| Reads and understands technical or other complex materials required for the job. |
| Uses computer software or applications to access, create, edit, print, send, or retrieve data, files, or other information. |
| Uses standard computer software or applications (for example, word processing, spreadsheets, presentation programs). |
| Uses the Internet to conduct research and collect and track information. |
| Works cooperatively with others to generate ideas/suggestions. |
| Works with others to complete a project. |

## Occupational Profiles for Specialized Work in Information Technology Management

The following occupational profiles highlight the technical competencies and top 20 tasks associated with each of the IT clusters. The newly developed IT 2210 structure includes clusters of IT work and specialties found as part of our study. **Agencies may use these specialties or use other specialties based on their analysis of work.**

Agencies may use the competencies and tasks contained in these occupational profiles to support key workforce efforts such as workforce planning, training and development, performance management, recruitment, and selection. Through job analysis (5 CFR § 300.103), agencies must determine the applicability of these competencies to positions within their agency. Please refer to OPM's Delegated Examining Operations Handbook for more information on conducting a job analysis. When used for selection, the competencies must be used in conjunction with the appropriate OPM Qualification Standards.

## Occupational Profiles for IT Operations and Security

This cluster involves the planning, installation, operation, and maintenance of hardware and software systems, as well as ensuring the security and integrity of systems, networks, and data.

### Occupational Profile for Customer Support

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Customer Support.

| **Customer Support** | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Accessibility | Information Assurance | Quality Assurance |
| Asset Management | Information Systems and Network Security | Requirements Analysis and Management |
| Change Management | Information Technology Continuity of Operations (COOP) | Risk Management |
| Communications Security Management | Information Technology Laws and Guidelines | Security |
| Compliance | Information Technology Resources Strategy and Planning | Security Incident Management |
| Computer Network Defense | Infrastructure Design | Security Models |
| Configuration Management | Internal Controls | Service Incident Management |
| Education and Training | Operating Systems | Systems Life Cycle |

| Customer Support | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Encryption | Operations Support | Technical Documentation |
| Hardware | Physical Security | Technology Awareness |
| Identity Management | | |

| Customer Support |
|---|
| **Important Technical Tasks** |
| Analyzes and diagnoses computer hardware, software, or system malfunctions or problems. |
| Collaborates with others to resolve information technology issues. |
| Communicates with customers about products, procedures, and policies. |
| Confers with customers or users to assess problems. |
| Confers with users to identify the need for, or evaluate the effectiveness of, computer programs or IT systems. |
| Determines appropriate products or services for clients or customers. |
| Develops a working knowledge of the customer's business or function. |
| Develops and implements customer support policies, procedures, and standards. |
| Gathers customer feedback on the customer support process. |
| Gathers information in order to provide services to customers. |
| Identifies computer incidents and escalates to appropriate authority. |
| Identifies needs or problems and determines corrective actions. |
| Integrates client expectations into the delivery process or products. |
| Notifies others of equipment repair or maintenance needs. |
| Prepares problem solution summaries (for example, help files) for users. |
| Responds to customer inquiries. |
| Responds to customer problems or complaints. |
| Reviews customer information. |
| Uses automation or other technology to improve delivery of services. |
| Works with clients to set standards for services and products. |

## Occupational Profile for Information Security

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Information Security.

| Information Security | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Asset Management | Information Systems Security Certification | Quality Assurance |
| Change Management | Information Technology Architecture | Requirements Analysis and Management |
| Cloud Services | Information Technology Continuity of Operations (COOP) | Risk Management |
| Communications Security Management | Information Technology Laws and Guidelines | Security |
| Compliance | Information Technology Performance Monitoring | Security Incident Management |
| Computer Forensics | Information Technology Program Management | Security Models |
| Computer Network Defense | Information Technology Resources Strategy and Planning | Service Incident Management |
| Configuration Management | Infrastructure Design | Systems Design |
| Education and Training | Internal Controls | Systems Life Cycle |
| Encryption | Network Engineering | Systems Testing and Evaluation |
| Enterprise Architecture | Network Management | Technical Documentation |
| Hardware | Operating Systems | Technology Awareness |
| Identity Management | Operations Support | Vulnerabilities Assessment |
| Information Assurance | Physical Security | Web Technology |
| Information Systems and Network Security | | |

| Information Security |
|---|
| **Important Technical Tasks** |
| Advises management, staff, and users on cybersecurity policy. |
| Assesses systems operations to ensure systems conform with requirements. |
| Conducts or assists with cybersecurity incident investigations. |

| Information Security |
| --- |
| **Important Technical Tasks** |
| Conducts security or compliance inspections. |
| Determines implications of new and upgraded technologies to the cybersecurity program. |
| Develops cybersecurity action plans and milestones. |
| Develops cybersecurity policies and procedures. |
| Develops, identifies, or implements IT system security standards and requirements. |
| Develops, reviews, or implements IT system cybersecurity plans and procedures. |
| Identifies system security requirements. |
| Identifies vulnerabilities and critical assets. |
| Implements organizational security policies and procedures. |
| Implements system cybersecurity policies. |
| Provides cybersecurity advice on implementation plans, standard operating procedures, maintenance documentation, and maintenance training materials. |
| Recommends required actions to correct software, network, and system deviations from implemented security postures. |
| Recommends security changes to systems and system components. |
| Recommends security control remediations based on security reviews. |
| Researches, resolves, or recommends solutions to IT system security problems. |
| Supports cybersecurity compliance activities. |
| Verifies security processes and procedures are followed by staff when performing their work. |

## Occupational Profile for Network Services

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Network Services.

| Network Services | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Asset Management | Information Technology Continuity of Operations (COOP) | Quality Assurance |
| Change Management | Information Technology Laws and Guidelines | Requirements Analysis and Management |
| Communications Security Management | Information Technology Performance Assessment | Risk Management |
| Compliance | Information Technology Performance Monitoring | Security |
| Computer Network Defense | Information Technology Program Management | Security Incident Management |
| Configuration Management | Information Technology Resources Strategy and Planning | Security Models |
| Education and Training | Infrastructure Design | Service Incident Management |
| Encryption | Internal Controls | Systems Design |
| Enterprise Architecture | Logical Systems Design | Systems Integration |
| Hardware | Migration and Modernization | Systems Life Cycle |
| Identity Management | Network Engineering | Systems Testing and Evaluation |
| Information Assurance | Network Management | Technical Documentation |
| Information Systems and Network Security | Operating Systems | Technology Awareness |
| Information Systems Security Certification | Operations Support | Telecommunications |
| Information Technology Architecture | Physical Security | Vulnerabilities Assessment |

| Network Services |
| --- |
| **Important Technical Tasks** |
| Defines network architecture, infrastructure, or resource requirements (for example, bandwidth, capacity, telecommunications). |
| Defines network system or software standards and requirements. |
| Defines physical network architecture, infrastructure, or specifications. |
| Designs or maintains computer networks. |
| Designs or maintains systems, architectures, or infrastructures (for example, networks or telecommunication systems, database architectures). |
| Develops or reviews IT system operational or maintenance procedures. |
| Develops troubleshooting or diagnostic techniques or methods. |
| Ensures network availability, reliability, and optimal performance. |
| Establishes and configures logical ports, protocols, and services related to the network and IT systems. |
| Identifies system and network capabilities. |
| Identifies system and network protection needs. |
| Installs, integrates, or configures IT system network hardware or software. |
| Installs, maintains, troubleshoots, repairs, or replaces telecommunication parts, equipment, or systems. |
| Maintains network infrastructure device operating system software. |
| Monitors systems for operational capacity, stability, and performance. |
| Participates in change control (for example, reviewing configuration change requests). |
| Recommends network infrastructure enhancements. |
| Recommends required actions to correct software, network, and system deviations from implemented security postures. |
| Repairs or upgrades complex computer hardware or systems. |
| Sets up or installs equipment or systems (for example, computers, security devices, telecommunications systems). |

## Occupational Profile for Operating Systems

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Operating Systems.

| Operating Systems | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Accessibility | Information Technology Architecture | Quality Assurance |
| Asset Management | Information Technology Continuity of Operations (COOP) | Requirements Analysis and Management |
| Business Process Reengineering | Information Technology Laws and Guidelines | Risk Management |
| Change Management | Information Technology Performance Assessment | Security |
| Cloud Services | Information Technology Performance Monitoring | Security Incident Management |
| Communications Security Management | Information Technology Program Management | Security Models |
| Compliance | Information Technology Resources Strategy and Planning | Service Incident Management |
| Computer Network Defense | Infrastructure Design | Software Testing and Evaluation |
| Configuration Management | Internal Controls | Systems Design |
| Education and Training | Licenses and Subscriptions | Systems Integration |
| Encryption | Logical Systems Design | Systems Life Cycle |
| Enterprise Architecture | Migration and Modernization | Systems Testing and Evaluation |
| Hardware | Operating Systems | Technical Documentation |
| Identity Management | Operations Support | Technology Awareness |
| Information Assurance | Physical Security | Vulnerabilities Assessment |
| Information Systems and Network Security | Process Control | Web Technology |
| Information Systems Security Certification | | |

| Operating Systems |
| --- |
| **Important Technical Tasks** |
| Analyzes and diagnoses computer hardware, software, or system malfunctions or problems. |
| Analyzes IT system requirements or environment. |
| Assesses systems operations to ensure systems conform with requirements. |
| Confers with users to identify the need for, or evaluate the effectiveness of, computer programs or IT systems. |
| Configures software systems. |
| Creates or maintains documentation for computer systems, applications, programs, or databases. |
| Develops or updates IT system manuals, handbooks, or other user materials. |
| Develops standard operating procedures to support operating systems. |
| Develops troubleshooting or diagnostic techniques or methods. |
| Implements new operating systems patches, upgrades, and releases. |
| Installs, integrates, or configures IT system network hardware or software. |
| Keeps up with new technological advancements related to operating systems. |
| Monitors systems for operational capacity, stability, and performance. |
| Oversees, evaluates, or coordinates the installation or implementation of IT system version controls or systems enhancements. |
| Participates in change control (for example, reviewing configuration change requests). |
| Performs functional verifications, tests, or audits of IT systems. |
| Provides information to others to ensure they know how and when to integrate automation or other technologies into their jobs. |
| Provides technical advice or assistance to others. |
| Sets up or installs equipment or systems (for example, computers, security devices, telecommunications systems). |
| Starts up, recycles, or shuts down IT systems. |

### Occupational Profile for Systems Administration

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Systems Administration.

| Systems Administration | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Accessibility | Information Systems Security Certification | Quality Assurance |
| Asset Management | Information Technology Architecture | Requirements Analysis and Management |
| Change Management | Information Technology Continuity of Operations (COOP) | Risk Management |
| Cloud Services | Information Technology Laws and Guidelines | Security |
| Communications Security Management | Information Technology Performance Monitoring | Security Incident Management |
| Compliance | Information Technology Resources Strategy and Planning | Security Models |
| Computer Network Defense | Infrastructure Design | Service Incident Management |
| Configuration Management | Internal Controls | Systems Design |
| Education and Training | Logical Systems Design | Systems Integration |
| Encryption | Migration and Modernization | Systems Life Cycle |
| Enterprise Architecture | Network Management | Systems Testing and Evaluation |
| Hardware | Operating Systems | Technical Documentation |
| Identity Management | Operations Support | Technology Awareness |
| Information Assurance | Physical Security | Vulnerabilities Assessment |
| Information Systems and Network Security | | |

| Systems Administration |
| --- |
| **Important Technical Tasks** |
| Analyzes and diagnoses computer hardware, software, or system malfunctions or problems. |
| Conducts or assists with cybersecurity incident investigations. |
| Conducts security or compliance inspections. |
| Creates or maintains documentation for computer systems, applications, programs, or databases. |
| Develops processes and procedures for updating and patching of system software. |
| Develops troubleshooting or diagnostic techniques or methods. |
| Installs, sets up, maintains, troubleshoots, upgrades, or repairs equipment or systems (for example, telecommunications devices, computers, printers). |
| Installs, uninstalls, configures, or integrates network hardware or software. |
| Maintains inventories of relevant information technology resources (for example, systems, hardware, software). |
| Modifies products or services based on suggestions, feedback, or needs of customers. |
| Monitors or maintains security of IT systems or data (for example, maintains logs, controls access, enables security features). |
| Monitors systems for operational capacity, stability, and performance. |
| Oversees the implementation of systems security plans and procedures. |
| Oversees, evaluates, or coordinates the installation or implementation of IT system version controls or systems enhancements. |
| Participates in change control (for example, reviewing configuration change requests). |
| Performs file management functions (for example, allocation, deletion, backup, recovery, upgrades). |
| Performs IT system backup or recovery operations. |
| Performs storage management. |
| Starts up, recycles, or shuts down IT systems. |
| Uses automation or other technology to improve delivery of services. |

## Occupational Profiles for IT Development and Analysis

This cluster focuses on the design, development, testing, and implementation of new and improved information systems.

### Occupational Profile for Applications and Software

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Applications and Software.

| Applications and Software | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Accessibility | Information Assurance | Software Development |
| Application Development | Information Technology Resources Strategy and Planning | Software Engineering |
| Business Process Reengineering | Logical Systems Design | Software Testing and Evaluation |
| Change Management | Migration and Modernization | Systems Design |
| Compliance | Modeling and Simulation | Systems Life Cycle |
| Configuration Management | Object-Oriented Technology | Systems Testing and Evaluation |
| Continuous Integration/Continuous Deployment (CI/CD) | Programming Languages | Technical Documentation |
| Data Analysis | Quality Assurance | Technology Awareness |
| Data Extraction and Transformation | Requirements Analysis and Management | User Interface/User Experience Design (UI/UX) |
| Data Management | Risk Management | Web Technology |
| Database Management Systems | Security | |

| Applications and Software |
|---|
| **Important Technical Tasks** |
| Analyzes and diagnoses computer hardware, software, or system malfunctions or problems. |
| Analyzes IT system requirements or environment. |
| Analyzes system capabilities and requirements. |
| Consults with customers about software system design and maintenance. |

| Applications and Software |
| --- |
| **Important Technical Tasks** |
| Creates or maintains documentation for computer systems, applications, programs, or databases. |
| Develops a working knowledge of the customer's business or function. |
| Develops or maintains IT system testing strategies, data, standards, plans, or scenarios. |
| Develops specifications for the design or modification of IT systems or applications. |
| Develops, modifies, or debugs computer applications or software. |
| Interprets and applies guidelines, standards, and policies relevant to applications and software. |
| Modifies products or services based on suggestions, feedback, or needs of customers. |
| Participates in applications and software code reviews to ensure accuracy. |
| Participates in change control (for example, reviewing configuration change requests). |
| Participates in project milestone and final reviews. |
| Performs functional verifications, tests, or audits of IT systems. |
| Performs IT system testing or validation procedures (for example, regression, user acceptance, system integration). |
| Performs source code management using version control tools. |
| Provides technical support of applications and software. |
| Tracks, interprets, or reports systems test results. |
| Writes software using programming languages and other tools. |

### Occupational Profile for Data Management

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Data Management.

| Data Management | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Business Process Reengineering | Data Management | Migration and Modernization |
| Change Management | Data Visualization | Quality Assurance |
| Cloud Services | Database Administration | Requirements Analysis and Management |
| Compliance | Database Management Systems | Security |
| Configuration Management | Information Assurance | Systems Design |
| Data Analysis | Information Technology Resources Strategy and Planning | Technical Documentation |
| Data Architecture | Logical Systems Design | Technology Awareness |
| Data Extraction and Transformation | | |

| Data Management |
|---|
| **Important Technical Tasks** |
| Assesses systems operations to ensure systems conform with requirements. |
| Collaborates with subject matter experts or others to identify the types of data or information to be processed, stored, or transmitted by a system. |
| Coordinates the Integration of IT system subsystems (e.g., APIs, database management systems). |
| Creates or maintains documentation for computer systems, applications, programs, or databases. |
| Develops databases, record systems, or information tracking systems. |
| Develops, manages, or maintains databases or information tracking systems. |
| Identifies physical and logical database characteristics. |
| Identifies unique identifiers in the database. |
| Implements data management standards, requirements, and specifications. |
| Maintains databases or information tracking systems. |
| Maintains or controls the data dictionary and associated metadata. |

| Data Management |
| --- |
| **Important Technical Tasks** |
| Modifies products or services based on suggestions, feedback, or needs of customers. |
| Monitors or maintains security and confidentiality of records, data, equipment, or systems. |
| Monitors systems for operational capacity, stability, and performance. |
| Participates in change control (for example, reviewing configuration change requests). |
| Prepares data for export and data analysis or visualization. |
| Processes or analyzes data using computer software or applications. |
| Uses automation or other technology to improve delivery of services. |
| Uses complex or large-scale databases. |
| Uses data retention policies and procedures to evaluate data for archiving or dispositioning. |

### Occupational Profile for Systems Analysis

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Systems Analysis.

| Systems Analysis | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Accessibility | Information Technology Architecture | Security |
| Business Process Reengineering | Information Technology Program Management | Service Incident Management |
| Change Management | Information Technology Resources Strategy and Planning | Software Testing and Evaluation |
| Cloud Services | Infrastructure Design | Systems Design |
| Compliance | Logical Systems Design | Systems Integration |
| Configuration Management | Migration and Modernization | Systems Life Cycle |
| Data Analysis | Operations Support | Systems Testing and Evaluation |
| Education and Training | Quality Assurance | Technical Documentation |
| Enterprise Architecture | Requirements Analysis and Management | Technology Awareness |
| Information Assurance | Risk Management | Web Technology |
| Information Systems and Network Security | | |

| Systems Analysis |
|---|
| **Important Technical Tasks** |
| Analyzes designs, operations, or processes. |
| Analyzes IT system requirements or environment. |
| Analyzes system capabilities and requirements. |
| Conducts reviews or walk throughs of systems or applications. |
| Confers with users to identify the need for, or evaluate the effectiveness of, computer programs or IT systems. |
| Creates or maintains documentation for computer systems, applications, programs, or databases. |
| Determines essential system capabilities that align with business functions. |
| Develops implementation plans or strategies for IT systems. |

| Systems Analysis |
| --- |
| **Important Technical Tasks** |
| Develops or maintains IT system testing strategies, data, standards, plans, or scenarios. |
| Develops test, appraisal, or evaluation plans for programs, processes, products, or models. |
| Develops, reviews, or implements information management plans. |
| Evaluates interface between operational and performance requirements of overall system. |
| Identifies and accommodates technology and resource constraints. |
| Identifies customers' IT system requirements. |
| Implements operational, program, or project plans to meet objectives. |
| Participates in change control (for example, reviewing configuration change requests). |
| Provides input into program or project budget or cost estimates. |
| Reviews or recommends automation of business processes. |
| Serves as liaison between employees, users, clients, and customers. |
| Uses automation or other technology to improve delivery of services. |

### Occupational Profile for Internet/Web Services

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Internet/Web Services.

| Internet/Web Services | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Accessibility | Information Assurance | Requirements Analysis and Management |
| Application Development | Information Systems and Network Security | Risk Management |
| Business Process Reengineering | Information Technology Architecture | Security |
| Change Management | Information Technology Resources Strategy and Planning | Software Development |
| Cloud Services | Infrastructure Design | Software Engineering |
| Compliance | Logical Systems Design | Software Testing and Evaluation |
| Computer Network Defense | Migration and Modernization | Systems Design |
| Configuration Management | Modeling and Simulation | Technical Documentation |
| Data Management | Operating Systems | Technology Awareness |
| Education and Training | Programming Languages | User Interface/User Experience Design (UI/UX) |
| Enterprise Architecture | Quality Assurance | Web Technology |
| Identity Management | | |

| Internet/Web Services |
|---|
| **Important Technical Tasks** |
| Collaborates with web development professionals, such as front-end or back-end developers, to complete the full scope of web development projects. |
| Communicates with others to address hardware or software issues affecting web sites. |
| Confers with users to identify the need for, or evaluate the effectiveness of, computer programs or IT systems. |
| Coordinates the Integration of IT system subsystems (e.g., APIs, database management systems). |
| Creates tools or products to support application or system development. |
| Designs or develops web sites or web-based applications. |

| Internet/Web Services |
| --- |
| **Important Technical Tasks** |
| Determines sources of webpage or server problems and takes action to correct problems. |
| Identifies, utilizes, or creates reusable IT system components. |
| Incorporates human factors in developing end user interfaces. |
| Informs website users of problems, problem resolutions, or application changes and updates. |
| Maintains web sites. |
| Modifies products or services based on suggestions, feedback, or needs of customers. |
| Performs IT system testing or validation procedures (for example, regression, user acceptance, system integration). |
| Performs or directs website updates. |
| Performs user testing or usage analyses to determine websites' effectiveness or usability. |
| Provides clear, detailed descriptions of websites, applications, or systems, such as product features, activities, software, communication protocols, programming languages, and operating systems software and hardware. |
| Reports computer security incidents to the appropriate incident response team. |
| Reviews or updates webpage content or links. |
| Uses automation or other technology to improve delivery of services. |
| Writes supporting code for Web applications or websites. |

## Occupational Profile for IT Strategy and Planning

This cluster encompasses strategic planning, policy development, and enterprise architecture.

## Occupational Profile for Enterprise Architecture

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Enterprise Architecture.

| Enterprise Architecture | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Business Process Reengineering | Information Systems Security Certification | Product Evaluation |
| Change Management | Information Technology Architecture | Quality Assurance |
| Cloud Administration | Information Technology Continuity of Operations (COOP) | Requirements Analysis and Management |
| Cloud Engineering | Information Technology Laws and Guidelines | Risk Management |
| Cloud Services | Information Technology Performance Assessment | Security |
| Communications Security Management | Information Technology Performance Monitoring | Security Incident Management |
| Compliance | Information Technology Program Management | Security Models |
| Computer Network Defense | Information Technology Resources Strategy and Planning | Service Incident Management |
| Configuration Management | Infrastructure Design | Systems Design |
| Data Architecture | Internal Controls | Systems Engineering |
| Data Management | Logical Systems Design | Systems Integration |
| Education and Training | Migration and Modernization | Systems Life Cycle |
| Encryption | Network Engineering | Systems Testing and Evaluation |
| Enterprise Architecture | Network Management | Technical Documentation |
| Hardware | Operating Systems | Technology Awareness |
| Identity Management | Operations Support | Vulnerabilities Assessment |
| Information Assurance | Physical Security | Web Technology |

| Enterprise Architecture | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Information Systems and Network Security | Process Control | |

| Enterprise Architecture |
|---|
| **Important Technical Tasks** |
| Analyzes IT system requirements or environment. |
| Creates diagrams to visually represent a baseline architecture, a target architecture, or a sequencing plan. |
| Designs or maintains systems, architectures, or infrastructures (for example, networks or telecommunication systems, database architectures). |
| Determines essential system capabilities that align with business functions. |
| Develops and Implements Architecture Goals, Objectives, Principles and Standards |
| Develops architectural governance standards, policies, and procedures. |
| Develops enterprise architecture. |
| Develops, reviews, or implements enterprise architecture maturity plans. |
| Develops, reviews, or implements IT modernization plans or roadmaps. |
| Evaluates the applicability of the latest technology, information, or research to program needs. |
| Explores new work methods, systems, or decision-making using automation or other technology. |
| Identifies and evaluates the applicability of off-the-shelf (commercial or government) products or systems. |
| Identifies enterprise architecture issues and potential resolutions as part of the technical assistance and review processes. |
| Implements data management standards, requirements, and specifications. |
| Implements organizational information infrastructure. |
| Participates in change control (for example, reviewing configuration change requests). |
| Recommends or reviews development or procurement of IT system elements (for example, hardware, software applications). |
| Reviews artifacts and applies architectural principles to ensure alignment with architecture and business goals. |
| Reviews enterprise information technology (IT) goals and objectives. |
| Uses automation or other technology to improve delivery of services. |

## Occupational Profile for Policy and Planning

The table below presents the important technical competencies and top 20 important tasks for information technology management work in Policy and Planning.

| Policy and Planning | | |
|---|---|---|
| **Important Technical Competencies** | | |
| Acquisition Strategy | Enterprise Architecture | Physical Security |
| Asset Management | Information Assurance | Quality Assurance |
| Budget Administration | Information Systems and Network Security | Requirements Analysis and Management |
| Business Process Reengineering | Information Technology Capital Planning and Investment Assessment | Risk Management |
| Change Management | Information Technology Continuity of Operations (COOP) | Security |
| Cloud Services | Information Technology Laws and Guidelines | Security Incident Management |
| Compliance | Information Technology Performance Monitoring | Systems Design |
| Computer Network Defense | Information Technology Program Management | Systems Life Cycle |
| Configuration Management | Information Technology Resources Strategy and Planning | Technical Documentation |
| Contracting/ Procurement | Infrastructure Design | Technology Awareness |
| Education and Training | Internal Controls | |

| Policy and Planning |
|---|
| **Important Technical Tasks** |
| Administers program or project budgets. |
| Creates an organizational environment that encourages staff to stay current and informed about new automation or other technology. |
| Develops or reviews bid specifications, requests for proposals, or statements of work. |
| Directs or interpret broad policies and guidelines for program planning and development. |
| Identifies critical technology procurement requirements. |
| Identifies project, system, or certification documentation requirements or procedures. |

| Policy and Planning |
| --- |
| **Important Technical Tasks** |
| Monitors contracts (includes administering, extending, modifying, or terminating contracts or licensing agreements). |
| Participates in project milestone and final reviews. |
| Prepares budget requests or justifications for funding. |
| Presents cost/benefit estimates of projects or programs to higher management. |
| Promotes the establishment or use of organizational policies, programs, or procedures (for example, information security awareness training programs). |
| Reviews enterprise information technology (IT) goals and objectives. |
| Serves as a liaison between government personnel (inside and outside the organization), representatives of business and industry, trade and professional associations, the media, or the public. |

## Federal Workforce Competency Initiative (FWCI) General Competencies

**Attention to Detail -** Is thorough when performing work and conscientious about attending to detail.

**Conflict Management** - Manages and resolves conflicts, grievances, confrontations, or disagreements in a constructive manner to minimize negative personal impact.

**Creative Thinking** - Uses imagination to develop new insights into situations and applies innovative solutions to problems; designs new methods where established methods and procedures are inapplicable or are unavailable.

**Customer Service** - Works with clients and customers 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.

Note: Clients and customers include 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.

**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.

**Digital Collaboration -** Uses digital tools, technologies, or social media for communication, knowledge-sharing, and collaborative processes; works with others to construct and create resources and knowledge, or provide services, in a digital environment.

**External Awareness -** Understands and keeps up-to-date on local, national, and international trends and policies that affect the organization and shape stakeholders' views; is aware of the organization's impact on the external environment.

**Flexibility** - Is open to change and new information; adapts behavior or work methods in response to new information, changing conditions, or unexpected obstacles; effectively deals with ambiguity.

**Influencing/Negotiating** - Persuades others to accept recommendations, cooperate, or change their behavior; works with others towards an agreement; negotiates to find mutually acceptable solutions.

**Information Management** - Identifies a need for and knows where or how to gather information; organizes and maintains information or information management systems.

**Integrity/Honesty** - Contributes to maintaining the integrity of the organization; displays high standards of ethical conduct and understands the impact of violating these standards on an organization, self, and others; is trustworthy.

**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.

**Leadership -** Influences, motivates, and challenges others; adapts leadership styles to a variety of situations.

**Learning -** Uses efficient learning techniques to acquire and apply new knowledge and skills; uses training, feedback, or other opportunities for self- learning and development.

**Mathematical Reasoning -** Solves practical problems by choosing appropriately from a variety of mathematical or statistical techniques.

**Memory -** Recalls information that has been presented previously.

**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.

**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.

**Partnering** - Develops networks and builds alliances; collaborates across boundaries to build strategic relationships and achieve common goals.

**Planning and Evaluating** - 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.

**Problem Solving** - Identifies problems; determines accuracy and relevance of information; uses sound judgment to generate and evaluate alternatives, and to make recommendations.

**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.

**Reading Comprehension -** Understands and interprets written material, including technical material, rules, regulations, instructions, reports, charts, graphs, or tables; applies what is learned from written material to specific situations.

**Reasoning** - Identifies rules, principles, or relationships that explain facts, data, or other information; analyzes information and makes correct inferences or draws accurate conclusions.

**Resilience –** Deals effectively with pressure; remains optimistic and persistent, even under adversity. Recovers quickly from setbacks.

**Self-Management -** Sets well-defined and realistic personal goals; displays a high level of initiative, effort, and commitment towards completing assignments in a timely manner; works with minimal supervision; is motivated to achieve; demonstrates responsible behavior.

**Teaching Others** - Helps others learn through formal or informal methods; identifies training needs; provides constructive feedback; coaches others on how to perform tasks; acts as a mentor.

**Teamwork** - Encourages and facilitates cooperation, pride, trust, and group identity; fosters commitment and team spirit; works with others to achieve goals.

**Technical Competence** - Uses knowledge that is acquired through formal training or on-the-job experience to perform one's job; works with, understands, and evaluates technical information related to the job; advises others on technical issues.

**Technology Application** - Uses computers, software applications, databases, and automated systems to accomplish work; uses machines, tools, instruments, or equipment effectively.

**Writing** - Recognizes or uses correct English grammar, punctuation, and spelling; communicates information (for example, facts, ideas, or messages) in a succinct and organized manner; produces written information, which may include technical material, that is appropriate for the intended audience.

## Federal Workforce Competency Initiative (FWCI) Technical Competencies

**Accessibility:** Knowledge of tools, equipment, and technologies used to help individuals use computer equipment, software, and applications.

**Acquisition Strategy:** Knowledge of the principles and methods for developing an integrated acquisition management plan that describes the business, technical, and support strategies, including the relationship between the acquisition phases, work efforts, and key program events (for example, decision points, contract awards, test activities).

**Application Development:** Uses programming languages to script and automate tasks; applies programming languages and skills across multiple platforms or frameworks.

**Asset Management:** Knowledge of methods and tools used to effectively oversee, track, and optimize IT assets throughout their lifecycle. This includes identifying assets, maintaining accurate records, evaluating utilization, planning for upgrades or replacements, disposing of retired equipment, and ensuring compliance with regulations and protocols.

**Budget Administration:** Knowledge of the principles and practices of budget administration and analysis; including preparing, justifying, reporting on, and executing the budget; and the relationships among program, budget, accounting, and reporting systems.

**Business Process Reengineering:** Knowledge of methods, metrics, tools, and techniques for the systematic improvement of organizational processes.

**Change Management:** Knowledge of principles, strategies, and techniques for planning, implementing, and evaluating change in the organization.

**Cloud Administration:** Knowledge of the principles, tools, and methods used to implement and maintain the infrastructure and functionality of an organization's cloud computing structures, including implementing organizational policies, resource management, and cost control.

**Cloud Engineering:** Knowledge of the principles, methods, and tools for planning, designing, deploying, and maintaining cloud infrastructure, including architecting, development, automation, and administration.

**Cloud Services:** Knowledge of cloud computing concepts, service models, environments, and delivery models.

**Communications Security Management:** Knowledge of the principles, policies, and procedures involved in ensuring the security of communications services and data, and in maintaining the communications environment on which it resides.

**Compliance:** Knowledge of procedures for assessing, evaluating, and monitoring programs or projects for compliance with Federal laws, regulations, and guidance, including agency policies.

**Computer Forensics:** Knowledge of tools and techniques used in data recovery and preservation of electronic evidence.

**Computer Network Defense:** Knowledge of defensive measures to detect, respond, and protect information, IT systems, and networks from threats.

**Configuration Management:** Knowledge of the principles and methods for planning, managing, and documenting the implementation, update, or integration of IT system components to assess impact across multiple IT systems and organizations.

**Continuous Integration/Continuous Deployment (CI/CD):** Knowledge of the practice of continuous integration of source code changes into shared systems and continuous testing and delivery of code changes.

**Contracting/Procurement:** Knowledge of various types of contracts, techniques, or requirements (for example, Federal Acquisitions Regulations) for contracting or procurement, and contract negotiation and administration.

**Data Analysis:** Knowledge of the principles, methods, and processes used to analyze data and datasets; including investigating trends or anomalies, establishing relationships, and identifying patterns.

**Data Architecture:** Knowledge of policies, standards, and models that govern the collection, storage, arrangement, integration, and use of data in organizations to ensure that the data management strategy aligns with business objectives and requirements.

**Data Extraction and Transformation:** Retrieves and ingests disparate types of data from a variety of unstructured and structured sources, and then organizes, cleans, and transforms data sets for easy access, analysis, and optimization.

**Data Management:** Knowledge of the principles, procedures, and tools of data management, such as modeling techniques, data normalization, metadata, data dictionaries, data backup, data recovery, data warehousing, data mining, data archiving, data disposal, and data standardization processes.

**Data Visualization:** Utilizes tools, techniques, and software to generate reports or visualizations that convey data analyses, findings, and limitations.

**Database Administration:** Knowledge of the principles, methods, and tools for automating, developing, implementing, or administering database systems.

**Database Management Systems:** Knowledge of the uses of database management systems and software to control the organization, storage, retrieval, routing, security, and integrity of data.

**Distributed Systems:** Knowledge of the principles, theoretical concepts, and tools underlying distributed computing systems, including their associated components and communication standards.

**Education and Training:** Knowledge of teaching, training, research, making presentations, lecturing, testing, and other instructional methods.

**Embedded Computers/Internet of Things (IoT):** Knowledge of specifications and uses of specialized computer systems used to control devices (for example, temperature controllers,

programmable logic controllers, video cameras), including the appropriate programming languages.

**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.

**Enterprise Architecture:** Knowledge of principles, concepts, and methods of enterprise architecture to align information technology (IT) strategy, plans, and systems with the mission, goals, structure, and processes of the organization.

**Hardware:** Knowledge of specifications, uses, and types of computers or other physical IT equipment.

**Hardware Engineering:** Knowledge of the principles, methods, and tools for designing, developing, and testing computer or computer-related equipment.

**Identity Management:** Knowledge of methods and controls to validate and authenticate the identity of individuals to verify access approval and level and monitor activity to ensure that only authorized access is taking place.

**Information Assurance:** Knowledge of methods and procedures to protect information systems and data by ensuring their availability, authentication, confidentiality, privacy, and integrity.

**Information Systems and Network Security:** Knowledge of methods, tools, and procedures, including development of information or network security plans, to prevent systems vulnerabilities, and provide or restore security of systems and network services.

**Information Systems Security Certification:** Knowledge of the principles, methods, and tools for information systems governance, including evaluating security features against a set of specified security requirements. Includes developing security assessment and authorization plans and procedures, documenting deficiencies, reporting corrective actions, and recommending changes to improve the security of information systems.

**Information Technology Architecture:** Knowledge of architectural methodologies used in the design and development of IT systems, including the physical structure of a system's internal operations and interactions with other systems.

**Information Technology Capital Planning and Investment Assessment:** Knowledge of the principles and methods of capital investment analysis or business case analysis, including return on investment analysis, investment performance management and control, portfolio management, IT cost classification and analysis, and IT investment data reporting.

**Information Technology Continuity of Operations (COOP):** Knowledge of policies, procedures, and guidelines for ensuring the continuity of critical IT operations; this includes establishing, maintaining, and reviewing IT continuity of operations plans.

**Information Technology Laws and Guidelines:** Knowledge of the laws, regulations, policies, and guidelines (for example, Executive Orders, Section 508 of the Rehabilitation Act of 1973, FITARA, FISMA) governing the use, security, privacy, and accessibility of digital information,

budgeting, and investment management. Applies this information to implement compliant and accessible IT products and solutions.

**Information Technology Performance Assessment:** Knowledge of the principles, methods, and tools (for example, surveys, system performance measures) to assess the effectiveness and practicality of IT systems, networks, or components.

**Information Technology Performance Monitoring:** Knowledge of the principles and methods for monitoring, estimating, documenting, or reporting actual performance or the performance capability of IT systems, networks, or components.

**Information Technology Program Management:** Knowledge of the principles, methods, and tools for the coordinated management of an information technology program to include providing oversight of multiple information technology projects, integrating dependent schedules and deliverables, and related activities (for example, benefits management, life cycle management, program governance).

**Information Technology Resources Strategy and Planning:** Knowledge of the principles, methods, and techniques of information technology (IT) assessment, planning, management, monitoring, and evaluation, such as information technology baseline assessment, interagency functional analysis, contingency planning, and disaster recovery.

**Infrastructure Design:** Knowledge of the architecture and topology of software, hardware, and networks, including wired and wireless networks and telecommunications systems, their components and associated protocols and standards, and how they operate and integrate with one another and with associated controlling software.

**Internal Controls:** Knowledge of the principles, methods, and techniques for establishing internal control activities (for example, access, authorizations, verifications, reconciliations), monitoring their use, and evaluating their performance (for example, identification of material weaknesses or significant deficiencies).

**Licenses and Subscriptions:** Knowledge of the methods and tools used to identify and manage IT service certificates, licenses, and subscription models.

**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.

**Migration and Modernization:** Knowledge of migrating existing applications, databases, and their functionalities into a cloud environment, including rehosting, refactoring, replatforming, rebuilding, or replacing applications or databases.

**Modeling and Simulation:** Applies tools, techniques, and procedures to develop functional, physical, or prototype models and simulations for training, testing and evaluation, to predict behavior and phenomena, to evaluate design alternatives, to support operational preparation, and to visually communicate concepts and/or validate requirements.

**Network Engineering:** Knowledge of the principles, concepts, methods, and tools used for architecting, designing, implementing, and overseeing networked systems.

**Network Management:** Knowledge of the operation, management, and maintenance of network systems, linked systems, and peripherals.

**Object-Oriented Technology:** Knowledge of the principles, methods, tools, and techniques that use object-oriented languages, analysis, and design methodologies.

**Operating Systems:** Knowledge of computer network, workstation, mobile, cloud, and server operating systems and their applications or middleware.

**Operations Support:** Knowledge of procedures to ensure production, delivery, maintenance, or oversight of products and services, including tools and mechanisms for distributing new or enhanced capabilities and remediation of vulnerabilities.

**Physical Security:** Knowledge of methods and controls to protect an organization from natural or man-made threats to physical locations where IT system equipment is located or work is performed (for example, computer rooms, work locations, and equipment rooms).

**Process Control:** Knowledge of the principles, methods, and procedures used for the automatic control of a process, including the design, development, and maintenance of associated software, hardware, and systems.

**Product Evaluation:** Knowledge of methods for researching and analyzing external products or services to determine their potential for meeting organizational standards and business needs.

**Programming Languages:** Knowledge of programming or scripting languages and their applications to enable a system to perform specific functions.

**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.

**Requirements Analysis and Management:** Knowledge of the principles and methods to identify, solicit, analyze, specify, design, and manage functional and infrastructure requirements; includes translating functional requirements into technical requirements and managing requirements used for logical design or presenting alternative technologies, services, or approaches.

**Risk Management:** Knowledge of the principles, methods, and tools used for risk assessment and mitigation, including assessment of failures and their consequences.

**Security:** Knowledge of the laws, regulations, and guidelines related to securing personnel, facilities, and information, including the requirements for handling, transporting, and protecting sensitive or classified information and proper reporting of security incidents.

**Security Incident Management:** Knowledge of the tactics, technologies, principles, and processes to protect, analyze, prioritize, and handle security incidents.

**Security Models:** Knowledge of security models and frameworks (for example, zero trust) that provide principles, concepts, and methods to limit access to IT systems.

**Service Incident Management:** Knowledge of the technologies, principles, procedures, and workflow processes (for example, ticket recording and tracking) used to analyze, prioritize, escalate, and handle service incidents.

**Software Development:** Knowledge of the principles, methods, and tools for designing, developing, and testing software in a given environment.

**Software Engineering:** Knowledge of software engineering design and development methodologies, paradigms, and tools; the software life cycle; software reusability; and software reliability metrics.

**Software Testing and Evaluation:** Knowledge of the principles, methods, and tools for analyzing and developing software test and evaluation procedures.

**Systems Design:** Knowledge of the methods, principles, and tools for designing and evaluating IT systems components (for example, networks, hardware, software, and cloud hosting environments) and developing enterprise and solution architectures.

**Systems Engineering:** Knowledge of the practice of integrating multiple disciplines into a team as part of a structured development process throughout a system's life cycle.

**Systems Integration:** Knowledge of the principles, methods, and procedures for installing, integrating, and optimizing IT system components.

**Systems Life Cycle:** Knowledge of systems life cycle management concepts and frameworks used to plan, develop, implement, operate, maintain, and retire IT systems.

**Systems Testing and Evaluation:** Knowledge of principles, methods, and tools for analyzing and developing systems testing and evaluation procedures and technical characteristics of information technology systems, including identifying critical operational, security, and privacy issues.

**Technical Documentation:** Knowledge of procedures for developing technical and operational support documentation.

**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 IT systems to meet organizational requirements.

**Telecommunications:** Knowledge of the concepts, principles, and theories of transmissions, broadcasting, switching, control, construction, or operation of telecommunications systems.

**User Interface/User Experience Design (UI/UX):** Knowledge of the principles, methods, tools, and techniques for designing and evaluating databases, applications, or systems to optimize the visual and interactive user components (for example, layout, navigation, design scheme) and the total experience of the user, including identification and resolution of user issues.

**Vulnerabilities Assessment:** Knowledge of the principles, methods, and tools for assessing vulnerabilities, and developing or recommending appropriate mitigation countermeasures.

**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.

**U.S. Office of Personnel Management**

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WPI-03914 4/2026