Microsoft Frameworks

White Paper

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IT Occupation Taxonomy v.3.0

Contents

Introduction

How the IT Occupation Taxonomy Benefits Customers, Microsoft, and Partners

During the process of adopting a Microsoft solution, Microsoft, its partners, and its customers must be able to establish clear and natural relationships between their respective job roles and responsibilities. Each may have their own development and operations approach and organizational structure, and these must be reconciled in order to ensure that all parties reference the same individuals within their companies and understand the roles they play during a project or in managing operations. A taxonomy, which classifies objects into an ordered system, can facilitate the identification of these relationships.

This white paper provides a taxonomy, or map, to the natural relationships between information technology (IT) job roles and team roles in the Microsoft Solutions Framework (MSF) and Microsoft Operations Framework (MOF). The intent of this taxonomy is to help customers and partners, regardless of how they organize their business, to easily identify the individuals within the organization who have the needed talents to successfully implement the Microsoft solution. This is an important first step to ensuring a smoothly run project. When everyone involved in a project is using a common terminology to define roles and functions, the potential for miscommunication is greatly reduced. Once the project is complete, the taxonomy can be applied to the operations environment to ensure that the Microsoft solution continues to achieve high performance.

Microsoft contracted with the Northwest Center for Emerging Technologies (NWCET) to define the job roles, or occupation clusters, within this IT occupation taxonomy. NWCET has undertaken a cooperative effort called the Advanced Technology Education project to identify skill standards that reflect industry expectations in IT career clusters.

The results of using the role mappings in this taxonomy are:

- Teams from different organizations clearly understand their roles and responsibilities within a project or operational environment.
- Project and operational risk is reduced by this clarity.
- Partners and customers better understand the roles within the Microsoft Frameworks and can more readily adopt the frameworks, thus realizing the benefits of the frameworks' flexibility.

Microsoft Solutions and Operations Frameworks

To maximize the success of IT projects, Microsoft has made available packaged guidance on effectively designing, developing, deploying, operating, and supporting solutions built on Microsoft technologies. The guidance is organized into two complementary and well-integrated bodies of knowledge, or "frameworks." These are Microsoft Solutions Framework (MSF) and Microsoft Operations Framework (MOF).

Microsoft Solutions Framework provides guidance in the planning, building, and deploying phases of the project life cycle. Microsoft Operations Framework provides guidance for effectively managing production systems within today's complex distributed IT environment.

Information on MSF is available on the Web at: http://www.microsoft.com/msf

Information on MOF is available on the Web at: http://www.microsoft.com/mof

Each of these frameworks has a process model and a team model. The process models each describe a high-level sequence of activities and milestones. The team models each describe best practice role clusters to structure teams and the key activities and competencies of each role cluster. Detailed information on these models can be found at the above links.

This taxonomy document relates standard IT industry job roles and the MSF and MOF team model role clusters to assist the user in making the connection between different environments.

Occupation Clusters

Occupation clusters are logical categorizations of similar critical work functions within an IT job role. This IT occupation taxonomy defines 13 occupation clusters. Each occupation cluster defines representative occupations, baseline critical work functions, and competencies necessary to carry out each role within an IT organization. These occupation clusters, representative occupations, and critical work functions together serve as a guideline to communicate roles and responsibilities commonly associated with IT businesses. This taxonomy document connects these standard IT job elements with the MSF and MOF role clusters and their work functions.

Some of these occupation clusters are not affiliated exclusively with just development or operations activities. As illustrated further into this document, some of these occupation clusters have both project (MSF) and operational (MOF) associations. The associations are based on a combination of the occupation cluster and the critical work functions performed by that occupation, which are described later in this document.

The following is a list of the 13 occupation clusters:

1. Technology architecture development and management
2. Business architecture development and management
3. Information technology (IT) management
4. Database administration and development
5. Network design and administration
6. Third-party management
7. Programming/software development
8. Project management
9. Product management
10. Technical support
11. Technical sales
12. Testing development and management
13. Professional training and user education

Note: In the occupation clusters listed above, the title of technical sales (11) usually is not associated with IT. However, the critical work functions the cluster performs are pivotal to the success of IT efforts and should be represented. The technical sales role, which a customer might not need, might be of greatest interest to partners and others filling the consultative role.

The Anatomy of the Occupation Clusters

Within every organization are individuals performing a wide variety of roles. The Microsoft Solutions and Operations Frameworks (MSF and MOF) are designed for use by any organization introducing new or changing products or technologies. The roles that the frameworks identify must be flexible. Therefore, rather than aligning competencies with a specific job title, which may change within every organization, the IT occupation taxonomy aligns competencies within occupation clusters.

Occupation clusters are logical categorizations of similar critical work functions within an IT job role.

Representative occupations are the most common, industry-standard job titles found within an occupational cluster.

Each occupation cluster lists the baseline critical work functions performed in that role, and the key activities, technical knowledge, and foundation skills that each critical work function requires.

Critical work functions are those baseline functions performed by people in that occupation cluster.

Key activities outline task ownership. They are the baseline tasks performed within each critical work function.

Key knowledge and foundation skills list the experience, capabilities, proficiency levels, and skills sets required to carry out the tasks associated with a particular critical work function within a particular occupation cluster.

The IT occupation taxonomy defines 13 IT occupation clusters, their critical work functions, and key knowledge and skill requirements. These details are described at the base level. The tables provided in this document will enable users to logically align each IT occupation cluster/critical work function combination with the recommended team roles in the Microsoft Solutions and Operations Frameworks (MSF and MOF).

Critical Work Functions and Key Activities

Regardless of the title that labels a job role, it is the critical work functions and key knowledge and skills that will determine what job roles are the right match for each particular team role one plays on a Microsoft project or operations team.

The critical work functions within each occupation cluster are not specific to any one IT environment. Each occupation cluster simply outlines baseline critical work functions, knowledge, and skills required for a typical IT job role. For example, some of the critical work functions for a database administration and development occupation cluster are to identify high-level business rules for data models, determine target environment/platform, apply appropriate database design principles, methodologies, and tools, and be knowledgeable about backup and recovery technology platforms.

The business rules, target environment, design principles and tools, or security platform that exists in an IT enterprise will differ from business to business. But the fact that these baseline functions and knowledge and skill requirements exist for most database administrators and developers is what makes the occupation cluster map work.

Critical work functions will most closely map to job descriptions. An individual may perform multiple critical work functions and multiple individuals may perform the same critical work functions. However, an organization should be able to identify at least one person who performs each of the critical work functions. If an organization does not have anyone on staff who meets the requirements of the critical work function, and if it is a role that a Microsoft technology project requires, then that role would be a candidate for either recruiting or outsourcing.

The Relationship Tables

This document presents the connections between the standard IT job roles and the MSF and MOF role clusters. This information is presented from two perspectives. The first is from the occupational cluster perspective. These tables (one each for MSF and MOF) identify for each occupational cluster the associated Microsoft role clusters. The second is from the Microsoft role cluster perspective. These tables (one each for MSF and MOF) identify for each Microsoft role cluster the associated occupational clusters.

Tables 1 and 3, "Occupational Cluster Perspective (MSF/MOF Role Association)," follow this format:

Occupation Cluster	Representative Occupation	Critical Work Functions	Microsoft Role Cluster	Microsoft Role Cluster Functions

Tables 2 and 4, "MSF/MOF Role Cluster Perspective," follow this format:

Microsoft Role Cluster	Occupation Cluster	Representative Occupation	Microsoft Role Cluster Functions	Critical Work Functions

The content of each cell in the table is a title. For four of the five columns in each table, there is more detailed descriptive information further into this document. The information in each of those cells is automatically linked to its descriptive information.

Within this document, this descriptive information is located after the tables. There are four types of descriptive information:

- Occupation cluster definitions

- Critical work function definitions (which include an itemization of each work function's key activities and knowledge and skill requirements)

- Microsoft role cluster definitions

- Microsoft role cluster functional area definitions

How to Use Tables 1 and 3

Table 1 (pg. 10) and Table 3 (pg. 15) map the 13 occupational clusters in the IT taxonomy to Microsoft Solutions Framework and Microsoft Operations Framework roles. If using this document electronically, you can link to definitions and further information by clicking items within the cells of each table. To return to the table, click the back arrow on the Web tool bar (if the tool bar does not display automatically, enable it).

If using this document in hard copy, you can find a page reference to the same information next to each item.

To assist you in making the connections between a specific IT job role and a Microsoft role:

1. Locate the occupational cluster (column 1) that represents the category of work in which the specific IT job role would normally fall.

2. Review the representative occupations (column 2) that are associated with that occupational cluster to find the job title (or one similar) that represents the work of the subject IT job role.

3. Review all cells of associated critical work functions (column 3) to select the work that is most similar to that specific IT job role.

4. For the relevant critical work functions, view the Microsoft Framework (MSF of MOF) role cluster (column 4) whose responsibilities are similar to the occupation cluster/critical work function combination selected.

5. Review the Microsoft role cluster functions (column 5) to understand the specific work activities for each role.

Example: A project in which an IT Application Architect would participate

1. The first occupation cluster, Technology Architecture Development and Management (row 1 of table), is where the IT architect's job role would normally fall.

2. The representative occupation "Information Systems Architect" is the job title this individual has within his IT organization.

3. The critical work functions (column 3) in row 1, Identify Strategic Customer Requirements and row 3, Determine Systems Solution, match the IT Applications Architect's expertise and work responsibilities.

4. The IT Application Architect's participation in the project would fall within the Product Management (column 4) role cluster and/or the Development Role Cluster.

5. The IT Application Architect's specific project functions (column 5) within the Product Management Role Cluster would be Customer Advocacy and Product Planning. His project function within the Development Role Cluster would be Implementation Architecture and Design.

Table 1: Occupational Cluster Perspective (MSF Role Association)

How to use this table (pg. 9)

Occupation Cluster	Representative Occupations	Critical Work Functions	MSF Role Association	Applicable MSF Role Functions
Technology Architecture Development and Management (pg. 15)	• Application integrator • Business continuity analyst • Cross-enterprise integrator • Data systems designer • Data systems manager • Data warehouse designer • Electronic business specialist • Electronic commerce specialist • Electronic transaction specialist • Electronic transactions implementer • Information systems architect • Information systems planner • Infrastructure analyst • Network architect • Systems analyst • Systems architect • Systems integrator	• Identify strategic customer requirements (pg. 15)	Product Management (pg. 15)	• Marketing (pg. 15) • Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)
		• Provide strategic direction for systems configuration and interoperability (pg. 15) • Provide high-level technology logistics (pg. 15) • Implement systems (pg. 15) • Define security requirements and implement security solutions (pg. 15)	Release Management (pg. 15)	• Infrastructure (pg. 15) • Support (pg. 15)
		• Determine systems solutions (pg. 15) • Implement systems (pg. 15) • Define security requirements and implement security solutions (pg. 15)	Development (pg. 15)	• Implementation Architecture and Design (pg. 15) • Application Development (pg. 15) • Infrastructure Development (pg. 15)
Business architecture development and management (pg. 15)	• Business architect • Business continuity analyst • Data systems manager • Electronic business specialist	• Provide strategic business direction for technology (pg. 15)	Product Management (pg. 15)	• Marketing (pg. 15) • Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)

Table 1: Occupation Clusters ► MSF

Table 1: Occupation Clusters ◄ MSF

Occupation Cluster	Representative Occupations	Critical Work Functions	MSF Role Association	Applicable MSF Role Functions
	• Electronic commerce strategist • Information systems planner • Infrastructure analyst • Infrastructure manager • Infrastructure planner • IT service manager	• Perform infrastructure planning (pg. 15)	Release Management (pg. 15)	• Infrastructure (pg. 15)
Information Technology Management (pg. 15)	• Development manager • Product deployment manager • Product development manager • Product manager • Product release manager • Product testing manager • Support manager • Team manager	• Manage solution definition process and customer expectations (pg. 15) • Manage customer interactions (pg. 15)	Product Management (pg. 15)	• Customer Advocacy (pg. 15) • Product Planning (pg. 15)
		• Manage overall solution development (pg. 15) • Manage IT budgeting process (pg. 15)	Program Management (pg. 15)	• Project Management (pg. 15) • Solution Architecture (pg. 15) • Process Assurance (pg. 15) • Administrative Services (pg. 15)
		• Manage solution release and deployment (pg. 15)	Release Management (pg. 15)	• Infrastructure (pg. 15) • Support (pg. 15) • Operations (pg. 15)
Database administration and development (pg. 15)	• Data administrator • Data analyst • Data architect	• Analyze and design database (pg. 15) • Develop and implement database (pg. 15)	Development (pg. 15)	• Application Development (pg. 15)

Occupation Taxonomy v.3.0

Occupation Cluster	Representative Occupations	Critical Work Functions	MSF Role Association	Applicable MSF Role Functions
	• Data management associate • Data modeler • Database administration associate • Database administrator • Database analyst • Database developer • Database manager • Database modeler • Database security expert • Decision support services specialist • Knowledge architect • Modeling specialist • Senior database administrator • Senior systems analyst • Systems administrator • Systems analyst	• Provide client services (pg. 15)	User Experience (pg. 15)	• Training/Support Material (pg. 15) • Usability Research and Testing (pg. 15)
Network Design and Administration (pg. 15)	• Communications analyst • Data communications analyst • Information systems administrator • Information systems operator	• Perform analysis and design (pg. 15) • Perform configuration and implementation (pg. 15) • Perform security administration (pg. 15)	Development (pg. 15)	• Technology Consulting (pg. 15) • Infrastructure Development (pg. 15)

Table 1: Occupation Clusters ◀ MSF

Occupation Cluster	Representative Occupations	Critical Work Functions	MSF Role Association	Applicable MSF Role Functions
	• IT engineer • Network administrator • Network analyst • Network architect • Network engineer • Network manager • Network operations analyst • Network security analyst • Network specialist • Network technician • Network transport administrator • PC network engineer • PC support specialist • PC systems support lead • Systems administrator • Systems engineer • Technical support specialist • User support specialist	• Perform testing (pg. 15)	Test (pg. 15)	• Test Planning (pg. 15) • Test Engineering (pg. 15) • Test Reporting (pg. 15)
Third-Party Management (pg. 15)	• Business relation manager • Contract manager • Partner manager • Partner relationship manager • Partner support manager • Partner strategy planner • Strategic partner analyst • Third-party contract manager • Third-party manager • Third-party support manager	• Identify and select strategic partners (pg. 15) • Provide strategic direction for partner relationship program (pg. 15) • Develop and manage partner business relationships (pg. 15) • Develop, manage, and negotiate contracts (pg. 15) • Evaluate performance of partners and effectiveness of relationships (pg. 15)	Product Management (pg. 15) Program Management (pg. 15)	• Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15) • Project Management (pg. 15) • Solution Architecture (pg. 15) • Process Assurance (pg. 15) • Administrative Services (pg. 15)

Table 1: Occupation Clusters ► MSF

Occupation Taxonomy v.3.0

Occupation Cluster	Representative Occupations	Critical Work Functions	MSF Role Association	Applicable MSF Role Functions
Programming/ software development (pg. 15)	• Applications analyst • Applications engineer • Business analyst • Computer engineer	• Analyze and design solution structure (pg. 15) • Manage enterprise-wide development activities (pg. 15)	Product Management (pg. 15)	• Customer Advocacy (pg. 15) • Product Planning (pg. 15)
	• Data modeler • Operating system designer/engineer	• Release solutions (pg. 15) • Implement solutions (pg. 15)	Release Management (pg. 15)	• Infrastructure (pg. 15) • Support (pg. 15) • Operations (pg. 15)
	• Operating system programmer/analyst • Program manager • Programmer • Programmer/analyst • Project lead • Software applications specialist • Software architect • Software design engineer • Software design engineer and tester • Software development engineer	• Analyze and design solution structure (pg. 15) • Design/develop programs (pg. 15) • Develop structure (pg. 15) • Implement solutions (pg. 15) • Manage development environment (pg. 15) • Manage enterprise-wide development activities (pg. 15) • Perform development-related security administration (pg. 15)	Development (pg. 15)	• Implementation Architecture and Design (pg. 15) • Application Development (pg. 15) • Infrastructure Development (pg. 15)
	• Software engineer • Software QA specialist • Software tester • Systems analyst • Systems administrator • Test engineer • Tester	• Test programs (pg. 15) • Validate programs (pg. 15)	Test (pg. 15)	• Test Planning (pg. 15) • Test Engineering (pg. 15) • Test Reporting (pg. 15)

Table 1: Occupation Clusters ◄ MSF

Occupation Cluster	Representative Occupations	Critical Work Functions	MSF Role Association	Applicable MSF Role Functions
Project Management (pg. 15)	• Procurement manager • Program budget manager • Program lead • Program manager • Program planner • Program risk manager • Project integration manager • Project lead • Project manager • Project planner • Project quality manager • Resource allocation manager • Risk assessment manager	• Define and manage project scope (pg. 15) • Define and manage project plan and timeline (pg. 15) • Manage project integration (pg. 15) • Develop and manage project budget (pg. 15) • Manage project quality process (pg. 15) • Manage project human resources (pg. 15) • Manage project communication processes (pg. 15) • Assess and manage risks (pg. 15) • Manage project procurement processes (pg. 15)	Program Management (pg. 15)	• Project Management (pg. 15) • Solution Architecture (pg. 15) • Process Assurance (pg. 15) • Administrative Services (pg. 15)
		• Manage project procurement processes (pg. 15)	Release Management (pg. 15)	• Infrastructure (pg. 15)
Product management (pg. 15)	• Product manager • Business analyst • Systems analyst • Systems planner	• Manage customer expectations and customer interaction processes (pg. 15) • Drive feature identification and prioritization (pg. 15) • Drive shared product vision (pg. 15)	Product Management (pg. 15)	• Marketing (pg. 15) • Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)

Table 1: Occupation Clusters ◄ MSF

Occupation Taxonomy v.3.0

Occupation Cluster	Representative Occupations	Critical Work Functions	MSF Role Association	Applicable MSF Role Functions
		• Develop, maintain, and execute the business case (pg. 15) • Develop, maintain, and execute the communications plan (pg. 15) • Support customer in marketing to users, and training users and technical staff (pg. 15)		
Technical Sales (pg. 15)	• Customer account manager • Customer liaison • Customer service representative • Customer support professional • Marketing strategy manager • Product solution manager • Sales consultant • Sales representative • Sales support technician • Service solution manager • Solution delivery manager • System engineer • Technical account manager • Technical sales consultant • Technical specialist	• Develop and manage customer accounts (pg. 15) • Develop product and service solution with customer (pg. 15) • Manage delivery of solution (pg. 15) • Develop and update presentations of product and services (pg. 15) • Assess general market environment (pg. 15) • Develop long-term sales and marketing strategies (pg. 15)	Product Management (pg. 15)	• Marketing (pg. 15) • Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)
Testing Development and Management (pg. 15)	• Software tester • Test analyst • Test engineer • Test lead • Test manager • Test strategy planner • Tester	• Develop test strategy and plan (pg. 15) • Develop test scripts and processes (pg. 15) • Implement test plan (pg. 15) • Analyze test results and findings (pg. 15) • Provide status and develop	Test (pg. 15)	• Test Planning (pg. 15) • Test Engineering (pg. 15) • Test Reporting (pg. 15)

Table 1: Occupation Clusters ◄ MSF

Occupation Cluster	Representative Occupations	Critical Work Functions	MSF Role Association	Applicable MSF Role Functions
	• Testing plan developer • Usability test manager • Usability tester	recommendations based on test results (pg. 15) • Perform usability testing (pg. 15) • Assess effectiveness of test plan, strategy, and processes (pg. 15)		
Professional Training and End User Education (pg. 15)	• Instructional designer • Needs assessment manager • Readiness assessment manager • Technical trainer • Technical training developer • Technical training manager • Trainer • Training manager • Training-needs assessment manager • Training solution developer • Training solution manager • User education professional • User manual developer • User manual tester	• Analyze training needs through skills assessment (pg. 15) • Develop training solutions (pg. 15) • Deliver training (pg. 15) • Assess training effectiveness (pg. 15) • Develop user manuals (pg. 15)	User Experience (pg. 15)	• Accessibility (pg. 15) • Training/Support Material (pg. 15) • Usability Research and Testing (pg. 15) • User Interface Design (pg. 15)

Table 1: Occupation Clusters ◄ MSF

How to Use Tables 2 and 4

Table 2 (pg. 15) and Table 4 (pg. 15) map Microsoft Solutions Framework and Microsoft Operations Framework roles to the 13 occupational clusters in the IT taxonomy. If using this document electronically, you can link to definitions and further information by clicking items within each cell. To return to the table, click the back arrow on the Web tool bar (if the tool bar does not display automatically, enable it).

☐ If using this document in hard copy, you can find a page reference to the same information next to each item.

☐ **To assist you in making the connections between a Microsoft role and a specific IT job role:**

1. Locate the Microsoft role cluster in which you are interested (column 1).

2. Select the occupation cluster (column 2) that represents the category of work that is relevant to the specific role cluster situation.

3. View the representative occupations (click its link or refer to its page number) to identify all the job titles that may be relevant to the situation. This will assist in identifying specific individuals within an IT organization.

4. Review the critical work functions (column 4) to relate these to the applicable Microsoft role functions (column 5).

5. Match the specific individuals within the IT organization with the appropriate Microsoft role functions.

Table 2: MSF Role Cluster Perspective

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
Development (pg. 15)	Technology Architecture Development and Management (pg. 15)	View Representative Occupations for Technology Architecture Development and Management	• Implement systems (pg. 15) • Determine systems solutions (pg. 15) • Define security requirements and implement security solutions (pg. 15)	• Implementation Architecture and Design (pg. 15) • Application Development (pg. 15) • Infrastructure Development (pg. 15)
	Database administration and development (pg. 15)	View Representative Occupations for Database Administration and Development	• Analyze and design database (pg. 15) • Develop and implement database (pg. 15)	• Application Development (pg. 15)
	Network Design and Administration (pg. 15)	View Representative Occupations for Network Design And Administration	• Perform analysis and design (pg. 15) • Perform configuration and implementation (pg. 15) • Perform security administration (pg. 15)	• Infrastructure Development (pg. 15) • Technology Consulting (pg. 15)

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
	Programming/ software development (pg. 15)	View Representative Occupations for Programming/ Software Development	• Analyze and design solution structure (pg. 15) • Design/develop programs (pg. 15) • Develop structure (pg. 15) • Implement solutions (pg. 15) • Manage development environment (pg. 15) • Manage enterprise-wide development activities (pg. 15) • Perform development-related security administration (pg. 15)	• Implementation Architecture and Design (pg. 15) • Application Development (pg. 15) • Infrastructure Development (pg. 15)
Product Management (pg. 15)	Technology Architecture Development and Management (pg. 15)	View Representative Occupations for Technology Architecture Development and Management	• Identify strategic customer requirements (pg. 15)	• Marketing (pg. 15) • Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)

Table 2: MSF ► Occupation Clusters

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
	Technical Sales (pg. 15)	View Representative Occupations for Technical Sales	• Develop and manage customer accounts (pg. 15) • Develop product and service solution with customer (pg. 15) • Manage delivery of solution (pg. 15) • Develop and update presentations of product and services (pg. 15) • Assess general market environment (pg. 15) • Develop long-term sales and marketing strategies (pg. 15)	• Marketing (pg. 15) • Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)
	Business architecture development and management (pg. 15)	View Representative Occupations for Business Architecture Development and Management	• Provide strategic business direction for technology (pg. 15)	• Marketing (pg. 15) • Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)
	Information Technology Management (pg. 15)	View Representative Occupations for Information Technology Management	• Manage solution definition process and customer expectations (pg. 15) • Manage customer interactions (pg. 15)	• Customer Advocacy (pg. 15) • Product Planning (pg. 15)

Table 2: MSF ► Occupation Clusters

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
	Third-Party Management (pg. 15)	View Representative Occupations for Third-Party Management	• Identify and select strategic partners (pg. 15) • Provide strategic direction for partner relationship program (pg. 15)	• Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)
	Programming/ software development (pg. 15)	View Representative Occupations for Programming/ Software Development	• Analyze and design solution structure (pg. 15) • Manage enterprise-wide development activities (pg. 15)	• Customer Advocacy (pg. 15) • Product Planning (pg. 15)
	Product management (pg. 15)	View Representative Occupations for Product Management	• Manage customer expectations and customer interaction processes (pg. 15) • Drive feature identification and prioritization (pg. 15) • Drive shared product vision (pg. 15) • Develop, maintain, and execute the business case (pg. 15) • Develop, maintain, and execute the communications plan (pg. 15) • Support customer in marketing to users, and training users and technical staff (pg. 15)	• Marketing (pg. 15) • Business Value (pg. 15) • Customer Advocacy (pg. 15) • Product Planning (pg. 15)

Table 2: MSF ► Occupation Clusters

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
Program Management (pg. 15)	Information Technology Management (pg. 15)	View Representative Occupations for Information Technology Management	• Manage overall solution development (pg. 15) • Manage IT budgeting process (pg. 15)	• Project Management (pg. 15) • Solution Architecture (pg. 15) • Process Assurance (pg. 15) • Administrative Services (pg. 15)
	Third-Party Management (pg. 15)	View Representative Occupations for Third-Party Management	• Develop and manage partner business relationships (pg. 15) • Develop, manage, and negotiate contracts (pg. 15) • Evaluate performance of partners and effectiveness of relationships (pg. 15)	• Project Management (pg. 15) • Solution Architecture (pg. 15) • Process Assurance (pg. 15) • Administrative Services (pg. 15)

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
	Project Management (pg. 15)	View Representative Occupations for Project Management	• Define and manage project scope (pg. 15) • Define and manage project plan and timeline (pg. 15) • Manage project integration (pg. 15) • Develop and manage project budget (pg. 15) • Manage project quality process (pg. 15) • Manage project human resources (pg. 15) • Manage project communication processes (pg. 15) • Assess and manage risks (pg. 15) • Manage project procurement processes (pg. 15)	• Project Management (pg. 15) • Solution Architecture (pg. 15) • Process Assurance (pg. 15) • Administrative Services (pg. 15)

Table 2: MSF ► Occupation Clusters

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
Release Management (pg. 15)	Project Management (pg. 15)	View Representative Occupations for Project Management	• Define and manage project scope (pg. 15) • Define and manage project plan and timeline (pg. 15) • Manage project integration (pg. 15) • Develop and manage project budget (pg. 15) • Manage project quality process (pg. 15) • Manage project human resources (pg. 15) • Manage project communication processes (pg. 15) • Assess and manage risks (pg. 15) • Manage project procurement processes (pg. 15)	• Infrastructure (pg. 15)
	Technology Architecture Development and Management (pg. 15)	View Representative Occupations for Technology Architecture Development and Management	• Provide strategic direction for systems configuration and interoperability (pg. 15) • Provide high-level technology logistics (pg. 15) • Implement systems (pg. 15) • Define security requirements and implement security solutions (pg. 15)	• Infrastructure (pg. 15) • Support (pg. 15)

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
	Business architecture development and management (pg. 15)	View Representative Occupations for Business Architecture Development And Management	• Perform infrastructure planning (pg. 15)	• Infrastructure (pg. 15)
	Information Technology Management (pg. 15)	View Representative Occupations for Information Technology Management	• Manage solution release and deployment (pg. 15)	• Support (pg. 15) • Operations (pg. 15)
	Programming/ software development (pg. 15)	View Representative Occupations for Programming/ Software Development	• Release solutions (pg. 15) • Implement solutions (pg. 15)	• Infrastructure (pg. 15) • Support (pg. 15) • Operations (pg. 15)
Test (pg. 15)	Testing Development and Management (pg. 15)	View Representative Occupations for Testing Development and Management	• Develop test strategy and plan (pg. 15) • Develop test scripts and processes (pg. 15) • Implement test plan (pg. 15) • Analyze test results and findings (pg. 15) • Provide status and develop recommendations based on test results (pg. 15) • Perform usability testing (pg. 15) • Assess effectiveness of test plan, strategy, and processes (pg. 15)	• Test Planning (pg. 15) • Test Engineering (pg. 15) • Test Reporting (pg. 15)

Table 2: MSF ► Occupation Clusters

MSF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MSF Role Functions
	Network Design and Administration (pg. 15)	View Representative Occupations for Network Design And Administration	• Perform testing (pg. 15)	• Test Planning (pg. 15) • Test Engineering (pg. 15) • Test Reporting (pg. 15)
	Programming/ software development (pg. 15)	View Representative Occupations for Programming/ Software Development	• Test programs (pg. 15) • Validate programs (pg. 15)	• Test Planning (pg. 15) • Test Engineering (pg. 15) • Test Reporting (pg. 15)
User Experience (pg. 15)	Professional Training and End User Education (pg. 15)	View Representative Occupations for Professional Training and End User Education	• Analyze training needs through skills assessment (pg. 15) • Develop training solutions (pg. 15) • Deliver training (pg. 15) • Assess training effectiveness (pg. 15) • Develop user manuals (pg. 15)	• Accessibility (pg. 15) • Training/Support Material (pg. 15) • Usability Research and Testing (pg. 15) • User Interface Design (pg. 15) • User Advocacy (pg. 128)
	Database administration and development (pg. 15)	View Representative Occupations for Database Administration and Development	• Provide client services (pg. 15)	• Training/Support Material (pg. 15) • Usability Research and Testing (pg. 15)

Table 3: Occupational Cluster Perspective (MOF Role Associations)

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
Technology Architecture Development and Management (pg. 15)	• Application integrator • Business continuity analyst • Cross-enterprise integrator • Data systems designer • Data systems manager • Data warehouse designer • Electronic business specialist • Electronic commerce specialist • Electronic transaction specialist • Electronic transactions implementer • Information systems architect • Information systems planner • Infrastructure analyst • Network architect • Systems analyst • Systems architect • Systems integrator	• Implement systems (pg. 15) • Identify strategic customer requirements (pg. 15) • Determine systems solutions (pg. 15) • Provide strategic direction for systems configuration and interoperability (pg. 15) • Provide high-level technology logistics (pg. 15)	Release (pg. 15) Infrastructure (pg. 15)	• Change Manager (pg. 15) • Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Configuration Manager (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15) • Application Architect (pg. 15) • Availability Manager (pg. 15) • Capacity Manager (pg. 15) • Directory Services Manager (pg. 15) • Facility Manager (pg. 15) • Messaging and Middleware Architect (pg. 15) • Program Manager (pg. 15) • Risk Manager (pg. 15) • Service Continuity Manager (pg. 15) • Service Level Manager (pg. 15) • System Integrator (pg. 15) • User Experience Engineer (pg. 15)

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
Business architecture development and management (pg. 15)	• Business architect • Business continuity analyst • Data systems manager • Electronic business specialist • Electronic commerce strategist • Information systems planner • Infrastructure analyst • Infrastructure manager • Infrastructure planner • IT service manager	• Define security requirements and implement security solutions (pg. 15)	Security (pg. 15)	• Security Manager (pg. 15)
		• Provide strategic business direction for technology (pg. 15) • Perform infrastructure planning (pg. 15) • Manage and support infrastructure (pg. 15) • Manage IT service budgeting process (pg. 15)	Infrastructure (pg. 15)	• Application Architect (pg. 15) • Directory Services Manager (pg. 15) • Facility Manager (pg. 15) • Financial Manager (pg. 15) • Organizational Designer (pg. 15) • Process Designer (pg. 15) • Program Manager (pg. 15) • Risk Manager (pg. 15) • System Integrator (pg. 15)
		• Manage IT and security policies and standards (pg. 15)	Security (pg. 15)	• Security Manager (pg. 15)
Information Technology Management (pg. 15)	• Development manager • Product deployment manager • Product development manager • Product manager • Product release manager • Product testing manager • Support manager • Team manager	• Manage solution release and deployment (pg. 15)	Release (pg. 15)	• Change Manager (pg. 15) • Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)

Occupation Taxonomy v.3.0

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
		• Manage solution definition process and customer expectations (pg. 15) • Manage overall solution development (pg. 15) • Manage IT budgeting process (pg. 15)	Infrastructure (pg. 15)	• Financial Manager (pg. 15) • Program Manager (pg. 15) • Project Manager (pg. 15)
		• Manage customer interactions (pg. 15)	Support (pg. 15)	• Communications Coordinator (pg. 15) • Major Incident Manager (pg. 15) • Service Desk Manager (pg. 15)
Database administration and development (pg. 15)	• Data administrator • Data analyst • Data architect • Data management associate • Data modeler • Database administration associate • Database administrator	• Analyze and design database (pg. 15) • Develop and implement database (pg. 15) • Perform administration and maintenance (pg. 15) • Perform security administration (pg. 15) • Provide client services (pg. 15)	Infrastructure (pg. 15)	• Data Architect (pg. 15) • Database Developer (pg. 15) • Data Modeler (pg. 15) • Directory Designer (pg. 15) • Software Tester (pg. 15) • Test Lead (pg. 15)

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
	• Database analyst • Database developer • Database manager • Database modeler • Database security expert • Decision support services specialist • Knowledge architect • Modeling specialist • Senior database administrator • Senior systems analyst • Systems administrator • Systems analyst	• Analyze and design database (pg. 15) • Develop and implement database (pg. 15) • Perform administration and maintenance (pg. 15) • Perform security administration (pg. 15)	Operations (pg. 15)	• Database Administrator (pg. 15) • Directory Administrator (pg. 15) • Middleware Manager (pg. 15) • Monitoring Manager (pg. 15) • Storage Administrator (pg. 15) • Storage Manager (pg. 15)
		• Perform security administration (pg. 15)	Security (pg. 15)	• Security Manager (pg. 15) • Database Security Technician (pg. 15)
Network Design and Administration (pg. 15)	• Communications analyst • Data communications analyst • Information systems administrator • Information systems operator • IT engineer • Network administrator • Network analyst • Network architect • Network engineer • Network manager • Network operations analyst • Network security analyst • Network specialist	• Perform configuration and implementation (pg. 15) • Perform testing (pg. 15) • Perform monitoring and management (pg. 15) • Perform administration and maintenance (pg. 15) • Perform security administration (pg. 15)	Release (pg. 15)	• Change Manager (pg. 15) • Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Configuration Manager (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)
		• Perform analysis and design (pg. 15) • Perform configuration and implementation (pg. 15)	Infrastructure (pg. 15)	• Network Designer (pg. 15)

Table 3: Occupation Clusters ◄ MOF

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
	• Network technician • Network transport administrator • PC network engineer • PC support specialist • PC systems support lead • Systems administrator • Systems engineer • Technical support specialist • User support specialist	• Perform monitoring and management (pg. 15) • Perform administration and maintenance (pg. 15)	Operations (pg. 15)	• Network Manager (pg. 15)
		• Perform monitoring and management (pg. 15) • Perform security administration (pg. 15)	Security (pg. 15)	• Messaging Security Technician (pg. 15) • Network Security Technician (pg. 15) • Security Manager (pg. 15)
Third-Party Management (pg. 15)	• Business relation manager • Contract manager • Partner manager • Partner relationship manager • Partner support manager • Partner strategy planner • Strategic partner analyst • Third-party contract manager • Third-party manager • Third-party support manager	• Identify and select strategic partners (pg. 15) • Provide strategic direction for partner relationship program (pg. 15) • Develop and manage partner business relationships (pg. 15) • Develop, manage, and negotiate contracts (pg. 15) • Evaluate performance of partners and effectiveness of relationships (pg. 15)	Partner (pg. 15)	• Contract Manager (pg. 15) • Outsourcing Manager (pg. 15) • Partner Account Manager (pg. 15) • Vendor Manager (pg. 15)

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
Programming/ software development (pg. 15)	• Applications analyst • Applications engineer • Business analyst • Computer engineer • Data modeler • Operating system designer/engineer • Operating system programmer/analyst • Program manager	• Release solutions (pg. 15) • Implement solutions (pg. 15)	Release (pg. 15)	• Change Manager (pg. 15) • Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Configuration Manager (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)

Table 3: Occupation Clusters ◄ MOF

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
	• Programmer • Programmer/analyst • Project lead • Software applications specialist • Software architect • Software design engineer • Software design engineer and tester • Software development engineer • Software engineer • Software QA specialist • Software tester • Systems analyst • Systems administrator • Test engineer • Tester	• Analyze and design solution structure (pg. 15) • Design/develop programs (pg. 15) • Develop structure (pg. 15) • Test programs (pg. 15) • Validate programs (pg. 15) • Manage enterprise-wide development activities (pg. 15)	Infrastructure (pg. 15)	• Application Architect (pg. 15) • Data Architect (pg. 15) • Database Developer (pg. 15) • Data Modeler (pg. 15) • Directory Designer (pg. 15) • Directory Services Manager (pg. 15) • Documentation Coordinator (pg. 15) • Messaging and Middleware Architect (pg. 15) • Program Manager (pg. 15) • Programmer (pg. 15) • Project Manager (pg. 15) • Software Engineer (pg. 15) • Software Tester (pg. 15) • System Integrator (pg. 15) • Test Lead (pg. 15) • Usability Tester (pg. 15) • User Experience Engineer (pg. 15)

Table 3: Occupation Clusters ► MOF

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
		• Analyze and design solution structure (pg. 15) • Design/develop programs (pg. 15) • Develop structure (pg. 15) • Test programs (pg. 15) • Validate programs (pg. 15) • Perform development-related security administration (pg. 15)	Security (pg. 15)	• Application Security Technician (pg. 15) • Hardware Security Technician (pg. 15) • Messaging Security Technician (pg. 15) • Network Security Technician (pg. 15) • Operating System Security Technician (pg. 15) • Security Manager (pg. 15)
		• Perform troubleshooting (pg. 15) • Perform hardware and software installation, configuration, and upgrades (pg. 15) • Provide technical support to production environment (pg. 15)	Release (pg. 15)	• Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Configuration Manager (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)
Technical Support (pg. 15)	• Analyst • Call center support representative • Customer liaison • Customer service representative • Customer support professional • Help desk specialist • Help desk technician • Maintenance technician • PC support specialist • PC systems coordinator • Product support engineer • Sales support technician • Senior systems analyst • Systems analyst • Technical account manager • Technical support engineer • Technical support representative • Testing engineer	• Perform troubleshooting (pg. 15) • Provide facilitation and customer service (pg. 15) • Perform system operations, monitoring, and maintenance (pg. 15) • Perform security administration (pg. 15) • Provide technical support to production environment (pg. 15)	Support (pg. 15)	• Communications Coordinator (pg. 15) • Major Incident Manager (pg. 15) • Service Desk Manager (pg. 15) • Incident Manager (pg. 15) • Problem Manager (pg. 15) • Service Desk Analyst (pg. 15) • Specialist Support (pg. 15)

Table 3: Occupation Clusters ► MOF

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
		• Perform troubleshooting (pg. 15) • Provide facilitation and customer service (pg. 15) • Perform hardware and software installation, configuration, and upgrades (pg. 15) • Perform system operations, monitoring, and maintenance (pg. 15) • Provide technical support to production environment (pg. 15)	• Operations (pg. 15)	• Applications Manager (pg. 15) • Database Administrator (pg. 15) • Directory Administrator (pg. 15) • Facilities Manager (pg. 15) • Hardware Manager (pg. 15) • Middleware Manager (pg. 15) • Monitoring Manager (pg. 15) • Network Manager (pg. 15) • Operating System Manager (pg. 15) • Operations Manager (pg. 15) • Print Administrator (pg. 15) • Print Manager (pg. 15) • Storage Administrator (pg. 15) • Storage Manager (pg. 15) • Voice Communications Technician (pg. 15)

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
		• Perform troubleshooting (pg. 15) • Perform security administration (pg. 15) • Provide technical support to production environment (pg. 15)	Security (pg. 15)	• Anti-virus Technician (pg. 15) • Application Security Technician (pg. 15) • Database Security Technician (pg. 15) • Egress Security Technician (pg. 15) • Facilities Security Technician (pg. 15) • Hardware Security Technician (pg. 15) • Messaging Security Technician (pg. 15) • Network Security Technician (pg. 15) • Operating System Security Technician (pg. 15) • Personnel Security Technician (pg. 15) • Security Compliance Officer (pg. 15) • Security Manager (pg. 15)
Professional Training and End User Education (pg. 15)	• Instructional designer • Needs assessment manager • Readiness assessment manager • Technical trainer • Technical training developer • Technical training manager • Trainer	• Analyze training needs through skills assessment (pg. 15) • Develop training solutions (pg. 15) • Deliver training (pg. 15) • Assess training effectiveness (pg. 15)	Release (pg. 15)	• Documentation Coordinator (pg. 15) • Training Manager (pg. 15)

Table 3: Occupation Clusters ► MOF

Occupation Taxonomy v.3.0

Occupation Cluster	Representative Occupations	Critical Work Functions	MOF Role Association	Applicable MOF Role Functions
	• Training manager • Training-needs assessment manager • Training solution developer • Training solution manager • User education professional • User manual developer • User manual tester	• Analyze training needs through skills assessment (pg. 15) • Develop training solutions (pg. 15) • Assess training effectiveness (pg. 15) • Develop user manuals (pg. 15)	Infrastructure (pg. 15)	• User Experience Engineer (pg. 15) • Documentation Coordinator (pg. 15) • Usability Tester (pg. 15)

Table 3: Occupation Clusters ◄ MOF

Table 4: MOF Role Cluster Perspective

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
Release (pg. 15)	Technology Architecture Development and Management (pg. 15)	View Representative Occupations for Technology Architecture Development and Management	• Implement systems (pg. 15)	• Change Manager (pg. 15) • Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Configuration Manager (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)
	Information Technology Management (pg. 15)	View Representative Occupations for Information Technology Management	• Manage solution release and deployment (pg. 15)	• Change Manager (pg. 15) • Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
	Network Design and Administration (pg. 15)	View Representative Occupations for Network Design And Administration	• Perform configuration and implementation (pg. 15) • Perform testing (pg. 15) • Perform monitoring and management (pg. 15) • Perform administration and maintenance (pg. 15) • Perform security administration (pg. 15)	• Change Manager (pg. 15) • Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Configuration Manager (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)
	Programming/ software development (pg. 15)	View Representative Occupations for Programming/ Software Development	• Release solutions (pg. 15) • Implement solutions (pg. 15)	• Change Manager (pg. 15) • Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Configuration Manager (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)
	Technical Support (pg. 15)	View Representative Occupations for Technical Support	• Perform troubleshooting (pg. 15) • Perform hardware and software installation, configuration, and upgrades (pg. 15) • Provide technical support to production environment (pg. 15)	• Change Owner (pg. 15) • Communications Coordinator (pg. 15) • Configuration Manager (pg. 15) • Documentation Coordinator (pg. 15) • Release Manager (pg. 15) • Test Coordinator (pg. 15) • Training Manager (pg. 15)

Table 4: MOF ► Occupation Clusters

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
	Professional Training and End User Education (pg. 15)	View Representative Occupations for Professional Training and End User Education	• Analyze training needs through skills assessment (pg. 15) • Develop training solutions (pg. 15) • Deliver training (pg. 15) • Assess training effectiveness (pg. 15)	• Documentation Coordinator (pg. 15) • Training Manager (pg. 15)
Infrastructure (pg. 15)	Technology Architecture Development and Management (pg. 15)	View Representative Occupations for Technology Architecture Development and Management	• Identify strategic customer requirements (pg. 15) • Determine systems solutions (pg. 15) • Provide strategic direction for systems configuration and interoperability (pg. 15) • Provide high-level technology logistics (pg. 15)	• Application Architect (pg. 15) • Availability Manager (pg. 15) • Capacity Manager (pg. 15) • Directory Services Manager (pg. 15) • Facility Manager (pg. 15) • Messaging and Middleware Architect (pg. 15) • Program Manager (pg. 15) • Risk Manager (pg. 15) • Service Continuity Manager (pg. 15) • Service Level Manager (pg. 15) • System Integrator (pg. 15) • User Experience Engineer (pg. 15)

Table 4: MOF ► Occupation Clusters

Occupation Taxonomy v.3.0

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
	Business architecture development and management (pg. 15)	View Representative Occupations for Business Architecture Development and Management	• Provide strategic business direction for technology (pg. 15) • Perform infrastructure planning (pg. 15) • Manage and support infrastructure (pg. 15) • Manage IT service budgeting process (pg. 15)	• Application Architect (pg. 15) • Directory Services Manager (pg. 15) • Facility Manager (pg. 15) • Financial Manager (pg. 15) • Program Manager (pg. 15) • Organizational Designer (pg. 15) • Process Designer (pg. 15) • Risk Manager (pg. 15) • System Integrator (pg. 15)
	Information Technology Management (pg. 15)	View Representative Occupations for Information Technology Management	• Manage solution definition process and customer expectations (pg. 15) • Manage overall solution development (pg. 15) • Manage IT budgeting process (pg. 15)	• Financial Manager (pg. 15) • Program Manager (pg. 15) • Project Manager (pg. 15)
	Database administration and development (pg. 15)	View Representative Occupations for Database Administration and Development	• Analyze and design database (pg. 15) • Develop and implement database (pg. 15) • Perform administration and maintenance (pg. 15) • Provide client services (pg. 15)	• Data Architect (pg. 15) • Database Developer (pg. 15) • Data Modeler (pg. 15) • Directory Designer (pg. 15) • Software Tester (pg. 15) • Test Lead (pg. 15)
	Network Design and Administration (pg. 15)	View Representative Occupations for Network Design And Administration	• Perform analysis and design (pg. 15) • Perform configuration and implementation (pg. 15)	• Network Designer (pg. 15)

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
	Professional Training and End User Education (pg. 15)	View Representative Occupations for Professional Training and End User Education	• Analyze training needs through skills assessment (pg. 15) • Develop training solutions (pg. 15) • Assess training effectiveness (pg. 15) • Develop user manuals (pg. 15)	• User Experience Engineer (pg. 15) • Documentation Coordinator (pg. 15) • Usability Tester (pg. 15)
	Programming/ software development (pg. 15)	View Representative Occupations for Programming/ Software Development	• Analyze and design solution structure (pg. 15) • Design/develop programs (pg. 15) • Develop structure (pg. 15) • Test programs (pg. 15) • Validate programs (pg. 15) • Manage enterprise-wide development activities (pg. 15) • Release solutions (pg. 15) • Implement solutions (pg. 15)	• Application Architect (pg. 15) • Data Architect (pg. 15) • Database Developer (pg. 15) • Data Modeler (pg. 15) • Directory Designer (pg. 15) • Directory Services Manager (pg. 15) • Documentation Coordinator (pg. 15) • Messaging and Middleware Architect (pg. 15) • Program Manager (pg. 15) • Programmer (pg. 15) • Project Manager (pg. 15) • Software Engineer (pg. 15) • Software Tester (pg. 15) • System Integrator (pg. 15) • Test Lead (pg. 15) • Usability Tester (pg. 15) • User Experience Engineer (pg. 15)

Occupation Taxonomy v.3.0

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
Support (pg. 15)	Information Technology Management (pg. 15)	View Representative Occupations for Information Technology Management	• Manage customer interactions (pg. 15)	• Communications Coordinator (pg. 15) • Major Incident Manager (pg. 15) • Service Desk Manager (pg. 15)
	Technical Support (pg. 15)	View Representative Occupations for Technical Support	• Perform troubleshooting (pg. 15) • Provide facilitation and customer service (pg. 15) • Perform system operations, monitoring, and maintenance (pg. 15) • Perform security administration (pg. 15) • Provide technical support to production environment (pg. 15)	• Communications Coordinator (pg. 15) • Incident Manager (pg. 15) • Major Incident Manager (pg. 15) • Problem Manager (pg. 15) • Service Desk Analyst (pg. 15) • Specialist Support (pg. 15) • Service Desk Manager (pg. 15)
Operations (pg. 15)	Database administration and development (pg. 15)	View Representative Occupations for Database Administration and Development	• Analyze and design database (pg. 15) • Develop and implement database (pg. 15) • Perform administration and maintenance (pg. 15) • Perform security administration (pg. 15)	• Database Administrator (pg. 15) • Directory Administrator (pg. 15) • Middleware Manager (pg. 15) • Monitoring Manager (pg. 15) • Storage Administrator (pg. 15) • Storage Manager (pg. 15)
	Network Design and Administration (pg. 15)	View Representative Occupations for Network Design And Administration	• Perform analysis and design (pg. 15) • Perform configuration and implementation (pg. 15)	• Network Manager (pg. 15)

Table 4: MOF ► Occupation Clusters

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
	Technical Support (pg. 15)	View Representative Occupations for Technical Support	• Perform troubleshooting (pg. 15) • Provide facilitation and customer service (pg. 15) • Perform hardware and software installation, configuration, and upgrades (pg. 15) • Perform system operations, monitoring, and maintenance (pg. 15) • Provide technical support to production environment (pg. 15)	• Applications Manager (pg. 15) • Database Administrator (pg. 15) • Directory Administrator (pg. 15) • Facilities Manager (pg. 15) • Hardware Manager (pg. 15) • Middleware Manager (pg. 15) • Monitoring Manager (pg. 15) • Network Manager (pg. 15) • Operating System Manager (pg. 15) • Operations Manager (pg. 15) • Print Administrator (pg. 15) • Print Manager (pg. 15) • Storage Administrator (pg. 15) • Storage Manager (pg. 15) • Voice Communications Technician (pg. 15)
Security (pg. 15)	Technology Architecture Development and Management (pg. 15)	View Representative Occupations for Technology Architecture Development and Management	• Define security requirements and implement security solutions (pg. 15)	• Security Manager (pg. 15)
	Business architecture development and management (pg. 15)	View Representative Occupations for Business Architecture Development and Management	• Manage IT and security policies and standards (pg. 15)	• Security Manager (pg. 15)

Occupation Taxonomy v.3.0

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
	Database administration and development (pg. 15)	View Representative Occupations for Database Administration and Development	• Perform security administration (pg. 15)	• Database Security Technician (pg. 15) • Security Manager (pg. 15)
	Network Design and Administration (pg. 15)	View Representative Occupations for Network Design and Administration	• Perform monitoring and management (pg. 15) • Perform security administration (pg. 15)	• Messaging Security Technician (pg. 15) • Network Security Technician (pg. 15) • Security Manager (pg. 15)
	Programming/ software development (pg. 15)	View Representative Occupations for Programming/ Software Development	• Analyze and design solution structure (pg. 15) • Design/develop programs (pg. 15) • Develop structure (pg. 15) • Test programs (pg. 15) • Validate programs (pg. 15) • Perform development-related security administration (pg. 15)	• Application Security Technician (pg. 15) • Hardware Security Technician (pg. 15) • Messaging Security Technician (pg. 15) • Network Security Technician (pg. 15) • Operating System Security Technician (pg. 15) • Security Manager (pg. 15)

Table 4: MOF ◄ Occupation Clusters

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
	Technical Support (pg. 15)	View Representative Occupations for Technical Support	• Perform troubleshooting (pg. 15) • Perform security administration (pg. 15) • Provide technical support to production environment (pg. 15)	• Anti-virus Technician (pg. 15) • Application Security Technician (pg. 15) • Database Security Technician (pg. 15) • Egress Security Technician (pg. 15) • Facilities Security Technician (pg. 15) • Hardware Security Technician (pg. 15) • Messaging Security Technician (pg. 15) • Network Security Technician (pg. 15) • Operating System Security Technician (pg. 15) • Personnel Security Technician (pg. 15) • Security Compliance Officer (pg. 15) • Security Manager (pg. 15)

Table 4: MOF ► Occupation Clusters

Occupation Taxonomy v.3.0

MOF Role Cluster	Occupation Cluster Association	Representative Occupations	Critical Work Functions	Applicable MOF Roles
Partner (pg. 15)	Third-Party Management (pg. 15)	View Representative Occupations for Third-Party Management	• Identify and select strategic partners (pg. 15) • Provide strategic direction for partner relationship program (pg. 15) • Develop and manage partner business relationships (pg. 15) • Develop, manage, and negotiate contracts (pg. 15) • Evaluate performance of partners and effectiveness of relationships (pg. 15)	• Contract Manager (pg. 15) • Outsourcing Manager (pg. 15) • Partner Account Manager (pg. 15) • Vendor Manager (pg. 15)

Occupation Cluster Definitions

Technology Architecture Development and Management

Professionals in this cluster deal with technology issues at the system or enterprise level. They need to be very knowledgeable of technology trends and of the benefits and limitations of specific technology solutions. However, their technical knowledge does not need to be as detailed as a technology developer. Most professionals in this cluster have a lot of experience with technology systems and technology organizations. They need to understand the business directions and constraints of the organization and how these impact technology decisions. Issues of security, flow of information throughout the enterprise, need for access to information by specific groups, system architecture, and overall interoperability of systems are major areas of concern for this role.

In large organizations, a team rather than an individual often fills this role. For instance, one person may specialize in system security issues and strategies, while another may focus on long-term technology needs of the organization.

A junior professional in this position may deal with parts of the organization and focused technology architecture issues. As this job increases in responsibilities and scope, this role deals with broader enterprise systems and technology strategies.

The path to this profession is often based on technology specialists who have developed a strong enterprise- and system-wide knowledge and perspective. A companion to this profile is the business architecture development and management profile, which has a stronger business emphasis.

Business Architecture Development and Management

Professionals in this cluster deal with high-level technology decisions and technology-related business strategies. Their knowledge of technology management and of the interaction between technology and business systems is critical. Development of long-term strategies and management of standards as they relate to the design of infrastructure and the use of technology throughout the enterprise are essential elements in this role. A strong business experience is necessary, complemented by broad technology knowledge.

In large organizations, a team rather than an individual often fulfills this role. For instance, one person may specialize in planning and management of infrastructure, while another may focus on the development and management of policies and standards. As a junior professional, this person may deal with the management of existing infrastructure and make recommendations for future development and improvement. As the job increases in responsibilities and scope, this role deals with long-term planning and long-term strategy development.

The path to this profession may be based on business professionals who have acquired a strong knowledge of technology solutions and systems. It can also be based on technology specialists who have acquired a broad business knowledge and enterprise-wide perspective. A companion to this profile is the technology architecture development and management profile, which has a stronger technology emphasis. In general, the business architect profile would include a higher level of responsibilities and have a higher impact on the enterprise.

IT Management

Professionals in this cluster deal with the management of people/teams, as well as IT processes. This profile is a composite of roles often performed by different professionals. Each critical work function requires similar skills in terms of planning and management, but different knowledge and experience in terms of the application. As an example, even though similar skills are required to manage "product definitions" and to manage "product development and testing," these two areas require a different set of knowledge and connections within and outside of the enterprise. In small organizations, the technology professionals themselves often perform the IT management role. Some organizations choose to have one IT manager who acts as an internal consultant and facilitator to a wide range of IT processes.

As a junior professional, this person may deal with simple processes or specific parts of complex processes and projects. As this job increases in responsibilities and scope, this role deals with processes with increasing levels of complexity, spanning longer time periods and involving larger teams of participants.

The path to this profession is often based on technology specialists who have acquired a strong knowledge of process management, and team interaction and organization. A companion to this profile is the project management profile, which has a stronger project focus as opposed to a process focus.

Database Administration and Development

Professionals in this cluster are responsible for the design, development, and maintenance of databases. In large organizations, a team rather than an individual often fills this role. For instance, one person may specialize in the design, while another may focus on the maintenance of the database. Some may specialize in large databases for financial applications, while others may focus on the design of databases for Internet applications. Specific applications require knowledge of specific database structures and programming languages.

As a junior professional, this person may deal with the maintenance of the database or the creation of specific database elements. As this job increases in responsibilities and scope, this role deals with the design and planning of large and complex database systems. This profile can lead to the technology architecture development and management role as a career path.

Network Design and Administration

Professionals in this cluster are responsible for the design, development, implementation, and administration of network systems. In large organizations, a team rather than an individual often fills this role. For instance, one person may specialize in the design, while another may focus on the maintenance of the network system. Some may specialize in large networks that form the backbone of the organization, while others may focus on the design of networks for Internet applications. Specific applications require knowledge of specific network structures and technology.

As a junior professional, this person may deal with the maintenance of the network, or the design or implementation of specific elements of the network system. As this job increases in responsibilities and scope, this role deals with the design and planning of large and complex network systems. This profile can lead to the technology architecture development and management role as a career path.

Third-Party Management

Professionals in this cluster are responsible for the establishment and management of third-party relationships. This role requires professionals to have a set of high-level business skills supported by a broad technical knowledge. They deal with partners to the enterprise often at a high management level of interaction. They need a thorough understanding of the enterprise strategic directions to make effective decisions regarding the selection of partners. They often act as a consultant to the partner organization to ensure a relationship that will benefit both sides of the partnership.

The supplier role includes a broad collection of IT partners, service suppliers, and outsource vendors who work as virtual members of the IT team in providing hardware, software, networking, hosting, and support services. The degree to which an IT organization utilizes supplier services varies widely from business to business, depending on the size, location, industry type, and the strategic goals of the business.

In large organizations, a team rather than an individual often fills this role. For instance, one person may specialize in the development and administration of third-party contracts, while another may focus on long-term partnership strategies. As a junior professional, this person may deal with only one partner or a specific element in the partnership process. As the job increases in responsibilities and scope, this role deals with long-term strategies in the development of strategic partnerships.

The path to this profession is often based on business and legal professionals who have acquired a broad knowledge of technology trends and strategies. A related profile is the technical sales profile. Technical sales professionals deal with customers in a partnership-type relationship but usually at a lower management level of interaction.

Programming/Software Development

Professionals in this cluster are responsible for the design, development, implementation, and administration of programs and software applications. In large organizations, a team rather than an individual often fills this role. For instance, one person may specialize in software solution design, while another may focus on the coding or testing of the software. Some may specialize in large software programs for financial applications, while other may focus on the design of user software or Internet applications. Specific applications require knowledge of specific programming structures and language.

As a junior professional, this person may deal with the design or implementation of simple applications or elements of a complex software solution. As this job increases in responsibilities and scope, this role deals with the design and planning of large and complex software solutions.

Project Management

Professionals in this cluster deal with the management of IT projects. In small organizations, the technology professionals themselves often perform the project management role. Some organizations choose to have one project manager who acts as an internal consultant and facilitator to a wide range of IT projects.

As a junior professional, this person may deal with simple projects or specific parts of complex projects. As this job increases in responsibilities and scope, this role deals with projects with increasing levels of complexity, spanning longer time periods and involving larger teams of participants.

The path to this profession is often based on technology specialists who have acquired a strong knowledge of project management, and team interaction and organization. A companion to this profile is the IT management profile that has a stronger process focus as opposed to a project focus.

Product Management

Professionals in this cluster deal with the management of the definition, development, and delivery of the technology product/solution. They have a close relationship with both the customers and the technical team, often acting as a negotiator and facilitator of the communication process between the two groups. Even though in some organizations, different persons perform these functions, having one professional in this role gives continuity to the communication and management process. This is critical both in ensuring customer satisfaction and in increasing efficiency of the overall process.

This professional's key role is to ensure success for the customer in implementing a technology product/solution that will meet their need; and to support the technical team in the product development and delivery process. It is critical for this person to have a thorough understanding of the constraints, needs, and perspectives of both the customer and technical team.

As a junior professional, this person may deal with simple processes or specific parts of complex processes and projects, or small customer organizations. As this job increases in responsibilities and scope, this role deals with customer and product processes with increasing levels of complexity, spanning longer time periods and involving larger customer organizations and technical teams.

The path to this profession is often based on technical sales specialists who have developed strong planning and management skills; or on technology specialists who have acquired a strong knowledge of process management and customer interaction and organization.

Technical Support

Professionals in this cluster support technology systems, applications, and users. In most organizations, a team fills this role. Members of the teams may specialize in hardware or software, while others may focus more exclusively on resolving technology problems for the users. Some technical support professionals specialize in one type of system or technology.

As a junior professional, this person may deal with routine maintenance and troubleshooting. As this job increases in responsibilities and scope, this role deals with complex systems and support of system deployments and upgrades. This profile overlaps with the maintenance/administration function of the network design and administration profile.

Technical Sales

Professionals in this cluster develop and manage customer accounts and relationships. This role requires a solid mix of business and technical skills and knowledge. They deal with customers in a partnership-type relationship, helping customers decide which solutions work best for their needs and facilitating the delivery and deployment process. They need a thorough understanding of the applications and of the available technology solutions. They often act as a consultant to the customer organization to select the most effective technical solutions and services.

In large organizations, teams of technical sales specialists serve large accounts, and each sales representative deals with one aspect of operations. As a junior professional, this person may deal with small accounts or with well-defined technology solutions. As the job increases in responsibilities and scope, this role deals with the delivery of complex, custom technology solutions and the development of long-term strategic partnerships with customers.

The path to this profession is usually based on technology specialists with strong customer skills. A related profile is the third-party management profile. Third-party management professionals deal with partners, rather than exclusively with customers, usually at a higher management level of interaction than do most technical sales professionals.

Testing Development and Management

Professionals in this cluster perform testing of technology applications. Members of the teams may specialize in testing hardware or software functionality, while others may focus on product usability. Some testing development and management professionals specialize in one type of system or technology.

As a junior professional, this person may deal with routine testing. As this job increases in responsibilities and scope, this role deals with the testing of complex systems and the development of testing strategies and protocols. This profile overlaps with the testing function of other technology application development specialists.

Professional Training and User Education

This profile is a composite of two related but often separate roles: professional training professionals and user education professionals. Professional training professionals assess the needs for skill enhancement of the organization, groups, and individuals, and develop and deliver appropriate training. This role requires a strong knowledge of assessment and training delivery techniques, as well as a good knowledge of technology products and solutions. User education professionals develop user manuals and user training. This role requires a thorough understanding of user needs and knowledge, as well as excellent document-development and writing skills.

As a junior professional, this person may deliver packaged training or write elements of a user manual. As this job increases in responsibilities and scope, this role deals with the development of custom training, the assessment of needs for training, or the planning of complex user documentation.

Critical Work Functions and Key Activities, Knowledge, and Skills

Technical Architecture Development and Management

Representative Occupations

- Application integrator
- Business continuity analyst
- Cross-enterprise integrator
- Data systems designer
- Data systems manager
- Data warehouse designer
- Electronic business specialist
- Electronic commerce specialist
- Electronic transaction specialist
- Electronic transactions implementer
- Information systems architect
- Information systems planner
- Infrastructure analyst
- Network architect
- Systems analyst
- Systems architect
- Systems integrator

Occupation Cluster: Technical Architecture Development and Management (pg. 15)

Critical Work Function: Identify Strategic Customer Requirements

Key activities:

Identify and document customer requirements

Assess and document current systems capabilities and user trends

Develop and document business process model

Capture, and maintain, applications and supporting systems models

Identify performance metrics

Key technical knowledge and foundation skills for this function:

- Knowledge of systems requirements and systems modeling
- Knowledge of company procedures regarding document sign-off and customer validation
- Ability to draw requirements from customers and infer technological implications
- Knowledge of external customer requirements and transaction procedures
- Ability to audit customer use of systems against systems capabilities
- Knowledge of analysis tools and metrics to measure user trends
- Ability to identify, collect, interpret, and document performance metrics
- Knowledge of business processes and distributed computing
- Ability to detect underlying issues and resolve technical conflicts
- Ability to respond to customer needs, relate to concerns, and resolve conflicts to customer satisfaction

Occupation Cluster: Technical Architecture Development and Management (pg. 15)

Critical Work Function: Determine Systems Solutions

Key activities:

Evaluate current and emerging tools and technologies

Perform opportunity analysis

Make fiscal recommendations regarding technology

Define delivery strategies

Define implementation strategies

Define systems interfaces

Key technical knowledge and foundation skills for this function:

- Knowledge of systems technology trends

- Ability to perform cost/benefit, return on investment (ROI) and life cycle cost analysis, and risk assessment

- Knowledge of business processes and options for technology use

- Knowledge of business plan and strategic goals

- Knowledge of delivery strategies and mechanisms and customer priorities and schedule

- Knowledge of implementation strategies such as concurrent processing, total system change-over, data migration, and data conditioning

- Knowledge of graphical user interface design and platforms

- Ability to justify systems modifications and to design for quality

- Ability to implement technological improvements and generate technological solutions

- Ability to evaluate effectiveness of solutions for customer and understand future customer needs

- Ability to develop alternative systems designs and establish new processes/procedures

- Ability to resolve conflicts to customer satisfaction and obtain appropriate resources to meet customer needs

Occupation Cluster: Technical Architecture Development and Management (pg. 15)

Critical Work Function: Provide Strategic Direction for Systems Configuration and Interoperability

Key activities:

Evaluate company's technology strategies

Make recommendations regarding company's investment in technology

Define data management requirements

Provide uniform integration for legacy systems

Provide systems consulting to user groups

Key technical knowledge and foundation skills for this function:

- Knowledge of organization strategic plan, business conditions, and future goals

- Knowledge of organization data communication and technology strategies

- Knowledge of current communication systems and protocols

- Knowledge of risk assessment analysis techniques

- Knowledge of decision support strategies and modeling

- Knowledge of company data systems and warehousing strategies
- Knowledge of legacy systems and interoperability issues and constraints
- Knowledge of application support and development processes
- Ability to provide technical knowledge and support to a variety of customer groups
- Ability to evaluate application of technology within a specific context
- Ability to analyze goals and constraints and evaluate effectiveness of modifications and improvements
- Ability to generate, evaluate, and recommend alternative solutions
- Ability to establish rapport with users and modify actions to environment
- Ability to communicate complex technical information effectively to users

Occupation Cluster: <u>Technical Architecture Development and Management</u> (pg. 15)

Critical Work Function: Provide High-Level Technology Logistics

Key activities:

Define performance metrics
Audit systems performance
Provide capacity planning
Provide long-term strategic consulting
Evaluate application of digital commerce to organization

Key technical knowledge and foundation skills for this function:

- Knowledge of performance metrics development and documentation procedures
- Knowledge of company procedures regarding customer validation
- Knowledge of statistical process control methods
- Knowledge of system audit processes and audit result reporting and documentation
- Knowledge of systems performance, usage, and capacities
- Knowledge of monitoring procedures
- Knowledge of internal, external, and global customer needs
- Ability to produce meaningful revenue and product analysis forecasts
- Knowledge of technology use and deployment strategies appropriate to enterprise
- Ability to summarize and interpret mathematical data
- Ability to analyze systems operation, monitor systems, distinguish trends in performance, and evaluate systems performance
- Ability to project future workloads
- Ability to predict technology trends and assess their impact on the organization

Occupation Cluster: <u>Technical Architecture Development and Management</u> (pg. 15)

Critical Work Function: Implement Systems

Key activities:

Manage systems implementation projects

Coordinate systems testing

Perform implementation readiness review

Secure and sustain effective project sponsorship

Assess and mitigate risks associated with resistance, cultural impact, and process change

Coordinate systems user training

Put systems into production

Provide systems documentation

Key technical knowledge and foundation skills for this function:

- Ability to use project management tools and techniques
- Ability to organize and lead implementation team
- Knowledge of systems technology and associated implementation issues
- Knowledge of test scope, schedule, and required resources
- Knowledge of test result dissemination documentation and procedures
- Ability to identify qualified testers and select appropriate automated testing tools
- Knowledge of stakeholders' needs and expectations
- Knowledge of political issues related to successful project implementation
- Knowledge of systems implementation procedures and schedules
- Ability to identify and procure resources for training
- Ability to evaluate training modality for technical skills required by end user
- Ability to assess impact of systems change on productivity
- Knowledge of customer approval process and systems ownership transfer guidelines
- Ability to create and document customer support policies
- Ability to understand continuous improvement process and analyze goals and complaints

Occupation Cluster: <u>Technical Architecture Development and Management</u> (pg. 15)

Critical Work Function: Define Security Requirements and Implement Security Solutions

Key activities:

Define security requirements

Define systems security specifications

Define security policies for system users

Evaluate system design and performance for security

Evaluate system and technology trends for impact on security

Develop recommendations for system security upgrades and improvements

Key technical knowledge and foundation skills for this function:

- Knowledge of system security limitations and capabilities
- Knowledge of systems security issues
- Knowledge of customer security requirements
- Knowledge of requirements regarding exchange of data and access issues
- Knowledge of security standards and policies
- Ability to relate system design specifications to security functions
- Ability to identify and resolve security issues
- Ability to implement organizational processes and procedures
- Ability to analyze information and formulate proposals for improvement or resolution

Business Architecture Development and Management

Representative Occupations

- Business architect
- Business continuity analyst
- Data systems manager
- Electronic business specialist
- Electronic commerce strategist
- Information systems planner
- Infrastructure analyst
- Infrastructure manager
- Infrastructure planner
- IT service manager
- Systems integrator

Critical Work Function: Provide Strategic Business Direction for Technology

Key activities:

Assess evolving and future business needs for information management and processing

Evaluate business value of organization's technology strategies in conjunction with organization's technology experts

Develop trade-off scenarios based on cost of technology and business efficiency factors

Assess trade-off scenarios based on cultural impact, process reengineering, and business efficiency factors

Develop proposals regarding organization's investment in technology

Define data warehousing and other data management strategy requirements

Define organization requirements for networking, hardware, and software architecture

Conduct information technology and business alignment analysis

Key technical knowledge and foundation skills for this function:

- Knowledge of organization strategic plan, business conditions, and future goals
- Knowledge of organization data communication and technology strategies
- Knowledge of current information management and processing systems and protocols
- Knowledge of risk assessment and cost trade-off analysis techniques
- Knowledge of the process by which individuals adapt to new technology
- Knowledge of decision-support strategies and modeling
- Knowledge of electronic commerce applications and issues
- Knowledge of electronic commerce processes and strategies
- Knowledge of organization data systems and data management strategies
- Knowledge of formal modeling techniques associated with one or more established methodologies
- Ability to evaluate business application of technology within a specific context
- Ability to analyze goals and constraints and evaluate effectiveness of changes and improvements
- Ability to generate, evaluate, and recommend alternative solutions
- Ability to project impact of technology systems on business efficiencies
- Knowledge of proposal development and approval process

Occupation Cluster: <u>Business Architecture Development and Management</u> (pg. 15)

Critical Work Function: Perform Infrastructure Planning

Key activities:

Develop infrastructure plans to meet new and changing requirements

Assess flow and management of information through the organization for security and efficiency

Assess impact of changes in infrastructure on physical space and on staff resources

Develop criteria to assess the need for infrastructure upgrade

Identify current and projected system limitations

Design operational framework governing systems management processes

Develop strategies and design environment to support uniform integration for legacy systems

Develop budget projections for and productivity impact of infrastructure upgrades

Key technical knowledge and foundation skills for this function:

- Ability to develop budgets and cost projections
- Ability to evaluate and quantify impact of system changes on productivity
- Knowledge of technology use and deployment strategies appropriate to enterprise
- Ability to project future workloads and their impact on the system
- Ability to predict technology trends and assess their impact on the organization
- Knowledge of information flow and access requirements
- Knowledge of system limitation to information flow, access, and processing
- Knowledge of security and access issues
- Knowledge of physical space planning tools and techniques
- Knowledge of personnel resource planning and management techniques
- Knowledge of legacy systems and interoperability issues and constraints
- Ability to visualize relationships between parts and whole
- Ability to identify barriers to smooth system deployment and functioning and develop effective solutions

Occupation Cluster: <u>Business Architecture Development and Management</u> (pg. 15)

Critical Work Function: Manage and Support Infrastructure

Key activities:

Develop plan for physical space and storage of IT equipment

Define processes and select tools necessary to manage and support infrastructure

Select and manage tools to monitor and measure system performance

Develop processes for ongoing maintenance of infrastructure

Define performance metrics for system and audit systems performance

Evaluate the adequacy of resources for IT staff and system support and make recommendations

Key technical knowledge and foundation skills for this function:

- Knowledge of performance metrics development and documentation procedures
- Knowledge of statistical process control methods
- Knowledge of system audit processes and audit result reporting and documentation
- Ability to analyze systems operation, monitor systems, distinguish trends in performance, and evaluate systems performance
- Knowledge of physical space planning tools and techniques
- Knowledge of system support structures and strategies
- Knowledge of equipment storage and disposal practices
- Knowledge of personnel resource planning and management techniques
- Knowledge of systems optimization procedures and tools
- Ability to develop, test, and refine processes in a technology environment
- Ability to coordinate and communicate with a wide range of groups within the organization
- Ability to integrate information from multiple sources and develop recommendations
- Ability to evaluate complex systems and processes and identify areas for improvement

Occupation Cluster: <u>Business Architecture Development and Management</u> (pg. 15)

Critical Work Function: Manage IT and Security Policies and Standards

Key activities:

Define security and access requirements

Keep current with industry practices and standards

Define areas of information management and security that require the establishment of policies and standards in the organization

Assess currency and efficiency of IT and security policies and standards

Revise policies and standards to meet changing requirements

Develop processes to disseminate and support compliance to policies and standards

Key technical knowledge and foundation skills for this function:

- Knowledge of security and access issues
- Knowledge of current industry practices and standards
- Ability to analyze policies and make recommendations for improvement
- Ability to adapt industry practices and standards to the organization environment
- Ability to project impact of policies and standards on operations and efficiencies
- Ability to identify areas of information management requiring further definition
- Ability to assess the effectiveness of existing policies
- Knowledge of communication and dissemination procedures
- Ability to communicate information in a positive and cooperative manner
- Knowledge of internal compliance procedures and processes

Occupation Cluster: <u>Business Architecture Development and Management</u> (pg. 15)

Critical Work Function: Manage IT Service Budgeting Process

Key activities:

Define line of IT services based on organization's strengths and focus

Develop general cost estimates and frameworks for IT services

Develop cost measurement, tracking, and reporting procedures and processes

Plan and develop budget procedures for IT services

Monitor effectiveness of costing and management of IT services

Key technical knowledge and foundation skills for this function:

- Knowledge of organization strengths and expertise
- Ability to evaluate cost effectiveness of potential service offerings
- Knowledge of customer relation processes
- Knowledge of customer expectations regarding IT services
- Knowledge of cost-estimation tools and techniques
- Ability to develop flexible budget processes
- Knowledge of cost-tracking and reporting processes and tools
- Ability to evaluate success based on customer satisfaction and overall benefits and cost to the organization
- Knowledge of IT services available from competition
- Knowledge of organizational structures that support IT services
- Ability to evaluate currency of IT service offerings
- Ability to assess the need for additional resources to support IT services
- Ability to assess impact of providing IT services to external customers of the organization

Occupation Cluster: <u>Information Technology Management</u> (pg. 15)

Information Technology Management

Representative Occupations

- Development manager
- Product deployment manager
- Product development manager
- Product manager
- Product release manager
- Product testing manager
- Support manager
- Team manager

Critical Work Function: Manage Solution Definition Process and Customer Expectations

Key activities:

Identify decision makers and decision process in customer group

Perform customer-needs analysis to identify customer needs or problems and create the business case

Outline and define requirements, objectives, and priorities

Lead the communication and negotiation process between customer and development team

Lead the identification and prioritization of product features based on customer expectations, business requirements, and technology constraints

Drive congruency between customer needs, business requirements, and technology solution

Develop and effectively communicate the project status plan with customer and team

Key technical knowledge and foundation skills for this function:

- Knowledge of customer relationship management processes and techniques
- Knowledge of project management processes and techniques
- Knowledge of strategic planning process management
- Knowledge of team management processes and techniques

- Knowledge of system architectures and application software development
- Knowledge of current technologies for analysis phase
- Ability to determine technical requirements and evaluate need
- Ability to negotiate solutions focusing on customer expectations and project requirements definition
- Ability to perform effective customer-needs assessment
- Ability to effectively plan and organize multiple tasks and complex processes
- Ability to effectively communicate and apply problem-solving techniques

Occupation Cluster: Information Technology Management (pg. 15)

Critical Work Function: Manage Overall Solution Development

Key activities:

Manage project scope, project life cycle, and product specifications

Manage master product schedule and report project status according to plan

Facilitate team communication and negotiation

Manage resource allocation during product development and testing

Drive critical project and product trade-off decisions

Interact with product management

Key technical knowledge and foundation skills for this function:

- Knowledge of current technologies
- Ability to select and implement effective technical solution
- Knowledge of system architectures and application software development
- Knowledge of client server and enterprise development
- Knowledge of project management processes and techniques
- Knowledge of team management processes and techniques
- Knowledge of production job stream
- Ability to plan, lead, direct, and control complex tasks, projects, and processes
- Ability to make staffing decisions and recommendations
- Ability to forecast human resource needs and make recommendations for resource allocation
- Ability to apply effective time-management processes and techniques
- Ability to demonstrate effective interpersonal skills, communication skills, and motivational skills

Occupation Cluster: Information Technology Management (pg. 15)

Critical Work Function: Manage Solution Release and Deployment

Key activities:

Drive the development and implementation of the product release and deployment plan

Identify, analyze, and prioritize risks related to the release and deployment process

Mitigate risks and identify contingency plan for the release and deployment process

Give input to design team focusing on product manageability, supportability, and deployability

Drive customer validation of beta product

Ensure proper assessment of organization readiness for deployment and develop recommendations to support deployment success

Ensure development of training plan for operations and technical support staff

Assess resource needs and manage resource allocations during product release and deployment

Analyze release and deployment process and identify areas for improvement

Drive deliverables, technical support assistance, and training plans

Drive and design product and training documentation

Key technical knowledge and foundation skills for this function:

- Knowledge of project management processes and techniques
- Knowledge of team management processes and techniques
- Knowledge of customer relationship management processes and techniques
- Knowledge of system architectures and application software development deployment
- Knowledge of client server and enterprise development
- Knowledge of project design, analysis, and implementation processes
- Knowledge of technical design, construction, and testing phases
- Knowledge of risk assessment and risk mitigation techniques and processes
- Ability to plan, lead, direct, and control complex tasks, projects, and processes
- Ability to make staffing decisions and recommendations
- Ability to apply effective time-management and problem-resolution processes and techniques
- Ability to demonstrate effective interpersonal skills, communication skills, and motivational skills

- Ability to understand organizational and operational management planning processes

- Ability to forecast human resource needs and make recommendations for resource allocation

- Ability to develop effective contingency plans

- Ability to recognize the need for intervention

Occupation Cluster: <u>Information Technology Management</u> (pg. 15)

Critical Work Function: Manage Customer Interactions

Key activities:

Define and implement effective, objective customer satisfaction measurements

Monitor customer satisfaction results and address trends appropriately

Identify customer communication processes, practices, and preferences

Identify customer expectations and confirm shared understanding on an ongoing basis

Evaluate trends in customer needs and expectations and project them into changes/improvements in infrastructure and support

Assess overall level of customer satisfaction with interactions and services

Identify ongoing customer needs for improvements and/or enhancements in products and services

Evaluate customer interaction processes and make recommendations for improvement and/or enhancements

Outline and define operational enhancement requirements, objectives, and priorities

Identify customer operational methods and procedures

Key technical knowledge and foundation skills for this function:

- Knowledge of customer relationship management processes and techniques

- Knowledge of project management processes and techniques

- Knowledge of management operational planning processes and techniques

- Knowledge of team management processes and techniques

- Knowledge of system architectures and application software development

- Knowledge of current technologies for the analysis phase

- Ability to perform effective assessment of customer needs

- Ability to determine customer satisfaction requirements and evaluate need for improvement and/or enhancement

- Ability to negotiate customer expectations and needs

- Ability to plan, organize, and lead complex processes and projects

- Ability to apply effective operational management and problem-resolution processes and techniques

- ■ Ability to demonstrate effective interpersonal skills, communication skills, and motivational skills

Occupation Cluster: <u>Information Technology Management</u> (pg. 15)

Critical Work Function: Manage IT Budgeting Process

Key activities:

Develop and monitor cost estimates and budgets for IT services and processes

Develop and monitor budget-tracking and reporting procedures and processes

Develop and monitor audit checklist to ensure all project milestones are satisfied

Evaluate effectiveness of cost distribution throughout the product development life cycle

Evaluate the alignment of allocated resources with actual expenditures

Monitor effectiveness of budgeting development and tracking processes and make recommendations for improvement

Key technical knowledge and foundation skills for this function:

- ■ Knowledge of organization strengths and expertise
- ■ Knowledge of effective resource management processes and techniques
- ■ Knowledge of budget accounting processes and techniques
- ■ Knowledge of management budgeting processes
- ■ Knowledge of budget tracking and auditing processes and techniques
- ■ Ability to assess effectiveness of complex processes
- ■ Ability to use software tools to plan and track resources and expenditures
- ■ Ability to plan, lead, direct, and control complex tasks, projects, and processes
- ■ Ability to make staffing decisions and recommendations
- ■ Ability to apply effective time management and problem resolution processes and techniques
- ■ Ability to demonstrate effective interpersonal skills, communication skills, and motivational skills

Occupation Cluster: <u>Database Administration and Development</u> (pg. 15)

Database Administration and Development

Representative Occupations

- Business architect
- Business continuity analyst
- Data systems manager
- Electronic business specialist
- Electronic commerce strategist
- Information systems planner
- Infrastructure analyst
- Infrastructure manager
- Infrastructure planner
- IT service manager
- Systems integrator

Critical Work Function: Analyze and Design Database

Key activities:

Perform research and analyze requirements

Create and refine conceptual and logical data models

Identify high-level business rules for data model

Adapt conceptual and logical data models to enterprise model

Validate conceptual and logical data models with clients

Determine target environment/platform

Identify backup and recovery requirements

Identify access and concurrency requirements

Design distributed data models

Key technical knowledge and foundation skills for this function:

- Knowledge of basic business objectives and requirement analysis
- Ability to apply appropriate database design principles, methodologies, and tools
- Ability to translate client/user requirements into data model
- Ability to develop and integrate conceptual and logical model to conform with enterprise model
- Knowledge of installed base, technical constraints, and preferred products
- Knowledge of company modeling policies and development standards
- Knowledge of platform implication on database design, performance, and usability issues
- Knowledge of corporate policy and business data requirements
- Knowledge of backup and recovery technology platform
- Knowledge of alternative concurrency control methods and locking mechanisms
- Ability to analyze alternatives, consider trade-offs, and make decisions
- Ability to plan adequately distributed data models
- Ability to negotiate and resolve conflicts
- Ability to interact and communicate effectively with users and stakeholders

Occupation Cluster: <u>Database Administration and Development</u> (pg. 15)

Critical Work Function: Develop and Implement Database

Key activities:

Develop physical database characteristics and user interface

Create database objects

Select unique identifiers and normalize the data model

Support population of database

Integrate high-level business rules with code

Develop and implement testing of database components

Develop and validate database implementation plan

Deploy database

Produce business and technical documents

Key technical knowledge and foundation skills for this function:

- Knowledge of user interface requirements and standards
- Ability to transform conceptual model into logical model
- Knowledge of database object design and testing procedures
- Ability to relate database usability and user requirements to object design
- Ability to define attributes and align to entities
- Knowledge of normalization rules and processes
- Knowledge of database code development
- Knowledge of database programming languages, practices, and standards
- Knowledge of database testing methods, tools, and processes
- Ability to evaluate defect impact on overall system performance and integrity
- Ability to evaluate overall system performance and productivity
- Knowledge of implementation and transition process
- Knowledge of appropriate validation processes and database system error resolution procedures
- Ability to create detailed documentation and track information efficiently and effectively
- Ability to generate and evaluate solutions

Occupation Cluster: <u>Database Administration and Development</u> (pg. 15)

Critical Work Function: Perform Administration and Maintenance

Key activities:

Develop and implement monitoring plan

Analyze monitoring data

Manage backup and recovery both on-site and off-site

Create and implement maintenance plan for regular integrity checks

Maintain physical organization of database objects

Apply software upgrades and fixes

Plan and manage physical resource requirements

Administer and enforce standards

Audit database systems

Key technical knowledge and foundation skills for this function:

- Knowledge of database performance factors, monitoring tools, and tuning procedures
- Knowledge of productivity factors and ability to understand impact of problem on overall database performance
- Knowledge of quality assurance methods and practices
- Knowledge of backup and recovery procedures
- Ability to identify user needs for backup and recovery and estimate required resources
- Knowledge of fault detection and resolution processes
- Knowledge of maintenance tools and procedures
- Ability to develop and implement monitoring, maintenance, and upgrade plans
- Knowledge of database audit and audit reporting procedures
- Ability to create detailed documentation and track information efficiently and effectively
- Ability to evaluate criticality of problem and generate and evaluate solutions
- Ability to judge system effectiveness and efficiency
- Ability to coordinate acquisition, storage, and distribution of physical resources
- Ability to evaluate system performance and diagnose performance deviations

Occupation Cluster: <u>Database Administration and Development</u> (pg. 15)

Critical Work Function: Perform Security Administration

Key activities:

Gather and document security requirements

Design and document security plan

Implement and enforce security requirements

Maintain and improve security in response to industry developments and user experience

Key technical knowledge and foundation skills for this function:

- Knowledge of security system strategies, tools, and practices
- Ability to identify and resolve security issues and potential conflicts
- Knowledge of security plan documentation procedures
- Ability to develop and implement security plan and procedures
- Ability to relate requirements to user privileges
- Knowledge of business, industry, and technology security trends
- Ability to gather user input, observe user practices, and provide technical training regarding security procedures
- Ability to encourage cooperation and negotiation among all participants
- Ability to implement organizational processes and procedures
- Ability to analyze information and formulate proposals for improvement or resolution
- Ability to responsibly challenge unethical practices or decisions
- Ability to present security trade-offs and risks and present practical alternatives

Occupation Cluster: <u>Database Administration and Development</u> (pg. 15)

Critical Work Function: Provide Client Services

Key activities:

Provide and support development environments

Identify additional requirements

Adapt existing structure to new business environments

Key technical knowledge and foundation skills for this function:

- Ability to define and solve application problems

- Knowledge of user applications and ability to assess user impact on database system
- Knowledge of change documentation procedures
- Ability to identify trends and relate them to current system
- Ability to work with and demonstrate commitment to client/user
- Ability to present complex information regarding changes in system and models

Occupation Cluster: <u>Network Design and Administration</u> (pg. 15)

Network Design and Administration

Representative Occupations

- Communications analyst
- Data communications analyst
- Information systems administrator
- Information systems operator
- IT engineer
- Network administrator
- Network analyst
- Network architect
- Network engineer
- Network manager
- Network operations analyst
- Network security analyst
- Network specialist
- Network technician
- Network transport administrator
- PC network engineer
- PC support specialist
- PC systems support lead
- Systems administrator
- Systems engineer
- Technical support specialist
- User support specialist

Critical Work Function: Perform Analysis and Design

Key activities:

Review and incorporate data identifying customer requirements

Identify, interpret, and evaluate system and network requirements

Define scope of work

Review network architecture, topology, interdependencies, and constraints

Research technical alternatives and analyze technical options

Lead and participate in design reviews

Prepare overall design and integration plan for new processes, protocols, and equipment

Recommend selection of architecture, topology, hardware, and software

Key technical knowledge and foundation skills for this function:

- Knowledge of basic business objectives and requirement analysis
- Ability to apply scientific methods to requirement analysis and definition
- Ability to communicate with technical and non-technical personnel, encourage cooperation, negotiate, and manage conflicts
- Ability to translate technical features into development and user benefits
- Knowledge of key sources of information regarding network technical options
- Ability to identify constraints, generate alternatives, consider risks, and evaluate options
- Ability to define scope and outline of project and estimate resources and timeline
- Knowledge of networking design principles and techniques
- Ability to evaluate risk and cost of implementation in technical terms
- Ability to develop system specifications based on requirements
- Knowledge of design review procedures and processes
- Knowledge of architecture design tools and methods, integration methods, and traffic analysis tools

- Ability to optimize reuse and redeployment of existing hardware and software
- Ability to summarize and document system requirements and specifications, and system design
- Ability to suggest design modifications, recommend trade-offs, and negotiate to resolve technical issues

Occupation Cluster: <u>Network Design and Administration</u> (pg. 15)

Critical Work Function: Perform Configuration and Implementation

Key activities:

Plan and document system configuration

Implement new system configuration

Perform workstation configuration and software loading

Support, track, and document change implementation

Contribute to the development of deployment plan and methods

Provide uniform integration for legacy systems

Key technical knowledge and foundation skills for this function:

- Ability to develop plan of action and to organize and coordinate activities
- Ability to apply flow charting and diagramming tools to develop implementation and configuration plans and track task status and completion
- Knowledge of standard roll-out practices and recovery procedures
- Knowledge of system and workstation installation and configuration procedures and tools
- Knowledge of software loading and configuration procedures and tools
- Knowledge of hardware and software compatibility issues and resolution procedures
- Ability to understand user applications and relate user needs to configuration
- Knowledge of enterprise-wide deployment practices and standards
- Knowledge of legacy systems and interoperability issues and constraints
- Ability to analyze and resolve system operational problems
- Ability to document work process flow in detailed supporting documents
- Ability to prepare and organize multiple schedules, manage timelines, and recommend adjustments
- Ability to analyze situation/information, consider risks/implications, generate alternative solutions, and formulate plan of action
- Ability to communicate with technical and non-technical personnel, encourage cooperation, negotiate, and manage conflicts

Occupation Cluster: <u>Network Design and Administration</u> (pg. 15)

Critical Work Function: Perform Testing

Key activities:

Define and document test specifications

Develop test plan and procedures

Schedule and perform testing

Document, interpret, and report test results

Key technical knowledge and foundation skills for this function:

- Knowledge of network hardware and software testing tools and procedures
- Ability to select testing tools based on tool capabilities and limitations
- Ability to propose/formulate test processes and procedures
- Knowledge of error impact on system performance and ability to relate errors to system functionality
- Ability to use tracking and scheduling tools and methods
- Ability to conduct a system analysis, interpret results, and identify problems
- Ability to analyze possible causes/reasons for problems, recommend action plan, and initiate corrective processes
- Ability to use scientific methods to analyze test data, and to recognize and interpret patterns, relationships, and trends
- Ability to identify need for resources and negotiate for resource allocation
- Ability to develop, test, and implement solutions
- Ability to compile, interpret, and communicate test results and solutions to technical and non-technical personnel
- Ability to encourage/support team members and assume responsibility for accomplishing team goals

Occupation Cluster: <u>Network Design and Administration</u> (pg. 15)

Critical Work Function: Perform Monitoring and Management

Key activities:

Analyze system performance to baseline

Monitor and report component and connectivity problems

Perform functional verifications and system audits

Make recommendations for system optimization/improvement

Generate and present reports

Key technical knowledge and foundation skills for this function:

- Ability to use network monitoring and testing tools and procedures
- Ability to conduct a system analysis, interpret results, and identify problems and deviation from baseline
- Ability to use scientific processes to gather, analyze, interpret, and represent system performance data
- Ability to identify the need for further information and develop test to acquire missing information
- Ability to follow standards and procedures in system monitoring and management
- Knowledge of documentation, storage and security tools, policies, and procedures
- Ability to identify and use proper reporting channels to communicate and resolve problems
- Knowledge of system baseline parameters and system audit procedures
- Ability to use modeling and simulation tools to analyze problems
- Ability to develop, test, and implement solutions
- Ability to document and communicate system performance using documentation standards and dissemination procedures
- Ability to recommend system modifications and improvements with supporting justification

Occupation Cluster: <u>Network Design and Administration</u> (pg. 15)

Critical Work Function: Perform Administration and Maintenance

Key activities:

Set up and maintain user accounts

Develop maintenance and upgrade plans

Schedule and coordinate network maintenance

Apply maintenance, upgrades, and process changes

Coordinate, communicate, and document changes

Perform system backups and restore data

Manage inventory

Document maintenance activities

Key technical knowledge and foundation skills for this function:

- Ability to use system configuration and security management tools
- Knowledge of backup, data storage, and restoration procedures
- Ability to identify user needs and expectations and translate them into system performance terms
- Knowledge of maintenance tools and procedures

- Ability to identify system problems, evaluate for criticality, and take appropriate action
- Knowledge of installation and upgrade procedures
- Knowledge of company change-management process
- Knowledge of organization of parts inventory systems and access procedures
- Knowledge of corporate policies and procedures for acquisition and asset management
- Knowledge of administration and maintenance documentation procedures and standards
- Ability to recommend and implement plan of action and outline procedures
- Ability to evaluate effectiveness of process and procedures and recommend and implement improvements
- Ability to evaluate system configuration/stability and make recommendations for improvement
- Ability to monitor usage and efficient utilization of materials and resources
- Ability to record administration and maintenance activities and report and document problems and solutions according to standards and procedures

Occupation Cluster: Network Design and Administration (pg. 15)

Critical Work Function: Perform Security Administration

Key activities:

Define system security requirements and specifications

Develop and implement security procedures

Evaluate system design and configuration for security

Monitor and report security problems

Perform security audits and analyze results

Develop recommendations for system security upgrades and improvements

Key technical knowledge and foundation skills for this function:

- Knowledge of system security processes and audit procedures
- Knowledge of organizational issues regarding system security and user access
- Knowledge of security tools, policies, and procedures
- Knowledge of organizational policies, procedures, and standards regarding system security and user access
- Knowledge of security management tools
- Ability to relate system design and configuration to security functions
- Ability to identify and resolve security issues
- Ability to implement organizational processes and procedures

■ Ability to analyze information and formulate proposals for improvement or resolution

Occupation Cluster: Third-Party Management (pg. 15)

Critical Work Function: Develop and Manage Partner Business Relationships

Key activities:

Represent company to partner regarding pricing and rebate issues

Represent partner interests and requirements to product and service groups

Contribute to the formulation of future service and product requirements with partners

Ensure the successful execution of programs through partners and vendors

Identify and resolve service and quality issues regarding partner programs

Develop and implement joint marketing plans

Key technical knowledge and foundation skills for this function:

■ Knowledge of organization marketing and pricing strategies

■ Ability to manage high-level and key professional relationships

■ Ability to manage complex interactions with high-level personnel outside the company

■ Knowledge of resources and partners outside the organization

■ Ability to identify and work with key stakeholders

■ Knowledge of partner needs and business value and constraints

■ Ability to negotiate high-level business partnerships

■ Ability to communicate with technical and non-technical groups

■ Ability to identify and communicate key information to appropriate groups

■ Ability to forecast needs for products and services

■ Ability to foster collaboration and drive negotiation process between groups

■ Ability to identify issues and develop effective solutions

Occupation Cluster: Third-Party Management (pg. 15)

Critical Work Function: Identify and Select Strategic Partners

Key activities:

Identify areas of operation that would benefit from outsourcing

Identify business trends and their impact on third-party business relationships and practices

Develop recommendations for the establishment of new partnerships

Assess the effectiveness of current partner relation strategies

Identify partner key business and technical assets that are necessary to ensure success of partnership

Develop strategy for establishing relationship with selected new partners

Key technical knowledge and foundation skills for this function:

- Knowledge of operational needs and constraints
- Knowledge of outsourcing benefits and disadvantages
- Knowledge of quality assurance processes and techniques
- Knowledge of strategies and issues regarding third-party relationships
- Ability to identify key business and strategic opportunities
- Ability to develop high-level recommendations and presentations
- Ability to accumulate and present relevant information to support recommendations
- Ability to assess the business value and effectiveness of outside organizations
- Ability to assess effectiveness of business strategies
- Ability to adapt business strategy to the specific situation
- Knowledge of strategy development and validation processes and techniques

Occupation Cluster: <u>Third-Party Management</u> (pg. 15)

Critical Work Function: Provide Strategic Direction for Partner Relationship Program

Key activities:

Develop proposals to optimize cost/performance ratio of third-party partner relationships

Develop standards for partner business relationship processes and practices

Develop guidelines for contract development and negotiation with partners

Assess the business impact of partner relationship processes on the organization

Assess the changes in market and business practices and their impact on partner relationships

Assess the impact of legal constraints on partner relationships

Key technical knowledge and foundation skills for this function:

- Knowledge of organization strategic plan, business conditions, and future goals
- Ability to analyze and draw conclusions based on complex data from multiple areas

- Ability to develop and apply measurement processes and guidelines
- Ability to articulate a clear strategic vision with supporting justification
- Knowledge of key issues and variables that will impact the success of the organization
- Ability to evaluate and adjust high-level strategies and plans to changes in priorities, market, and technology
- Knowledge of market and business trends
- Ability to develop and present recommendations and effective white papers
- Knowledge of the long-term strategic development and business plan of the organization
- Knowledge of legal constraints and opportunities, and trends in legislation affecting business partnerships
- Knowledge of contractual terms and issues for partnerships and third-party relationships

Occupation Cluster: <u>Third-Party Management</u> (pg. 15)

Critical Work Function: Develop, Manage, and Negotiate Contracts

Key activities:

Manage contract negotiation process

Drive contract approval and signature process

Ensure ongoing compliance of partners with contract terms

Provide primary interface to the organization legal group

Assess needs for and drive the renegotiation of existing contracts

Key technical knowledge and foundation skills for this function:

- Knowledge of contractual terms and issues for partnerships and third-party relationships
- Knowledge of negotiation processes and techniques
- Knowledge of key stakeholders and approval and signature processes
- Ability to develop creative and effective solutions to support the negotiation process
- Ability to evaluate performance against plan
- Knowledge of legal implications of performance deviation from contract
- Ability to identify performance issues early on and to develop effective resolution processes
- Ability to identify critical information and communicate with relevant groups in a timely manner
- Ability to act as an interface between technical and non-technical groups
- Ability to make high-level decisions and drive high-level agreements

Occupation Cluster: <u>Third-Party Management</u> (pg. 15)

Critical Work Function: Evaluate Performance of Partners and Effectiveness of Relationships

Key activities:

Develop and apply metrics to ensure conformance with contract

Monitor vendor/partner activities and accounts

Evaluate effectiveness of partner relationship and business and communication processes

Make recommendations for improvement in processes and performance

Analyze cost/performance ratio of partner relationships

Assess technical and organizational readiness of partners

Key technical knowledge and foundation skills for this function:

- Ability to judge process effectiveness/efficiency
- Knowledge of process and performance evaluation techniques and tools
- Knowledge of contractual terms and constraints
- Ability to track and evaluate partner activities and budgets
- Ability to identify problems, their criticality, and impact on overall project and partnership
- Ability to identify root causes of problems
- Ability to develop meaningful and realistic measurement goals
- Knowledge of quality standards
- Ability to assess results and develop recommendations for improvements
- Ability to develop and revise existing best practices for partnership management
- Ability to analyze effectiveness of communication process
- Knowledge of cost performance metrics development and interpretation
- Ability to assess technical and business assets against requirements

Programming/ Software Development

Representative Occupations

- Applications analyst
- Applications engineer
- Business analyst
- Computer engineer
- Data modeler
- Operating system designer/engineer
- Operating system programmer/analyst
- Program manager
- Programmer
- Programmer/analyst
- Project lead
- Software applications specialist
- Software architect
- Software design engineer
- Software design engineer and tester
- Software development engineer
- Software engineer
- Software QA specialist
- Software tester
- Systems analyst
- Systems administrator
- Test engineer
- Tester

Occupation Cluster: Programming/Software Development (pg. 15)

Critical Work Function: Analyze and Design Solution Structure

Key activities:

Gather data to identify customer requirements

Define scope of work

Incorporate, identify, and define content requirements

Define system and software requirements

Develop and present concept alternatives

Create and refine preliminary design/mockup

Establish measurable performance requirements

Develop test requirements

Gather data on development standards

Develop high-level systems and functional specifications

Determine security requirements

Key technical knowledge and foundation skills for this function:

- Ability to pose critical questions and analyze and prioritize group/individual responses
- Ability to transfer customer requirements into system and software requirements
- Ability to gather, analyze, develop, and present cost data
- Knowledge of technology constraints and risk analysis techniques
- Ability to define measurable criteria for completion of work
- Knowledge of market, product history, and user business needs, and the ability to analyze competing products
- Ability to plan resource needs and constraints
- Ability to visualize tasks sequentially, identify interdependencies, and predict outcomes/results based on experience, prior knowledge or expert input
- Ability to identify and resolve conflicts to customer satisfaction
- Ability to formulate proposals and effectively communicate performance expectations and actual results
- Ability to write detailed and accurate functional specifications following organizational standards
- Knowledge of security requirements as they apply to program development
- Knowledge of site mapping and information mapping techniques
- Ability to translate functional/features into application/site design

Critical Work Function: Develop Structure

Key activities:

Choose an architecture

Identify major subsystems and interfaces

Select design tools and programming language

Produce graphics and layout elements

Develop models: site maps, application models, etc.

Integrate security requirements and features into the structure

Validate design scheme and models

Key technical knowledge and foundation skills for this function:

- Knowledge of design concepts, techniques, tools, processes, and trade-offs
- Ability to translate technical features into performance functionality, user benefits, project timeline, and budget impacts
- Ability to identify subsystems, evaluate degree of connectivity of system components, and rearrange systems to improve overall system functionality
- Ability to evaluate options, resolve technical conflicts, and make decisions
- Knowledge of make-or-buy considerations and decision-making process
- Knowledge of model development options and methodologies
- Ability to create comprehensive models and simulations
- Knowledge of model testing procedures, and limitations and strengths of simulations and models
- Ability to contrast models and design scheme with specifications
- Knowledge of impact of security requirements on program structure
- Knowledge of various graphical applications and sources of graphic images

Occupation Cluster: Programming/Software Development (pg. 15)

Critical Work Function: Design/Develop Programs

Key activities:

Develop design and interface specifications

Identify system platform, components, and dependencies

Develop appropriate data model

Determine information flow and level of detail to display

Prepare and conduct design review

Identify maintenance requirements

Create and test prototypes

Review and provide input to user documentation

Incorporate security requirements into design

Provide uniform integration for legacy systems

Key technical knowledge and foundation skills for this function:

- Knowledge of interface requirements and specification procedures
- Knowledge of normalization, relational theory, and data modeling tools
- Knowledge of grammar, readability, and usability standards for consistent design
- Knowledge of available platforms and of components and their compatibility with platform
- Ability to evaluate system configuration/stability and organization/hierarchy and recognize system strengths/limitations
- Ability to transform logical data model into physical data model
- Knowledge of structured program design principles and object orientation principles
- Ability to present complex ideas/information and to encourage others to adopt new concepts
- Ability to define maintenance requirements and procedures
- Knowledge of prototype design, building, and testing methodologies and tools
- Knowledge of legacy systems and interoperability issues and constraints
- Ability to relate prototype test results to model performance predictions
- Knowledge of version and revision control practices and procedures
- Ability to translate customer security requirements into functional specifications
- Knowledge of design and programming techniques that provide security

Occupation Cluster: Programming/Software Development (pg. 15)

Critical Work Function: Test Programs

Key activities:

Develop test plan and system

Develop test procedures

Perform functionality tests

Test security performance of program

Document test results and make recommendations

Key technical knowledge and foundation skills for this function:

- Knowledge of user application and external interfaces

- Knowledge of testing impact on timeline and budget

- Knowledge of test domain and specifications and ability to distinguish edges and critical points

- Ability to construct automated test sequences and recognize errors in test procedure and system

- Knowledge of testing principles, tools, and methodologies

- Knowledge of testing methodologies as applied to security features

- Ability to evaluate system performance and devise plan to monitor and/or correct system

- Ability to modify test processes/procedures to improve testing reliability

Occupation Cluster: Programming/Software Development (pg. 15)

Critical Work Function: Validate Programs

Key activities:

Perform user acceptance test

Validate user documentation

Validate security features

Key technical knowledge and foundation skills for this function:

- Knowledge of test procedures for user acceptance

- Knowledge of application environment and user requirements

- Ability to identify major issues and make recommendations

- Knowledge of user documentation validation procedures

- Ability to present complex ideas/information, analyze group/individual response, and pose critical questions

- Knowledge of data and access security procedures and standards

- Ability to integrate multiple items of data and summarize findings in detailed supporting documents

Occupation Cluster: Programming/Software Development (pg. 15)

Critical Work Function: Release Solutions

Key activities:

Lead or participate in development of release plan

Train technical support staff

Lead or participate in development of user training plan

Transition to new system

Evaluate, correct, and document defects

Evaluate, implement, and document enhancements

Key technical knowledge and foundation skills for this function:

- Ability to develop plan of action and to organize and coordinate activities and resources
- Knowledge of technical training processes and training objectives
- Ability to design, organize, and present technical material to a technical audience
- Ability to assess and analyze training needs and conduct effective training
- Knowledge of release and transition processes, contingency procedures, and productivity factors
- Ability to evaluate system performance and productivity
- Knowledge of system error analysis and resolution procedures
- Ability to evaluate the importance of a defect and take appropriate action
- Ability to translate available feedback into recommended system enhancements
- Ability to formulate and evaluate trade-offs regarding enhancements
- Ability to analyze impact of modification on overall system performance

Occupation Cluster: Programming/Software Development (pg. 15)

Critical Work Function: Implement Solutions

Key activities:

Write code

Perform unit testing

Integrate subsystems

Lead and/or participate in peer code review

Resolve defects and rework code

Revise and adapt existing code

Key technical knowledge and foundation skills for this function:

- Knowledge of code development procedures and code version and revision control practices
- Knowledge of programming language required for application
- Knowledge of reusable component programming processes
- Ability to document code, errors, and code modifications in detailed supporting documents
- Ability to evaluate alternatives in code implementation and make decisions
- Knowledge of debugging tools, unit testing procedures, and iteration design processes

- Ability to identify, troubleshoot, and correct malfunctions/failures
- Knowledge of system testing procedures and of subsystem conflict analysis and resolution
- Knowledge of peer code review process and procedures
- Ability to encourage others to adopt new concepts and resolve conflicts

Occupation Cluster: <u>Programming/Software Development</u> (pg. 15)

Critical Work Function: Manage Development Environment

Key activities:

Evaluate and recommend hardware, software, and third-party solutions

Set up server software and hardware

Manage server

Support disaster recovery

Key technical knowledge and foundation skills for this function:

- Knowledge of risk assessment methods
- Knowledge of sources of information regarding server hardware, software, and third-party solutions
- Ability to evaluate effectiveness of solutions for customer and forecast future customer needs
- Knowledge of the impact of the installation plan on the whole system
- Knowledge of installation obstacles and how to resolve them
- Ability to load and test third-party software/extensions
- Ability to present complex ideas and information and debate issues
- Ability to use system administration and systems performance-monitoring tools
- Ability to analyze and resolve hardware and software problems
- Knowledge of monitoring procedures and ability to design and generate reports
- Ability to analyze and optimize system operation
- Knowledge of their backup/recovery procedures and their planning and implementation process
- Ability to identify system problems and evaluate for criticality
- Ability to respond appropriately to others and demonstrate understanding of their concerns

Occupation Cluster: <u>Programming/Software Development</u> (pg. 15)

Critical Work Function: Manage Enterprise-wide Development Activities

Key activities:

Define and manage development standards

Train designers and developers

Evaluate technologies and standards

Provide quality customer service

Key technical knowledge and foundation skills for this function:

- Knowledge of server- and client-side capabilities and limitations
- Knowledge of company usage standards and branding
- Ability to analyze and manipulate learning tools and formulate and adapt learning strategies
- Ability to identify training needs and resources and conduct task-specific training
- Ability to evaluate effectiveness of solutions for customer and forecast future customer needs
- Ability to adapt principles to new applications
- Knowledge of support boundaries and escalation procedures
- Ability to analyze customer needs, resolve conflicts, and demonstrate commitment to customers
- Ability to identify problem, analyze possible causes, and recommend action plan
- Ability to develop formal and informal relationships with leaders in the enterprise

Occupation Cluster: Programming/Software Development (pg. 15)

Critical Work Function: Perform Development-related Security Administration

Key activities:

Define security requirements

Design site security measures

Define security standards and policies for users and developers

Evaluate site design and performance for security

Evaluate server for security

Evaluate technology and usage trends for impact on security

Develop recommendations for system security upgrades and improvements

Key technical knowledge and foundation skills for this function:

- Knowledge of system security limitations and capabilities

- Knowledge of customer security requirements
- Knowledge of requirements regarding exchange of data and access issues
- Knowledge of security standards and policies
- Knowledge of Web and other site security management tools
- Ability to relate system design specifications to security functions
- Ability to identify and resolve security issues
- Ability to implement organizational processes and procedures
- Ability to analyze information and formulate proposals for improvement or resolution

Occupation Cluster: Project Management (pg. 15)

Project Management

Representative Occupations

- Procurement manager
- Program budget manager
- Program lead
- Program manager
- Program planner
- Program risk manager
- Project integration manager
- Project lead
- Project manager
- Project planner
- Project quality manager
- Resource allocation manager
- Risk assessment manager

Critical Work Function: Manage Project Integration

Key activities:

Develop recommendations for improvement of project management processes

Develop effective evaluation tools and processes

Evaluate project completion with regard to scope, schedule, and budget against the project plan

Assess effectiveness of project monitoring processes and tools

Design and develop work processes and procedures

Key technical knowledge and foundation skills for this function:

- Ability to apply systematic evaluation methods
- Ability to assess results and develop recommendations for improvements
- Ability to demonstrate sensitivity to stakeholders' concerns and interests
- Ability to develop and revise existing best practices for project management
- Ability to develop meaningful and realistic measurement goals
- Ability to formulate project purpose and major goals
- Ability to identify critical steps and develop comprehensive models
- Ability to identify problems, their criticality, and impact on overall project
- Ability to identify root causes of problems
- Ability to judge project effectiveness/efficiency
- Ability to make and justify high-level decisions
- Ability to monitor and improve processes and procedures
- Ability to translate scope, schedule, and work breakdown of tasks into business impact terms
- Ability to use appropriate project management software and flow-charting tools
- Knowledge of company policies and procedures
- Knowledge of organization hierarchy and decision-making processes

- Knowledge of organization processes and procedures
- Knowledge of project-evaluation techniques and tools
- Knowledge of project-proposal processes
- Knowledge of spreadsheets and software-based budget development and tracking tools
- Knowledge of work processes and procedures

Occupation Cluster: <u>Project Management</u> (pg. 15)

Critical Work Function: Define and Manage Project Scope

Key activities:

Evaluate project requirements

Define project goals and identify constraints

Negotiate project definition and scope with customers and development team

Develop and document scope of project

Develop a work breakdown structure based on the deliverable and project requirements

Create a scope change-control process and management plan

Drive the development and validation of product specifications

Negotiate product features with customer/user and development team

Make trade-off decisions on product features, budget, and timelines

Key technical knowledge and foundation skills for this function:

- Ability to negotiate and drive for consensus
- Ability to define and assess both human and technical objectives of the project
- Knowledge of development and testing procedures, processes, constraints, and issues
- Knowledge of organization release practices and processes
- Knowledge of product specification development and validation processes

Occupation Cluster: <u>Project Management</u> (pg. 15)

Critical Work Function: Define and Manage Project Plan and Timeline

Key activities:

Develop detailed task list to the work package level

Identify the sequence of work and any internal/external interdependencies

Estimate the duration and resource requirements for each task to the work package level

Obtain input from development team and customers to finalize project plan

Create product development, testing, and delivery schedule and plan

Create identifying and documenting Gantt chart, network, and resource diagrams

Define a baseline for progress and performance measurement

Develop specific monitoring criteria and processes

Identify, track, and manage final and interim milestones by phase

Organize and conduct project phase reviews

Monitor, analyze, and evaluate processes and project completion

Continuously evaluate project plan and revise as necessary

Key technical knowledge and foundation skills for this function:

- Ability to adjust plans and milestones to changing priorities, constraints, and requirements
- Ability to diagram and document the sequence of work and internal/external interdependencies
- Ability to evaluate project status and outcomes in an objective manner
- Ability to formulate and organize processes
- Ability to identify critical issues and problems and develop effective solutions
- Ability to integrate complex plans involving multiple groups and schedules
- Ability to summarize and present project progress, status, and problems/opportunities to customers
- Ability to track the use of resources throughout the project
- Ability to visualize project duration, resource, and budget requirements at the work package level
- Ability to visualize the sequence of work and its associated critical path(s)

Occupation Cluster: <u>Project Management</u> (pg. 15)

Critical Work Function: Develop and Manage Project Budget

Key activities:

Develop cost estimates for proposal to customer based on input from
appropriate groups

Present, justify, and negotiate cost with customer and technical team

Develop overall budget and budget detail for project

Identify budgets and costs by technical and/or functional groups

Develop and implement budget-tracking processes and schedule

Identify budget issues and develop solutions

Key technical knowledge and foundation skills for this function:

- Ability to analyze and summarize budget information and draw appropriate
  conclusions
- Ability to assess criticality and impact of cost overruns
- Ability to develop creative and effective solutions to budget problems
- Ability to identify impact of budget changes on project
- Ability to recognize budget issues in a timely manner
- Ability to support various groups in the budget estimation and tracking
  processes
- Ability to use estimation processes and tools
- Knowledge of budget-tracking processes and tools
- Knowledge of organization costing structure and practices

Occupation Cluster: <u>Project Management</u> (pg. 15)

Critical Work Function: Manage Project Quality Process

Key activities:

Define acceptance criteria and quality processes

Monitor, analyze, and evaluate processes and quality-acceptance objectives

Key technical knowledge and foundation skills for this function:

- Knowledge of monitoring and quality-assurance processes and procedures
- Knowledge of project quality standards

Occupation Cluster: <u>Project Management</u> (pg. 15)

Critical Work Function: Manage Project Human Resources

Key activities:

Identify key skills and competencies for project members

Select team members based on project goals and resource requirements

Define the structure and processes for the team

Assign team roles and responsibilities

Provide feedback and coaching to team members

Resolve conflicts and support effective functioning of the team

Assess effective use of resources throughout the project

Assess effectiveness of team processes and communication

Manage resource allocation during product development, testing, and release

Assess organization readiness for product release and make recommendations

Key technical knowledge and foundation skills for this function:

- Ability to conduct gap analysis between desired and current states of organization readiness
- Ability to coordinate and negotiate with others to meet deadlines
- Ability to coordinate with diverse groups having different responsibilities for product development and release
- Ability to design effective work and communication processes
- Ability to evaluate individual and team performance
- Ability to identify skills and competencies needed to perform a specific role
- Ability to lead and facilitate team processes
- Ability to negotiate for resource allocation and develop creative solutions to resource usage
- Ability to negotiate for support and resources
- Ability to organize and lead group review processes
- Ability to provide constructive and relevant feedback
- Ability to request and justify need for resources
- Ability to work effectively with and motivate diverse teams
- Ability to work with the team to develop and implement evaluation processes
- Knowledge of company operating procedures regarding resource allocations
- Knowledge of conflict resolution techniques
- Knowledge of group dynamics and processes
- Knowledge of skill and competency distribution throughout the organization

Occupation Cluster: <u>Project Management</u> (pg. 15)

Critical Work Function: Manage Project Communication Processes

Key activities:

Identify stakeholders and decision makers

Communicate and justify project plan to development team

Communicate relevant elements of project plan to customers highlighting key business issues

Communicate overall project goals and scope to customer and development team and obtain approval

Communicate budget issues and propose solutions to customer and technical team

Communicate project status, critical milestones, and critical issues to customer

Secure and sustain effective project sponsorship

Assess and mitigate risks associated with resistance, cultural impact, and process change

Communicate to and negotiate with customers any major changes to project plan

Communicate relevant information to team members in a timely manner

Communicate and justify release and deployment processes and plan to customers and technical team

Coordinate with customers/users, development teams, and deployment groups

Document and report project status

Assess the effectiveness of the interaction and communication with customer

Key technical knowledge and foundation skills for this function:

- Ability to analyze effectiveness of communication process
- Ability to analyze multiple viewpoints and negotiate to bring consensus
- Ability to communicate and negotiate on technical and non-technical issues
- Ability to communicate budgetary information in business terms
- Ability to communicate features and trade-offs to users and stakeholders
- Ability to communicate with technical and non-technical staff in ways appropriate to the audience focus and perspective
- Ability to interpret and clarify communication
- Ability to solicit and analyze feedback
- Knowledge of political issues related to successful project implementation

Occupation Cluster: <u>Project Management</u> (pg. 15)

Critical Work Function: Assess and Manage Risks

Key activities:

Identify elements of risks in project

Analyze and prioritize risks and assess potential impact on project

Develop processes and systems to minimize risks

Develop and test recovery plan for identified risks

Develop and apply monitoring processes to measure risk probability

Key technical knowledge and foundation skills for this function:

- Knowledge of risk assessment techniques and processes
- Knowledge of risk mitigation techniques and processes
- Knowledge of recovery techniques and processes
- Knowledge of monitoring techniques and processes
- Knowledge of contingency plans and procedures
- Knowledge of probability- and statistical-based decision-making processes
- Ability to develop effective contingency plans
- Ability to recognize the need for intervention
- Ability to assess criticality of risks and potential impact on system
- Ability to analyze complex information and develop projections
- Ability to recognize areas of uncertainty and constraints
- Ability to work and communicate effectively with project members and stakeholders
- Ability to monitor complex processes and recognize deviations from plan
- Ability to establish processes and procedures that minimize risk

Occupation Cluster: <u>Project Management</u> (pg. 15)

Critical Work Function: Manage Project Procurement Processes

Key activities:

Negotiate for and secure necessary tools and resources

Obtain input from the customer on invoice and payment administration

Key technical knowledge and foundation skills for this function:

- Ability to project resource and budgetary needs

Product Management

**Representative
Occupations**

Occupation Cluster: <u>Product Management</u> (pg. 15)

Critical Work Function: Manage Customer Expectations and Customer Interaction Processes

Key activities:

Identify decision makers and the decision process in the customer group

Gather and analyze customer requirements and expectations

Assess customer level of satisfaction and confidence and reconfirm expectations throughout the project

Evaluate customer interaction processes and make recommendations for improvement and/or enhancements

Address customer issues in an effective and timely manner

Inform customers of changing risks and other challenges and drive customer reevaluation of needs and expectations

Identify customer ongoing needs for product and services improvements and/or enhancements

Ensure that the technology solution meets the needs and expectations of the customer

Key technical knowledge and foundation skills for this function:

- Knowledge of customer relationship-management processes and techniques
- Knowledge of customer organizations and decision hierarchy
- Knowledge of specification- and requirement-gathering and analysis processes and techniques
- Ability to negotiate solutions focusing on customer expectations and project requirements definition
- Ability to identify key issues and requirements
- Ability to evaluate processes and make recommendations for improvements
- Ability to perform effective customer-needs assessment
- Ability to assess effective level of detail and timing in communicating with customer
- Knowledge of technology trends and changing needs in technology services
- Knowledge of customer's technology strategies
- Ability to effectively communicate and apply problem-solving techniques
- Ability to assess effectiveness of current use of technology and of technology solutions

Occupation Cluster: <u>Product Management</u> (pg. 15)

Critical Work Function: Drive Feature Identification and Prioritization

Key activities:

Outline and define requirements, objectives, and priorities

Lead the identification and prioritization of product features based on customer expectations, business requirements, and technology constraints

Communicate the trade-off decisions on product features based on technology and budget constraints and customer requirements

Reassess feature prioritization throughout product development based on changing requirements and constraints

Give input to design team focusing on customer requirements for product manageability, supportability, and deployability

Key technical knowledge and foundation skills for this function:

- Ability to analyze, summarize, and prioritize requirements
- Knowledge of product features and limitations
- Ability to integrate technology and business requirements and constraints
- Ability to negotiate solutions focusing on customer expectations and project requirements definition
- Ability to influence customer decision in a positive and cooperative manner
- Ability to keep track of changes and evaluate their impact on overall solution
- Ability to assess effective level of detail and timing in communicating with customer
- Knowledge of design processes and constraints
- Knowledge of requirement change impact on design process
- Knowledge of product manageability, supportability, and deployability issues
- Ability to communicate and negotiate effectively with technical design team

Occupation Cluster: <u>Product Management</u> (pg. 15)

Critical Work Function: Drive Shared Product Vision

Key activities:

Drive congruency between customer needs, business requirements, and technology solution

Identify customer expectations and confirm shared understanding on an ongoing basis

Lead the communication and negotiation process between customer and program management team

Evaluate trends in customer needs and expectations and project associated changes/improvements in infrastructure and support

Act as the customer advocate to the team

Act as the team advocate to the customer

Key technical knowledge and foundation skills for this function:

- Ability to integrate technology and business requirements and constraints
- Ability to analyze multiple viewpoints and requirements and develop an overall recommendation
- Ability to promote open communication of issues
- Ability to identify and address underlying issues
- Ability to interpret communication from technical and non-technical customers and team members
- Knowledge of program management team goals and constraints
- Ability to negotiate between groups with different goals and perspectives
- Knowledge of customer technology needs and trends
- Knowledge of impact of product design/feature change on system infrastructure and support
- Ability to assess effective level of detail and timing in communicating with customer and team
- Ability to understand and present different viewpoints and perspectives

Occupation Cluster: <u>Product Management</u> (pg. 15)

Critical Work Function: Develop, Maintain, and Execute the Business Case

Key activities:

Support cost/benefit analysis of solution development and implementation

Support the assessment of impact of product deployment on customer productivity and business effectiveness

Support the development of the business rationale for the proposed solution

Ensure proper assessment of organization readiness for deployment and develop recommendations to support deployment success

Support the assessment and allocation of resource during product release and deployment

Support the assessment and the mitigation of risks associated with solution implementation

Key technical knowledge and foundation skills for this function:

- Knowledge of cost/benefit analysis processes and tools
- Ability to interpret cost/benefit analysis summaries
- Knowledge of solution development and implementation processes and issues
- Knowledge of customer operations and culture
- Knowledge of impact of technology change and implementation on productivity
- Ability to develop supporting documentation and rationale for specific solution
- Knowledge of business and cost issues in technology implementation
- Knowledge of readiness assessment processes and techniques
- Knowledge of customer level of technology sophistication
- Ability to draw outline of deployment plan with justification and contingencies
- Knowledge of resource needs to support implementation and deployment of technology solution
- Knowledge of implementation risks and issues
- Ability to assess risks and propose effective mitigation procedures

Occupation Cluster: Product Management (pg. 15)

Critical Work Function: Develop, Maintain, and Execute the Communications Plan

Key activities:

Identify customer communication processes, practices, and preferences

Develop an integrated communications plan that is responsive to the needs of the customer and the team

Assess the effectiveness of the communications plan and adapt to changing needs and unexpected problems

Ensure that issues are communicated and resolved in a timely and effective manner

Develop high-level briefings to senior management/customers

Ensure an effective two-way communication between the customer and team

Key technical knowledge and foundation skills for this function:

- Knowledge of customer communication processes
- Knowledge of customer relationship management processes and techniques
- Knowledge of customer organizations and decision hierarchy
- Knowledge of communication plan development principles
- Ability to evaluate the effectiveness of the process and make changes for improvement

- Ability to be responsive and flexible in interactions with customers and the team
- Ability to develop creative solutions to communication problems
- Ability to assess effective level of detail and timing in communicating with the customer
- Ability to facilitate communication and negotiation between the customer and team
- Ability to develop and deliver effective business and technical presentations
- Ability to identify and address a wide range of communication issues

Occupation Cluster: Product Management (pg. 15)

Critical Work Function: Support Customer in Marketing to Users, and Training Users and Technical Staff

Key activities:

Support the development of marketing strategies and materials to users

Drive the organization and scheduling of user demonstrations

Support product launches

Ensure requirements definition of training plan for operations and technical support staff

Drive the requirements of product and training documentation

Key technical knowledge and foundation skills for this function:

- Knowledge of marketing strategies development processes and techniques
- Knowledge of marketing material development processes and techniques
- Knowledge of user demonstration processes and techniques
- Ability to identify the need for and timing of key marketing events
- Knowledge of product launch processes and techniques
- Ability to identify the training needs of different technical and user groups

Occupation Cluster: <u>Technical Support</u> (pg. 15)

Technical Support

Representative Occupations

- Analyst
- Call center support representative
- Customer liaison
- Customer service representative
- Customer support professional
- Help desk specialist
- Help desk technician
- Maintenance technician
- PC support specialist
- PC systems coordinator
- Product support engineer
- Sales support technician
- Senior systems analyst
- Systems analyst
- Technical account manager
- Technical support engineer
- Technical support representative
- Testing engineer

Critical Work Function: Perform Troubleshooting

Key activities:

Analyze problem and research solutions

Query existing knowledge base

Identify, test, and implement solutions

Manage system resolution with available resources

Communicate technical solutions and implementation processes

Implement long-range solutions

Document hardware and software problems and resolutions

Key technical knowledge and foundation skills for this function:

- Knowledge of systematic methods of solving technical problems
- Knowledge of sources of relevant technical data
- Ability to prioritize possible solutions based on technical criteria
- Ability to use written and electronic documentation
- Ability to read and interpret technical diagrams and decision trees
- Knowledge of how to read and query a database
- Ability to remove, repair, or replace modules and subassemblies as appropriate
- Ability to examine the situation, analyze possible causes/reasons, and recommend an action plan
- Knowledge of physical inventory and access and control procedures
- Ability to implement proper procedures and work within established guidelines
- Knowledge of technical specifications and relevant indicators of system performance
- Ability to plan according to resource constraints and requirements
- Knowledge of problem and resolution documentation procedures and standards
- Ability to develop recommendations for system optimization and improved stability

Occupation Cluster: <u>Technical Support</u> (pg. 15)

Critical Work Function: Provide Facilitation and Customer Service

Key activities:

Gather and analyze customer input

Manage working relationships with customers

Perform negotiated services

Act as liaison between groups

Provide training to customers

Manage demands from multiple customers

Solicit customer feedback and apply input to improve quality of service

Document and communicate customer feedback and requests

Key technical knowledge and foundation skills for this function:

- Ability to analyze and interpret customer input for expressed and implied issues
- Ability to foster and contribute to an open communication environment
- Knowledge of support boundaries and escalation procedures
- Knowledge of practices of internal, external, and global customers
- Ability to recognize and analyze customer needs and resolve conflicts to customer satisfaction
- Ability to resolve technical issues and obtain customer approval
- Knowledge of available resources and customer constraints
- Knowledge of negotiated agreement parameters and negotiation variables
- Ability to redirect customer to appropriate resources for solutions to problems outside the bounds of assigned responsibilities
- Knowledge of each group's function and responsibilities and interrelation between groups
- Knowledge of organizational communication processes
- Ability to encourage cooperation/negotiation
- Ability to create appropriate presentation visuals for technical material
- Ability to analyze and manipulate learning tools and formulate and adapt learning strategies
- Ability to perform appropriate learning-needs assessments and write learning objectives
- Ability to prioritize daily tasks, prepare schedule, and monitor/adjust task sequence
- Ability to apply management skills and analyze and adjust personal/team goals
- Knowledge of service delivery methods and practices

- Ability to evaluate quality and effectiveness of processes
- Ability to actively participate in discussions and present complex technical information
- Knowledge of communication procedures for customer feedback and requests

Occupation Cluster: <u>Technical Support</u> (pg. 15)

Critical Work Function: Perform Hardware and Software Installation, Configuration, and Upgrades

Key activities:

Identify and interpret customer requirements

Evaluate present data and system configuration

Develop installation plan

Install, configure, and test system hardware and peripherals

Install, configure, and test new operating and application software and software upgrades

Perform quality checks on outcomes of work performed

Document system installation, configuration procedures, and current configuration

Key technical knowledge and foundation skills for this function:

- Ability to develop plan of action and to organize and coordinate activities
- Ability to evaluate priorities and assess and organize resources
- Knowledge of system installation and configuration processes and specifications
- Knowledge of the impact of the installation plan on the whole system
- Knowledge of solution and modification tracking methods
- Ability to identify installation-related tasks and sequence them accordingly
- Knowledge of hardware, software, and peripheral installation and configuration practices
- Knowledge of hardware and software troubleshooting and adjustment techniques and practices
- Ability to detect and resolve hardware and software interaction and compatibility problems
- Knowledge of quality-assurance principles, techniques, and standards

Occupation Cluster: <u>Technical Support</u> (pg. 15)

Critical Work Function: Perform System Operations, Monitoring, and Maintenance

Key activities:

Operate computer system and run system applications

Perform system diagnostics

Monitor and analyze system performance

Optimize system performance through software and hardware configuration

Develop and implement preventative maintenance plan

Evaluate maintenance processes and outcomes

Communicate and document maintenance procedures and system status

Key technical knowledge and foundation skills for this function:

- Knowledge of applicable startup, shutdown, and backup procedures
- Knowledge of system optimization and diagnostic procedures and processes
- Ability to assess system performance against specifications
- Ability to apply system monitoring and diagnostic tools and procedures
- Ability to use test programs and other tools to analyze system operation
- Ability to identify and resolve operational and performance issues
- Ability to identify problems and develop and test solutions
- Ability to detect, evaluate, and appropriately escalate problems
- Knowledge of performance measurement tools and procedures
- Knowledge of preventative-maintenance procedures and processes
- Knowledge of roles and responsibilities of company personnel and departments
- Knowledge of company practices for maintenance
- Ability to analyze and summarize information and identify trends and interdependencies
- Ability to evaluate installation processes and suggest modifications/improvements
- Knowledge of technical documentation procedures and standards
- Knowledge of internal and external communication procedures

Occupation Cluster: <u>Technical Support</u> (pg. 15)

Critical Work Function: Perform Security Administration

Key activities:

Implement security procedures

Evaluate system design and configuration for security

Monitor and report security problems

Perform security audits and analyze results

Develop recommendations for system security upgrades and improvements

Key technical knowledge and foundation skills for this function:

- Knowledge of system security processes and audit procedures
- Knowledge of security tools, policies, and procedures
- Knowledge of organizational policies, procedures, and standards regarding system security and user access
- Knowledge of security management tools
- Ability to relate system configuration to security functions
- Ability to identify and resolve security issues
- Ability to implement organizational processes and procedures
- Ability to analyze information and formulate proposals for improvement or resolution

Occupation Cluster: <u>Technical Support</u> (pg. 15)

Critical Work Function: Provide Technical Support to Production Environment

Key activities:

Contribute to the system implementation in the production environment

Give input to operational strategy related to business/technology strategy

Support multiple systems and releases of varying levels of complexity

Contribute to the development and improvement of guidelines and procedures for system implementation and releases

Provide application support to facilitate effective utilization of the system

Contribute to the acceptance process for new releases into production

Support processes facilitating the readiness of the production environment

Key technical knowledge and foundation skills for this function:

- Knowledge of production environment constraints and procedures
- Knowledge of implementation and release processes and guidelines
- Ability to relate technology features and limitations into operational impact
- Knowledge of production environment applications and goals
- Knowledge of problem- and resolution-documentation processes and standards
- Ability to examine the situation, analyze possible causes/reasons, and recommend an action plan
- Knowledge of user-acceptance process and procedures
- Ability to communicate with a wide range of personnel with varying levels of technical expertise
- Ability to evaluate user level of expertise and need for training in specific technical areas

Occupation Cluster: Technical Sales (pg. 15)

Technical Sales

Representative Occupations

- Customer account manager
- Customer liaison
- Customer service representative
- Customer support professional
- Marketing strategy manager
- Product solution manager
- Sales consultant
- Sales representative
- Sales support technician
- Service solution manager
- Solution delivery manager
- System engineer
- Technical account manager
- Technical sales consultant
- Technical specialist

Critical Work Function: Develop and Manage Customer Accounts

Key activities:

Identify new customers and qualify based on customer business needs and their alignment with available products and services

Develop appropriate marketing strategies and plan to secure new accounts

Develop an effective strategy to keep current on customers' business needs and identify new sales opportunities with existing customers

Develop a service plan and engage appropriate partners to meet specific customer opportunities

Adapt interaction style and marketing strategy to specific customer cultures and behaviors

Build strong partnerships with customers based on trust, ethics, and quality of service

Document customer feedback on products and services and communicate feedback with development and implementation teams and management

Key technical knowledge and foundation skills for this function:

- Ability to analyze customer buying behaviors and patterns
- Ability to identify new customer prospects and business opportunities
- Ability to adapt sales strategies to customer culture and feedback
- Ability to manage high-level and key professional relationships
- Ability to manage complex interactions with high-level personnel outside the company
- Knowledge of resources and partners outside the organization

- Ability to identify and work with key stakeholders
- Knowledge of customer needs and business value and constraints
- Knowledge of marketing strategy development principles and tools
- Ability to identify key customer data and communicate with appropriate groups
- Knowledge of customer- and opportunity-tracking tools and techniques

Occupation Cluster: <u>Technical Sales</u> (pg. 15)

Critical Work Function: Develop Product and Service Solution with Customer

Key activities:

Identify and analyze customer needs and preferences

Obtain input from technical teams regarding cost of development and implementation, and delivery schedule

Collaborate with customer and technical teams to develop potential solutions with associated costs, benefits, and business value

Present technology life cycle and risks to customer for each solution and assess customer readiness to implement solution

Present candidate solutions to customers and drive the negotiation process with the support of appropriate technical personnel

Develop integrated solution and finalize delivery and implementation cost and schedule

Develop detailed proposal and obtain necessary contractual agreements from development and customer organizations

Key technical knowledge and foundation skills for this function:

- Ability to address customer issues and reluctance in an effective and positive manner
- Ability to analyze and draw conclusions based on complex data from multiple areas
- Ability to design complex systems and processes effectively
- Ability to collaborate with a wide range of technical and non-technical groups
- Ability to negotiate effectively on a wide range of technical and non-technical issues
- Ability to listen to and interpret inputs from different teams and participants
- Ability to act as an advocate for the customer to the technical development and deployment groups
- Ability to act as an advocate for the technical development and deployment groups to the customer
- Ability to organize complex cross-team projects

- Knowledge of product life cycles and technology risks
- Knowledge of technical proposal development processes and tools
- Knowledge of cost-estimate and budget-development tools and techniques
- Knowledge of technology and operational constraints for the various groups
- Ability to develop and deliver complex presentations
- Ability to identify critical elements and make trade-off decisions

Occupation Cluster: <u>Technical Sales</u> (pg. 15)

Critical Work Function: Manage Delivery of Solution

Key activities:

Recruit appropriate support personnel from sales and technical teams to develop and deliver solution

Secure and monitor sponsorship for the project

Coordinate delivery of products and services with customer and technical teams

Act as an intermediary between technical teams and customer

Give regular status reports to customer on progress of delivery

Identify problems affecting the delivery schedule and/or cost and develop effective solutions

Document delivery process and develop recommendations for process improvement

Key technical knowledge and foundation skills for this function:

- Ability to identify problems and develop creative and effective solutions
- Ability to manage complex systems and processes effectively
- Ability to act as an advocate for the customer to the technical development and deployment groups
- Ability to act as an advocate for the technical development and deployment groups to the customer
- Ability to manage complex cross-team projects
- Knowledge of available resources and resource allocation practices
- Ability to identify the need and effectively negotiate for resources within and outside the organization
- Ability to negotiate with project sponsors when support appears to be insufficient or declining
- Ability to identify critical issues and collaborate effectively with customers and technical groups to resolve these issues
- Ability to track cost and schedule and identify potential issues and risks

Occupation Cluster: <u>Technical Sales</u> (pg. 15)

Critical Work Function: Develop and Update Presentations of Product and Services

Key activities:

Update knowledge of product and service offerings to keep current with technology and changes in organization product line

Organize personal and team training on new products and services and upgrades

Identify the need for further technical or sales training to improve sales effectiveness

Create effective presentations and simulations using technology to enhance communication with customers

Develop and adapt customer presentations based on customer business needs and solution benefits and cost

Develop a coherent and integrated sales presentation that addresses complex customer business needs

Key technical knowledge and foundation skills for this function:

- Ability to use technology and simulations to enhance presentations
- Knowledge of organization product development strategies
- Knowledge of organization communication process for new products and product upgrades
- Knowledge of available training resources and forums
- Ability to evaluate the need for further training and the most effective training forum
- Ability to organize and present complex data from multiple technology areas
- Ability to deliver effective presentations appropriate to purpose and audience
- Ability to adapt presentation style and technical level to audience needs and knowledge
- Ability to adapt sales presentations to customer feedback
- Knowledge of customer business and technical needs and current state of readiness
- Ability to visualize relationships and complements between different products and services

Occupation Cluster: <u>Technical Sales</u> (pg. 15)

Critical Work Function: Assess General Market Environment

Key activities:

Identify and assess competition and competitors' development and sales strategies

Assess the trends in customer needs and preferences

Conduct regular market research and analyze trends in markets and customer profiles and business needs

Assess the trends in customer interactions and partnerships with selling organizations

Give feedback to technical teams and management on market trends affecting product and service strategies

Key technical knowledge and foundation skills for this function:

- Ability to analyze and draw conclusions based on complex data from multiple areas
- Ability to identify and analyze trends
- Ability to identify meaningful and critical information
- Knowledge of market analysis tools and techniques
- Knowledge of key issues and variables that will impact the overall market
- Knowledge of market dynamics and trends
- Knowledge of competition products, services, and customer strategies
- Ability to identify critical information and its impact on the organization
- Knowledge of customer cultures and expectations regarding partnerships
- Ability to translate market information in terms meaningful to technical and non-technical groups and management

Occupation Cluster: <u>Technical Sales</u> (pg. 15)

Critical Work Function: Develop Long-Term Sales and Marketing Strategies

Key activities:

Develop long-term estimations and sales forecasts

Assess cost-effectiveness of current sales strategies

Give input based on sales forecasts and cost of sales to development team and management

Assess effectiveness of the marketing strategies in supporting existing customers and acquiring new customers

Assess effectiveness of the sales organization and team in responding to customers' business needs and expectations

Identify areas of customer business needs that are not met by current sales strategies and assess criticality and long-term impact

Develop white papers on sales trends and strategies and recommendations to meet the long-term needs of the market

Key technical knowledge and foundation skills for this function:

- Ability to analyze and draw conclusions based on complex data from multiple areas
- Ability to develop and apply measurement processes and guidelines
- Ability to articulate a clear strategic vision with supporting justification
- Knowledge of key issues and variables that will impact the marketing success of the organization
- Ability to evaluate and adjust high-level strategies and plans to changes in priorities, market, and technology
- Knowledge of sales-forecast development tools and techniques
- Knowledge of break-even analysis and revenue-estimation tools and techniques
- Ability to translate financial information in terms meaningful to technical and non-technical groups and management
- Knowledge of customer needs and expectations and market trends
- Knowledge of technology impact on business success
- Ability to develop and present recommendations and effective white papers
- Knowledge of the long-term strategic development and business plan of the organization

Occupation Cluster: Testing Development and Management (pg. 15)

Testing Development and Management

Representative Occupations

- Software tester
- Test analyst
- Test engineer
- Test lead
- Test manager
- Test strategy planner
- Tester
- Testing plan developer
- Usability test manager
- Usability tester

Critical Work Function: Develop Test Strategy and Plan

Key activities:

Translate user application environment and product features into testing requirements

Define and document test specifications

Prioritize needs for testing and develop cost estimates based on testing scenarios

Communicate to and negotiate with project/product manager and technical groups the proposed testing plan and scope

Develop testing strategy for specific product and application

Manage testing schedule and report project status according to plan

Obtain team and project/product manager approval for test plan and strategy

Key technical knowledge and foundation skills for this function:

- Knowledge of test procedures and strategies
- Knowledge of product testing processes and techniques
- Knowledge of technical design, construction, and testing phases
- Ability to identify key product features to be tested
- Ability to develop cost estimates based on various testing scenarios
- Knowledge of user requirements and their impact on test plan and strategy
- Ability to make and communicate trade-off decisions regarding testing based on cost and product quality
- Ability to adapt testing strategies to specific needs
- Ability to develop complex plans and assess impact of plan on technical groups and overall development schedule
- Knowledge of approval processes internal to the development organization
- Knowledge of organization hierarchy and decision-making processes
- Ability to consider risks and their potential impact on product quality
- Ability to formulate and justify high-level decisions

Occupation Cluster: <u>Testing Development and Management</u> (pg. 15)

Critical Work Function: Develop Test Scripts and Processes

Key activities:

Identify components to be tested

Develop test schedule and detailed test specifications and parameters

Communicate test schedule and specifications to project/product manager and product development team in appropriate level of detail

Assign testing responsibilities to appropriate groups

Define test scenarios and test data

Define acceptable range for test results and performance

Assess impact of performance deviation on project schedule and budget and on product performance

Key technical knowledge and foundation skills for this function:

- Knowledge of product features and components
- Ability to identify critical elements and components of product
- Knowledge of testing processes and results on similar products
- Ability to analyze parts and whole and their relationships in a logical and systematic way
- Ability to develop schedule for testing processes
- Knowledge of testing issues and constraints
- Knowledge of testing-specifications development processes
- Knowledge of testing tools and their features and limitations

- Ability to assess impact of defect/error on overall product performance
- Knowledge of quality-measurement techniques and processes
- Knowledge of test scenarios and relevant test data
- Ability to assess criticality of errors/defects and their impact on overall product development and release
- Ability to communicate to and resolve issues with technical teams
- Ability to identify qualified testers and select appropriate automated testing tools
- Ability to select testing tools based on tool capabilities and limitations

Occupation Cluster: Testing Development and Management (pg. 15)

Critical Work Function: Implement Test Plan

Key activities:

Develop and implement test schedule and processes for components, system, and documentation

Assess and revise test sequence and scope based on test results and/or changes in product design

Coordinate component, system, and documentation testing with the appropriate technical groups

Identify and allocate resources needed to support test plan

Document test procedures and problems

Communicate test issues to project/product manager and team in the appropriate level of detail

Key technical knowledge and foundation skills for this function:

- Knowledge of test procedures and parameters
- Knowledge of responsibilities of various technical groups regarding testing
- Knowledge of technical and user documentation standards and practices
- Ability to develop complex schedules and plans
- Ability to continuously assess effectiveness of plan and revise accordingly
- Ability to assess criticality of problems during testing on test reliability
- Ability to assess the impact of changes in testing plan on project cost and schedule
- Ability to coordinate with various technical groups
- Knowledge of availability of and allocation processes for resources
- Ability to evaluate, summarize, and document test procedures and issues
- Ability to assess the amount of detail that needs to be communicated to various technical groups and project manager
- Ability to develop creative and effective solutions to problems
- Ability to make effective and timely decisions

Occupation Cluster: <u>Testing Development and Management</u> (pg. 15)

Critical Work Function: Analyze Test Results and Findings

Key activities:

Gather, analyze, and summarize test results
Reconcile test results from different tests and different groups
Document findings from test results
Communicate test results to appropriate personnel
Evaluate the importance of test results and compare to acceptable variance in performance
Identify missing or erroneous test information and develop appropriate solutions

Key technical knowledge and foundation skills for this function:

- Knowledge of statistical analysis methods
- Knowledge of testing protocols and test uncertainties
- Knowledge of trend analysis methods
- Ability to organize and evaluate complex information
- Ability to reconcile conflicting information and identify missing data
- Ability to recognize and evaluate trends
- Ability to communicate with different technical groups
- Ability to understand a wide range of technical information
- Ability to weigh and recognize the criticality of specific findings
- Knowledge of test documentation procedures
- Ability to choose what information should be communicated and in what level of detail
- Knowledge of variance analysis methods
- Ability to present information to technical and non-technical audiences

Occupation Cluster: <u>Testing Development and Management</u> (pg. 15)

Critical Work Function: Provide Status and Develop Recommendations Based on Test Results

Key activities:

Develop status reports based on test completion and test findings

Communicate and disseminate reports to appropriate technical groups

Develop recommendations based on test results to improve or correct design

Contribute information based on test results to design, development, and documentation teams and other relevant technical groups

Assess readiness and deviation of product performance based on test results and product specifications

Communicate status to project/product manager and present the implication of test results on overall project plan

Key technical knowledge and foundation skills for this function:

- Knowledge of documentation processes and standards
- Knowledge of organization dissemination and reporting processes and standards
- Knowledge of testing schedule and plan
- Ability to develop high-level technical recommendations
- Knowledge of design and development processes and constraints
- Ability to communicate with a wide range of technical groups
- Ability to contribute recommendations in a positive, constructive, and persuasive manner
- Ability to develop creative solutions to complex problems
- Knowledge of product specifications and performance criteria
- Ability to communicate critical information to project/product manager in persuasive terms and relevant details
- Ability to compare product performance to specifications
- Ability to evaluate criticality of problem and impact on product design
- Ability to evaluate impact of design change on schedule and cost
- Ability to make trade-off recommendations and decisions on product features and performance
- Ability to forcefully advocate and defend own convictions even when they are unpopular

Occupation Cluster: <u>Testing Development and Management</u> (pg. 15)

Critical Work Function: Perform Usability Testing

Key activities:

Develop usability problem statements, test plan, and methodology

Develop test scenario, test environment, and evaluation measures

Develop user profile and recruit usability participants

Prepare and pilot test materials on sample user group

Administer usability test

Analyze test data and make recommendations for further testing and/or product design modifications

Document usability test process, scenarios, findings, and recommendations

Key technical knowledge and foundation skills for this function:

- Knowledge of usability test procedures and strategies
- Ability to identify key product features to be tested
- Knowledge of product features and components
- Knowledge of usability testing issues and constraints
- Knowledge of usability testing methodologies and their features and limitations
- Knowledge of test scenarios and relevant test data
- Ability to identify qualified usability testers and select appropriate sample user groups
- Knowledge of statistical analysis methods
- Knowledge of testing protocols and test uncertainties
- Knowledge of trend analysis methods
- Ability to organize and evaluate complex information
- Knowledge of usability test documentation procedures

Occupation Cluster: <u>Testing Development and Management</u> (pg. 15)

Critical Work Function: Assess Effectiveness of Test Plan, Strategy, and Processes

Key activities:

Develop effective evaluation tools and processes

Assess effective use of resources and technical staff throughout the testing process

Assess effectiveness of communication and feedback process with technical

team

Assess effectiveness of communication with project/product manager and team regarding test status and findings

Evaluate the relevance and effectiveness of testing tools, processes, and overall test plan

Evaluate the cost effectiveness of the testing tools, processes, and overall test plan

Develop recommendations for improvement in test tools, processes, and overall test plan

Key technical knowledge and foundation skills for this function:

- Ability to judge process and tool effectiveness/efficiency
- Knowledge of process-evaluation techniques and tools
- Ability to track the use of resources throughout the test plan
- Ability to identify problems, their criticality, and impact on overall process
- Ability to identify root causes of problems
- Ability to develop meaningful and realistic measurement goals
- Knowledge of process quality standards
- Ability to apply systematic evaluation methods
- Ability to work with the team to develop and implement evaluation processes
- Ability to modify test processes/procedures to improve testing reliability
- Ability to develop and revise existing best practices for test plans and processes
- Ability to solicit and analyze feedback
- Ability to analyze effectiveness of communication process

Professional Training and User Education

Representative Occupations

- Instructional designer
- Needs assessment manager
- Readiness assessment manager
- Technical trainer
- Technical training developer
- Technical training manager
- Trainer
- Training manager
- Training-needs assessment manager
- Training solution developer
- Training solution manager
- User education professional
- User manual developer
- User manual tester

Critical Work Function: Analyze Training Needs Through Skills Assessment

Key activities:

Identify core competencies, skills, and processes of the organization

Identify individual competency and skill distribution throughout the organization

Assess internal principles and practices that support and hinder training and overall performance improvement

Perform gap analysis against target competencies, skills, and processes

Identify and document desired goals, objectives, and priorities for training

Identify population and individuals to be trained to meet goals, objectives, and priorities

Identify skills and competencies through assessment of the skills that need upgrading to bridge the gap

Evaluate and assess impact of training on organization stability and productivity

Stay advised of all industry curriculum changes and requirements

Key technical knowledge and foundation skills for this function:

- Ability to evaluate organizational and individual practices and processes
- Ability to assess individual skills and competencies
- Knowledge of skill and competency profiles within the organization
- Knowledge of gap analysis processes and tools
- Knowledge of organization and departmental environment and culture
- Ability to evaluate environment and culture as they impact training delivery methods and effectiveness
- Knowledge of practices that support training and practices that hinder training
- Ability to formulate and document purpose of training
- Ability to assess impact of training on organization and individual effectiveness
- Ability to identify target population in line with training goals, objectives, and priorities
- Ability to perform appropriate learning-needs assessments and write learning objectives to address the identified learning needs

Occupation Cluster: <u>Professional Training and User Education</u> (pg. 15)

Critical Work Function: Develop Training Solutions

Key activities:

Identify time, budget, and other constraints regarding development and delivery method of training
Evaluate alternatives to training, including outsourcing, mentoring, and hiring
Define target population to be trained according to this current skill set
Develop proposal for training including scope, customized training, target audience, and cost and time estimates
Present proposal and alternatives to stakeholders and obtain management approval and commitment
Identify specific content and skills to be included in training solutions
Select training methodologies best suited for content, skills, and audience
Develop and pilot test training material and methods
Finalize training content, format, and methods based on results of pilot test
Stay advised of all industry curriculum changes and requirements

Key technical knowledge and foundation skills for this function:

- Ability to develop proposals and draw budget estimates
- Ability to develop alternatives and evaluate these alternatives based on cost and effectiveness
- Ability to adapt and customize content and training methods to audience
- Knowledge of training methodologies and effective learning techniques
- Knowledge of instructional design principles and tools
- Knowledge of pilot testing processes and principles
- Ability to gather relevant and objective feedback
- Ability to analyze feedback and make recommendations for improvement and/enhancements
- Knowledge of available resources for training design and delivery
- Knowledge of technical content and skills to be included in the training delivery
- Ability to work with subject matter experts to develop training content, hands-on labs, best practices, and scope
- Knowledge of instructional technologies that support and enhance training processes
- Ability to analyze and manipulate learning tools, formulate and adapt learning strategies, and synthesize multiple learning techniques

Occupation Cluster: <u>Professional Training and User Education</u> (pg. 15)

Critical Work Function: Deliver Training

Key activities:

Develop user training plan and schedule

Communicate plan and purpose to users

Organize training sessions and trainers

Deliver training to groups and individuals, including users, support staff, designers, and developers

Conduct training evaluation and document feedback

Network with students, corporate clients, and competitors

Communicate with the training coordinators and training group manager

Key technical knowledge and foundation skills for this function:

- Ability to organize multiple training sessions
- Knowledge of logistics planning processes and tools
- Ability to organize training team and schedule
- Ability to organize content in a meaningful and interesting format
- Ability to address diverse groups with relevant and interesting presentations
- Knowledge of delivery styles and processes
- Ability to adapt delivery style to content and audience
- Ability to solicit genuine and valuable feedback
- Ability to analyze multiple inputs and summarize recommendations
- Knowledge of delivery technologies
- Ability to set up and perform basic troubleshooting on technical presentation equipment
- Ability to analyze and document effectiveness of training sessions
- Ability to effectively communicate training plan and purpose

Occupation Cluster: <u>Professional Training and User Education</u> (pg. 15)

Critical Work Function: Assess Training Effectiveness

Key activities:

Conduct follow-up evaluation of individual and organizational performance after training to ensure satisfaction

Perform evaluation of performance gain from training through after-class skills assessment

Perform gap analysis of skills, competencies, and processes against desired

goals and priorities

Evaluate training implementation cost and schedule against plan

Analyze feedback from training sessions for effectiveness of delivery methodologies and content

Document findings and recommendations, including recommendations for further training

Ensure that students' questionnaires are reviewed and address all student issues

Key technical knowledge and foundation skills for this function:

- Ability to analyze budgets and schedules against plan
- Knowledge of performance measurement tools and indicators
- Ability to design evaluation processes and measurement frameworks
- Ability to judge organization and individual efficiency and/or deficiencies
- Ability to develop meaningful and effective measurement goals and objectives
- Knowledge of organization quality standards and procedures
- Ability to assess individual skills and competencies
- Knowledge of gap analysis processes and tools
- Ability to assess trade-off between cost and gain of evaluation process
- Ability to work with the organization to develop and implement evaluation processes
- Ability to assess results and develop recommendations for improvements and/or enhancements
- Ability to develop and revise existing best practices for training delivery methods
- Ability to assess and justify the need for further training
- Ability to document findings and recommendations and summarize in business terms

Occupation Cluster: Professional Training and User Education (pg. 15)

Critical Work Function: Develop User Manuals

Key activities:

Define purpose, standards, and use of documentation

Identify content for user manual from developers and users

Identify technology and resource constraints for manual development and publication

Interview and/or observe target audience

Identify delivery options and formats that meet user needs

Identify sources of information and gather relevant material

Design, develop, write, and proof manuals

Test and validate manuals with users

Key technical knowledge and foundation skills for this function:

- Knowledge of user requirements
- Knowledge of documentation standards and procedures
- Ability to identify audience and purpose of document
- Knowledge of document development and publishing software and online tools
- Ability to assess audience level of technology knowledge and skills
- Knowledge of interview techniques for technology subject-matter experts and users
- Knowledge of workplace and industry terminology, methodologies, and concepts
- Ability to evaluate relevance, effectiveness, and consistency of written material
- Ability to select and evaluate appropriateness and accuracy of existing information
- Knowledge of word processing, design, publication, and online tools
- Ability to present complex ideas/information
- Knowledge of the principles of user documentation writing and presentation
- Ability to organize information in a logical and easy-to-use manner
- Ability to use appropriate language, style, organization, and format
- Knowledge of grammar, readability, and usability standards

Microsoft Solutions Framework Role Clusters

Product Management Role Cluster

The key goal of the Product Management Role Cluster is satisfied customers. Projects must meet the needs of customers in order to be successful. However, first the customer must be clearly identified and understood. In some cases the customer requesting a solution or set of features may be different from the sponsor who is paying or supporting effort. Thus there must be a clear distinction and requirements analysis for the success factors for both parties. Only then can the responsibilities of setting and meeting the expectations be assigned to the appropriate function areas. It is possible to meet budget and time goals but still be unsuccessful if customer and business needs have not been met. To achieve the goal of satisfied customers, the Product Management Role Cluster requires several functional areas: product planning, business value, advocacy, and marketing.

Program Management Role Cluster

The focus of the Program Management Role Cluster is to meet the goal of delivering the solution within project constraints. This can be viewed as ensuring that the project sponsor is satisfied with the outcome of the project. To meet this goal, Program Management owns and drives the schedule, the feature set, and the budget for the project. Program Management ensures that the right solution is delivered at the right time and that the project sponsor's expectations are understood and managed throughout the project.

Development Role Cluster

The "build to specification" goal is the focus for the Development Role Cluster during an MSF project. To succeed in meeting its quality goal, the role of Development is to build a solution that meets the customer's expectations and specifications as expressed in the functional specification. Development adheres to the solution architecture and designs that, together with the function specification, form the overall specifications of the solution.

In addition to being the solution builders, Development serves the team as the technology consultant. As technology consultant, Development provides input into design and technology selection decisions, as well as constructing functional prototypes to validate decision-making and mitigate development risks.

As builders, Development provides low-level solution and feature design, estimates the effort required to deliver on that design, and then builds the solution. Development estimates its own effort and schedule because it works daily with all developmental contingency factors. MSF refers to this concept as bottom-up estimating, and it is a fundamental part of the MSF philosophy. Its goal is to achieve a higher quality of schedule and to increase accountability of those providing the estimates and of their work performance.

Test Role Cluster

The goal of the Test Role Cluster is to approve for release only after all product quality issues are identified and addressed. All software is delivered with defects. A key goal is to ensure those defects are identified and addressed prior to releasing the product. Addressing can involve everything from fixing the defect in question to documenting work-around solutions. Delivering a known defect that has been addressed along with a work-around solution is preferable to delivering a product containing unidentified defects that may surprise the team and customer later.

User Experience Role Cluster

The goal of the User Experience Role Cluster is enhanced user effectiveness. User Experience is comprised of six functional areas: accessibility, internationalization, user advocacy, training/support material, usability research and testing, and user interface design. The User Experience team acts as an advocate between the user and the entire project team.

Release Management Role Cluster

The goal of the Release Management Role Cluster is smooth deployment and ongoing operations. Release Management is the role that directly involves operations on the MSF team. It includes the following functional areas of responsibility:

- Acts as primary advocate between project development and operations groups
- Manages tool selection for release activities and drives optimizing automation
- Sets operational criteria for release to production
- Participates in design, focusing on manageability, supportability, and deployability
- Drives training for operations
- Drives and sets up support for pilot deployment(s)
- Plans and manages solution deployment into production
- Ensures that stabilization measurements meet acceptance criteria

Microsoft Solutions Framework Role Cluster Functional Areas Defined

Product Management Role Cluster Functional Areas

Marketing
- Drive marketing and public relations messages that have an impact on the target customer.
- Be highly differentiated so the solution stands out from the competition.
- Place the solution into distribution so that the target customer can easily acquire it.
- Provide support so that customers have a positive experience buying and using the solution.

Business Value
- Define and maintain the business justification for the project.
- Define and measure the business value realization and metrics.

Customer Advocacy
- Drive a shared project and solution vision.
- Manage customer expectations and communications.

Product Planning
- Gather, analyze and prioritize customer and business requirements.
- Perform market research, market demand, competitive intelligence/analysis.
- Determine business metrics and success criteria.
- Identify multi-version release plan.

Program Management Role Cluster Functional Areas

Project Management
- Track and manage budget.
- Manage master project schedule.
- Drive risk management process.
- Facilitate communication and negotiation within the team.
- Track progress and managing project status reporting.
- Manage resource allocation.

Solution Architecture
- Drive overall solution design.
- Manage the functional specification.

- Manage the solution scope and critical trade-off decisions.

Process Assurance
- Drive process quality assurance.
- Define and recommend improvements.

Administrative Services
- Implement the project management processes and support the team leads in using them.
- Provide a range of administrative services to support efficient team work.

Development Role Cluster Functional Areas

Technology Consulting
- Serve the team as a technology consultant.
- Evaluate and validate technologies.
- Participate actively in the creation and review of the functional specification.
- Contribute to defining development standards for the organization.

Implementation Architecture and Design
- Map the Enterprise Architecture (EA) to the solution's implementation architecture by providing solution-specific detail for application, data, and technology views of the architecture.
- Own and implement the logical and physical designs of the solution.

Application Development
- Code features to meet the design specifications.
- Conduct code reviews during development to share knowledge and experience.
- Carry out unit testing as defined in the test plan with the support of the test role.

Infrastructure Development
- Develop features that meet the design specifications.
- Conduct code reviews during development to share knowledge and experience.
- Carry out unit testing as defined in the test plan with the support of the test role.
- Develop scripts for automated deployment.
- Develop deployment documentation.

Test Role Cluster Functional Areas

Test Planning

- Develop testing approach and plan.

- Participate in setting the quality bar.

- Develop test specification.

Test Engineering

- Develop and maintain automated test cases, tools and scripts.

- Conduct tests to accurately determine the status of product development.

- Manage the build process.

Test Reporting

- Provide the team with data related to product quality.

- Track all bugs and communicate issues to ensure their resolution before product release.

User Experience Functional Areas

Accessibility

- Drive accessibility concepts and requirements into design.

Internationalization

- Improve the quality and usability of the solution in international markets.

User Advocacy

- Act as the user advocate to the project team.

Training/Support Material

- Design and develop documentation for support systems (Help desk manuals, KB articles, and more).

- Document Help/assistance.

- Develop and execute learning strategy (build/buy/deliver).

Usability Research and Testing

- Gather, analyze, and prioritize user requirements.

- Provide feedback and input to solution design.

- Develop usage scenarios and use cases.

User Interface Design

- Drive user interface design.

Release Management Functional Areas

Infrastructure
- Enterprise infrastructure planning.
- Coordinate physical environment use and planning across geographies (data centers, labs, field offices).
- Provide the team with policies and procedures for consistent infrastructure management and standards.
- Provide infrastructure services to the MSF team (building servers, standard images, installing software).
- Manage hardware/software procurement for the team.
- Build test and staging environments that accurately mirror production environments.

Support
- Provide primary liaison and customer service to the IT users.
- Support the business by managing the SLA with the customer and ensuring commitments are met.
- Provide incident and problem resolution; rapid response to user requests and logged incidents.
- Give feedback to development and design team.
- Develop failover and recovery procedures.

Operations
- Account and system setup controls; manage user accounts and permissions
- Messaging, database, telecom operations; network operations
- Systems administration, batch processing
- Firewall management; security administration
- Application services
- Host integration services
- Directory service operations

Logistics
- Provide logistics management support to the team.
- Procure and set up equipment needed for development and testing.
- Procure software needed for development and testing.
- Manage network connectivity needs for the team.

Commercial Release Management
- Product registration codes; registration verification process
- Licensing management
- Packaging
- Manage distribution channel

- Print and electronic publication

Microsoft Operations Framework Role Clusters

Release Role Cluster

The release role cluster of the MOF team model is the point where the Microsoft Solutions Framework (MSF) team model intersects with MOF. The MSF Release Management Role Cluster maps directly to the MOF release role cluster. This is the transition point between development/test and production operations, and it is a crucial juncture for the smooth transition of the system into production. The release role serves as the primary liaison between the project development team and the operations groups.

After a service has been deployed into the production environment, the release role cluster is responsible for:

- Ongoing identification, change control, and status reporting of the system and environment.
- Asset management with version control, software distribution, license tracking, usage monitoring, and retirement information.
- Maintenance of the Change Management Database (CMDB) of inventory management for hardware, software, and physical assets.

The release role cluster owns responsibility for both inventory management and asset value management. Maintaining an accurate CMDB provides identification and scope of all systems at a given baseline, provides accounting for each configuration item (CI) within the CMDB, and provides management-reporting information on the state of the IT infrastructure at any given time. The CMDB goes beyond a basic inventory and asset list; it provides relationships among systems and between systems and users of the systems so that change triggers and dependencies can be tracked. Regularly scheduled baseline reviews of all assets are necessary to make sure that the inventory accounting includes non-networked devices. The frequency of baseline inventory reviews depends entirely on the scope of CIs recorded, and the rate of change within the environment.

Infrastructure Role Cluster

The Infrastructure role cluster is the key enabler of agility for the enterprise. Infrastructure looks at the evolving enterprise architecture and ensures that plans are in place to meet the new and changing requirements of running the business from a networking, telecommunications, hardware, and software perspective.

A key component of long-term planning is capacity management of the enterprise resources. Infrastructure owns the selection, design, and implementation of the fundamental building blocks that, in order to execute, applications rely on for underlying system services. Examples of these building blocks include system-level software, installation software such as Microsoft

Systems Management Server, network management software, middleware, and security software.

Infrastructure works closely with the real estate and facilities group in planning and coordinating building and office moves, expansions and acquisitions, physical environment changes, and other events to ensure that all IT requirements are planned and documented. It plans for issues such as proper wiring, lab space, data center accommodations, and user connectivity to the corporate network.

In large enterprises, the Infrastructure role cluster frequently includes a role that owns the task of organizing and managing IT policies and procedures, methodologies, standards such as desktop and server hardware, distributed computing connectivity and telecommuting resources, and cost-management techniques.

The infrastructure role cluster works closely with the support and operations role clusters to ensure efficient infrastructure development and effective deployment. This joint effort allows support and operations to design sound processes for smooth operation of the infrastructure solutions.

Support Role Cluster

The most important goal of the support role cluster is to provide timely, efficient, and accurate customer support. This support serves to increase customer satisfaction while reducing the cost of the service. A service desk staffing plan needs to ensure that the number of support staff on hand scales proportionately to the demand for support, at both peak and low-usage times. This helps to maintain support costs with an efficiently run service desk team and minimizes response times on incidents, thus supporting the goals specified within the service level agreements.

Automation tools enable the support staff to prioritize their workload of incidents based on priority and business impact of the incident. These support-automation tools also provide the ability to report on the measurements of success, such as response time, number of occurrences of a given incident type, and so forth.

Studies have shown that if customers do not receive good support from their central support organization, they will use peers for support. Unfortunately the cost of peer support is approximately 3-6 times that of centralized support. Therefore the initial step in reducing support cost to the company is to increase the number of calls to the service desk. Only once all support activities have been centralized can an accurate cost reduction metric be derived.

Operations Role Cluster

The operations role cluster includes skilled specialists who focus on the performance of production systems and the tasks necessary to run them on a daily basis. Enterprise operations roles include dedicated specialties such as messaging, system administration, telecommunications, networking, and database administration. Each specialty function requires experience and knowledge to effectively implement and support the technology and supporting processes. It also requires ongoing education and certification to increase

knowledge on the latest advancements in technologies and tools to ensure that the systems are implemented, maintained, and supported in the most efficient, automated way at the lowest cost.

The operations role manages the daily operations and system administration activities to run and maintain the IT services and applications across the enterprise. The operations role performs the scheduled and repeatable processes such as data backup, archiving and storage, output management, system monitoring and event log management, and print and file server management.

Reports by industry analyst advisors state that the IT staff positions most difficult to recruit and retain are in the operations roles, specifically systems, network, and database administration. E-commerce and other business on the Internet raise the importance and visibility of keeping systems running, with high availability and reliability. These positions are the heart of many IT service management organizations, and require staff that are skilled not only in their specific technology, but also have strong organizational, project management, and communication skills.

Operations management groups create and track large amounts of documentation on technical procedures and standard processes, from operations guides to detailed escalation procedures for a database recovery scenarios. Operations staff should be able to write technical information clearly and procedurally.

Security Role Cluster

The security role cluster is an important component in nearly all IT activities. An information system with a weak security foundation eventually will experience a security breach. Depending on the information system and the severity of the breach, the results could vary from embarrassment, to loss of data, to loss of revenue, to loss of life. In effect, the security role cluster actively practices risk management in all activities that it performs.

The primary goals of the security role cluster are to ensure:

- **Data confidentiality.** No one should be able to view data if not authorized.
- **Data integrity.** All authorized users should feel confident that the data presented to them is accurate and not improperly modified.
- **Data availability.** Authorized users should be able to access the data they need, when they need it.

Security specialists in this role focus not only on the technical intricacies of protecting the corporate network, but on the business policies and practices on such things as company e-mail, remote access usage, permissions on sensitive corporate financial and human resource data, and issues as specific as maintaining the confidentiality of the company's employee phone listing.

Information security architecture bridges the gap between corporate business process and policy directives, and platform-specific security measures. One example of security's role in business processes is defining and implementing exit procedures for employees leaving the company. The risk is especially high and in need of managing when a company's business is intellectual property, thus making it more difficult to track.

Another responsibility of the IT security role cluster is creation of a comprehensive plan for the audit, retention, classification, and secure disposal of data. Legal, financial, and historical data need to be safely stored for appropriate periods of time as defined by law, the industry, and the corporation. Non-critical data should be disposed of to minimize the cost of expensive storage. This requires implementing an efficient back-up and retrieval process in the operations role. Physical security, as it relates to data, assures secure telephone and data connections and physical access to assets, as well as secures connections to business partners, joint ventures, and new acquisitions. Exposures related to weak physical security allow easy access to intruders.

The IT security role cluster must take an active role in setting and auditing security standards for 3rd party suppliers and partners. If an external partner has weak security, then any information provided to that partner is at risk. IT security must ensure that partners are protecting IT's data as well as IT's customer's data.

IT security must also ensure that they are protecting their customer's interests. This may include proprietary data, access to corporate offices, or any other threat. As a key enabler of the business, IT must strive to uphold their link in the supply chain.

Partner Role Cluster

The partner role includes a broad collection of IT partners, service suppliers, and outsourced vendors who work as virtual members of the IT staff in providing hardware, software, networking, hosting, and support services. The degree to which an IT organization utilizes partner services varies widely from business to business, depending on the size, location, industry type, and the strategic goals of the business.

In the MOF team model, the partner role represents the external business partnerships involved in delivering a service. The exact type and nature of the relationship with a partner can take on a variety of forms and perspectives; however, the importance of the partner in an efficient operations team structure cannot be understated. The management of the partner relationship within the company is the primary responsibility of the partner account manager.

Underpinning contracts are an integral piece of managing high-quality services that are obtained through vendors, suppliers, outsourcers, or any other type of third-party provider. The partner account manager is responsible for defining the terms of these contracts, costs, and ongoing operational details involved in getting both the partner provider and the customer recipient to meet their commitments to the agreement.

Maintenance contracts are a prime example of an ongoing third-party service level. Microsoft, for example, outsources its internal IT help desk function to a company whose core competency is providing service desk functions and managing the service desk staff. A Microsoft IT group employee is the account manager responsible for owning the relationship with the help desk vendor, continually assessing service levels and making whatever modifications are necessary with the goal of continually improving the service to the internal end users while balancing appropriate costs of running the service desk.

Microsoft Operations Framework Role Cluster Functional Areas Defined

Release Role Cluster Functional Areas

Change Manager
- Receives requests for changes (RFCs) and ensures that they are properly recorded in the change management log
- Reviews RFCs for completeness
- Selects change advisory board (CAB) members and facilitating CAB meetings
- Prepares CAB meeting agendas and providing all necessary review information to the CAB members prior to board meetings
- Assigns teams to conduct RFC impact analyses and risk assessments
- Analyzes, prioritizes, categorizes, approves, and schedules RFCs
- Provides change notification to affected parties
- Monitors the successful completion of all RFCs, including change planning, building, testing, and implementation to ensure that these processes follow the change schedule
- Reviews and evaluates the change process

Change Owner
- Manages the planning and coordination of the pilot staging and organization-wide implementations
- Develops implementation plans and determine site locations for pilot rollouts
- Establishes implementation schedules
- Identifies and communicates problems and schedule changes based on feedback from release team coordinators
- Ensures that the rollout team is properly trained
- Validates rollout and back out plans during release testing

Communications Coordinator
- Develops and manages the communications plan
- Develops content based on input from all project members
- Finalizes, gains approval for, and distributes content
- Determines the channels of information dissemination
- Develops feedback mechanisms and a collection database for user comments
- Ensures issue resolution is communicated in a timely and effective manner
- Evaluates and updates the communications plan to maintain its effectiveness throughout the release process

- Communicates release goals and scope to users
- Communicates release status, progress, and issues to appropriate groups

Configuration Manager

- Establishes the policies and procedures to govern the configuration management process
- Participates as a member of the Change Advisory Board (CAB) to ensure that the impacts of proposed changes are known prior to being authorized
- Determines the scope and granularity of the Configuration Items (CI's) recorded in the Configuration Management Database (CMDB)
- Performs audits and establish baselines
- Conducts organization-wide awareness campaigns about configuration management policies
- Selects, assigns responsibilities to, and trains the configuration management staff
- Establishes CMDB policies including CI naming conventions
- Automates CMDB updating systems, if possible
- Provides baseline report for the assessment of the impact of the release on the live environment
- Updates the CMDB with all changes to the target environment when both the pilot and the full release have been completed
- Assists in development of the test environment (for changes) to mirror target environment

Documentation Coordinator

- Assesses current user guides, administrator guides, and reference manuals
- Defines purpose and use of required documentation
- Identifies required documentation from developers and users
- Identifies delivery options and formats that meet the users' needs
- Designs, develops, and proofs documentation
- Tests and validates documentation with users
- Manages the modification of existing documentation to support the release
- Disseminates documentation to appropriate personnel

Release Manager

- Develops detailed release plans
- Coordinates all project teams associated with the release
- Acts as a liaison to appropriate management
- Manages the evaluation process upon completion of the project
- Forms a release team to manage the many required activities by selecting team members, obtaining management approval, and assigning team roles and responsibilities

- Facilitates team communication to ensure that releases are implemented according to schedule with system integrity and availability maintained
- Manages release planning
- Ensures user acceptance tests have been completed
- Verifies training has been provided to the affected user community
- Validates back-out plan

Test Coordinator

- Designs, builds, and maintains the test environment
- Prepares test scripts and execute testing strategies
- Identifies testers and assigns testing responsibilities
- Develops and manages testing schedule
- Documents test procedures and problems
- Manages problem resolution and re-testing
- Gathers, analyzes, and documents test results
- Communicates results and provide recommendations to appropriate parties
- Validates readiness of release package to be integrated into the live environment

Training Manager

- Identifies user competency to use the release
- Performs gap analysis against target competencies and skill requirements
- Identifies individuals to be trained to meet goals and objectives of the release
- Selects training methodologies best suited for content and audience
- Designs, builds, and implements the training strategy
- Communicates training plan to audience
- Manages and coordinates daily training activities
- Collects and analyzes feedback from trainees for effectiveness of training methodology and content
- Leverages the training materials produced by the User Experience Role in the Infrastructure role cluster

Infrastructure Role Cluster Functional Areas

Application Architect

- Designs an application to meet a defined business need

- Determines the distribution of work in an N-tier client-server system

- Locates network services required for application

- Works with the Middleware Designer, Network Designer, Database Designer, and Operating System Manager to determine an optimal design

Availability Manager

- Ensures that business requirements are correctly translated into availability goals that can be achieved at reasonable cost

- Negotiates cost-effective countermeasures to all single points of failure

- Undertakes availability modeling to assess the impact of future changes and to identify potential improvements

- Ensures availability goals are reflected within appropriate service level agreements both inside and outside the company

- Defines the need for and helps with the implementation of availability monitoring processes and tools

- Collects and interprets availability metrics on behalf of the business

- Forecasts the impact of future availability requirements

- Participates in the availability management Project Board to review proposed business and infrastructure changes for their impact on availability

- Provides consulting expertise for the review and creation of any external contracts that include availability clauses

- Manages the day-to-day availability requirements of services

- Coordinates scheduling of release implementation in pilot staging and live environments

Capacity Manager

- Forecasts future service capacity requirements

- Ensures that capacity targets can be achieved at a reasonable cost

- Assists in the creation and review of new service level agreements (SLAs)

- Participates in the Change Advisory Board to review suggested changes for impact to existing service levels

- Provides consulting expertise for the review and creation of any external contracts that include capacity clauses

- Manages day-to-day capacity requirements of services

Data Architect

- Determines where sources of data are located and how they can be accessed

- Ensures that efficient data access is available where required

- Creates requirements for network infrastructure in order to ensure data access

- Manages the activities of one or more Database Developers and Data Modelers

Database Developer

- Creates triggers and stored procedures for accessing and manipulating data in a database

Data Modeler

- Designs a logical data model for an application

- Maximizes performance, capacity, and availability of data in accordance with service level requirements

Directory Designer

- Designs the directory infrastructure to meet service level requirements

- Creates the directory database schema

- Creates a list of changes required to an existing database schema in order to meet new business requirements

- Creates requirements for network infrastructure in order to ensure data replication

Directory Services Manager

- Determines all directory design and deployment components

- Determines all directory administration, integration and operation strategies

- Ensures that all application integration and dependencies are met

- Ensures enterprise directory documentation is accurate and current

- Ensures that directory administrators have the skills and tools to perform all administrative operations and functions

- Ensures accurate representation of directory resources in the CMDB

Documentation Coordinator

- Assesses current user guides, administrator guides, and reference manuals

- Defines purpose and use of required documentation

- Identifies required documentation from developers and users

- Identifies documentation options and formats that meet the users' needs

- Designs, develops, and proofs documentation

- Tests and validates documentation with users

- Manages the modification of existing documentation to support a new release
- Disseminates documentation to appropriate personnel

Facility Manager

- Coordinates installation and maintenance of system print/output hardware and software and configuration of printer resources
- Representative of each site within an organization
- Provides first hand knowledge of assets within corporate sites
- Provides first hand experience to challenges and environment consideration at each site
- Assumes the management of the continuity plan once it is constructed
- Provides status reports to Service Continuity Manager if the contingency plan is executed
- Ensures that preventive measures are enforced within facility to avoid disaster
- Watches for changes within the environment that would require redesign the service continuity effort

Financial Manager

- Handles the financial activities of a department
- Provides guidelines on organizational policy, assistance in setting up cost accounts, and assistance creating budget templates
- Ensures that all finance-related policies developed conform to those adopted by the organization

Messaging and Middleware Architect

- Manages the data communications between system services. This includes managing messaging communications standards such as XML
- Creates message format standards with internal and external entities
- Manages the activities of the Data Architect and Directory Designer

Network Designer

- Creates designs for new network facilities as business needs change and grow
- Evaluates the design of existing network components as new technologies are developed
- Facilitates the availability of database, directory, and messaging services

Organizational Designer

- Determines the optimal organizational design in order to meet a business need
- Manages the changes required to organizational structures while minimizing stress on those affected

Process Designer

- Designs processes for performing business critical functions
- Maximizes value-add activities while minimizing non-value-add activities
- Manages the implementation of process changes
- Trains those involved in the process in any new procedures

Program Manager

- Manages the efforts of one or more Project Managers and System Integrators
- Manages the budget and schedules of multiple projects

Programmer

- Creates software in accordance with the architecture guidelines set by the Application Architect and the style guides set by the Software Engineer
- Manages component testing of software to ensure technical quality
- Reviews the code of other Programmers to ensure consistency and code quality

Project Manager

- Manages a project to meet or improve business needs
- Manages the budget and schedule for a single project
- Manages the activities of one or more Process Designers, Organizational Designers, and Application Architects

Risk Manager

- Identifies possible risks to process, people, technology, and external threats
- Notifies the backup team of special requests for backups prior to introducing change

Service Continuity Manager

- Reports progress to senior company officials in the instance of a contingency plan execution
- Identifies critical business processes
- Negotiates and sets service level agreements (SLAs)
- Sets policies in reference to SLA
- Manages the continuity effort
- Manages the personnel who recover the systems

- Ensures that recovery can occur with the set SLA

- Ensures that backups are completed and verified by backup personnel

- Manages the backup and recovery team who will recover the systems

- Responsible for technical skill set of recovery team members

- Manages recovery efforts

- Provides monthly status of backup solution to facility manager to ensure that recovery can occur with the set SLA

- Works with facility manager, capacity manager and the availability manager on a daily basis to ensure the service continuity plan remains valid

Service Level Manager

- Leads a team of IT and customer representatives responsible for the delivery and quality of current services

- Analyzes the organization's ability to absorb and deploy changes to the environment at a rate consistent with changing business need

- Manages the service level management process

- Ensures that IT and its customers understand the specific commitments that both parties have made relative to IT service availability and functionality

Software Engineer

- Determines the best implementation that will meet the design of the Application Architect

- Sets software coding and style guides to ensure consistency

- Performs code reviews to ensure consistency to style standards and code quality

- Ensures that thorough component testing is carried out

- Manages assembly testing, whereby one or more components are tested together to ensure interoperability

- Manages the activities of one or more Programmers to create the application

Software Tester

- Performs tests in accordance with the test plans created by the test lead

- Creates test data that will allow the thorough testing of hardware, software, and processes

- Verifies that tests meet the functional requirements

- Creates test scripts to automate testing where possible

System Integrator

- Creates requirements for applications to facilitate interoperability

- Integrates technologies from multiple projects and/or product vendors

- Ensures interoperability between systems

Test Lead

- Creates test plans to verify that new processes and technologies will meet the business needs set forth in the functional requirements and service level requirements
- Works with the customer to verify functional tests and achieve final sign-off on the implementation
- Manages the activities of one or more Software Testers

Usability Tester
- Performs tests to ensure that users will be able to use a new process or technology
- Minimizes support costs by ensuring that the system is as intuitive as possible

User Experience Engineer
- Gathers, analyzes, and prioritizes user requirements
- Drives accessibility concepts and requirements into a design
- Improves the quality and usability of a solution in international markets
- Develops documentation for support services
- Develops user help
- Develops user training
- Develops usage scenarios and use cases
- Acts as the user advocate to the project team
- Drives graphical user interface design

Support Role Cluster Functional Areas

Communications Coordinator
- Develops and manages the release communications plan
- Ensures release issue resolution is communicated in a timely and effective manner
- Evaluates and updates the communications plan to maintain its effectiveness throughout the release process
- Communicates release goals and scope to users
- Communicates release status, progress, and issues to appropriate groups

Incident Manager

- Ensures that service disruptions are properly identified, reported, prioritized, escalated and resolved efficiently
- Drives the efficiency and effectiveness of the incident management process
- Produces management information
- Manages the work of 1st and 2nd line support staff
- Develops and maintains the Incident Management System
- Identifies major incidents

Major Incident Manager

- Coordinates and manages during major incidents
- Produces and maintains the major incident communication plan
- Facilitates the production and maintenance of the major incident restoration plan
- Facilitates management team reviews
- Produces major incident progress updates
- Participates in major incident reviews

Problem Manager

- Deals with events that impact multiple systems or locations, recurring incidents, deficiencies in the infrastructure, or service disruptions that are the root cause of other service disruptions
- Analyzes the cause of problems
- Resolves problems if possible
- Modifies single or multiple Configuration Items (CIs) by creating a Request for Change (RFC) and forwards it to the change management process

Service Desk Analyst

- Registers incidents
- Routes requests to support groups when incidents are not closed
- Provides initial support and classification
- Monitors the status and progress towards resolution of all open incidents
- Keeps affected users informed about progress
- Escalates the process if necessary
- Resolves and recovers incidents not assigned to specialist support groups
- Confirms and closes resolution of incidents

Service Desk Manager

- Ensures service desk staff is properly trained
- Develops and continuously refines support tools, including documentation
- Establish a system to collect, categorize, and track questions and problems

- Tracks issues until they are resolved

Specialist Support
- Handles service requests
- Monitors incident details, including the configuration items affected
- Investigates and diagnoses incidents (including resolution where possible)
- Detects possible problems and notifies Problem Management
- Resolves and recovers assigned incidents

Operations Role Cluster Functional Areas

Application Manager
- Manages a business application to optimize availability and conformance to agreed service levels.
- Monitors application to ensure and demonstrate compliance with service levels
- Repairs application as needed if it falls out of compliance with agreed service levels
- Manages the efforts of one of more Application Technicians

Database Administrator
- Optimizes database tables for efficient searches
- Creates new databases and tables as needed
- Manages database schema
- Copies data to tape or other storage media
- Monitors database for capacity, availability, and performance

Directory Administrator
- Creates new directory objects
- Manages database schema
- Monitors data replication to ensures it occurs in a timely fashion
- Copies data to tape or other storage media
- Monitors directory for capacity, availability, and performance

Facilities Manager
- Manages the physical facility
- Manages the facilities budget including the payment of utility bills
- Ensures that the facility:
    - is structurally sound

o   is in conformance with all workplace regulations

o   provides a secure and conducive work environment

o   has sufficient reliable power, water, and sewer.

o   has janitorial service

- Ensures that all communications into and out of the company are reliable and efficient

Hardware Manager

- Manages the acquisition, retiring, and repair of hardware in order to meet business needs

- Manages the creation of the Definitive Hardware Store (DHS)

- Ensures that sufficient hardware spares are on-hand to meet service level requirements

- Creates hardware standards to minimize spare parts requirements

- Manages the acquisition of new hardware

- Manages the efforts of one or more Hardware Technicians

Middleware Manager

- Manages the communications and data infrastructure for one or more applications

- Monitors middleware to ensure and demonstrate compliance with service levels

- Manages the efforts of one of more database administrator and directory administrator

Monitoring Manager

- Monitors and controls production systems

- Enables automated monitoring of system components

- Across multiple shifts, detects management events and raise alerts

- Executes documented operational procedures for event escalations

- Follows data security procedures

- Adheres to maintenance contracts

- Provides regular feedback on operational performance, both in general and against specific service levels

- Ensures detection of alerts from all infrastructure components

- Reacts and attempts to solve incidents or ensure that they are transferred for resolution

Network Manager

- Oversees operation of data networks
- Improves quality of services by ensuring network components achieve contributing service value
- Manages networking staff
- Monitors and controls service levels of network suppliers
- Ensures adequate vendor support is received
- Adheres to maintenance contracts
- Provides regular feedback on network performance, both in general and against specific service levels
- Participates in network planning, design, development, deployment, and modification
- Ensures detection of alerts from the network infrastructure
- Assists in obtaining network resources for test environment
- Resolves network issues identified during component and pilot tests
- Assists in obtaining network resources for service implementation
- Resolves network issues identified during production tests
- Installs, configures, and maintains network components
- Provides technical support for network components
- Adjusts network capacity and performance configurations based on capacity management recommendations
- Participates in various tests (prototype, unit, and pilot tests)
- Participates in production and user acceptance tests
- Upon service activation, delivers ongoing network administration associated with the service
- Assesses impact of release on the live network environment
- Develops upgrade plans to support the release
- Tests and implements network upgrades and changes in coordination with other release team members
- Documents all changes to the system network

Operating System Manager

- Manages the acquisition of operating system software and licenses as required
- Determines the correct mix of operating system brands, versions, and models to meet service level objectives
- Understands operating system security
- Manages the efforts of one or more Operating System Technicians

Operations Manager

- Drives the efficiency and effectiveness of the operations processes
- Produces management information

- Monitors business-critical services to ensure compliance with agreed service levels
- Develops understanding of end user and company business goals
- Manages and coordinates the efforts of the Application Manager, Middleware Manager, Operating System Manager, Hardware Manager, Network Manager, and Facilities Manager

Print Administrator

- Manages the creation and distribution of reports, both print and electronic forms
- Manages hard-copy output and physical paper assets and records
- Manages the storage, retention, and destruction of paper archives

Print Manager

- Maintains standards and standardization (such as corporate branding, page description language, graphics, multimedia, change control, and output devices)
- Manages output development (such as design of documents, print application development, and print resources)
- Manages production printing and high-volume printing
- Manages distributed printing
- Manages central reprographics
- Manages print on demand (such as digital prepress, color, and Internet printing)
- Manages mailroom (ADF) processing
- Manages output environment management (such as queues, spooler, data stream transforms, and character code translation)
- Provides document management services
- Provides forms management services
- Provides document finishing services

Storage Administrator

- Performs backup and restore of critical data
- Monitors disk and other storage media for availability and capacity
- Administers redundant array of independent disks (RAID) storage, CD-ROM towers, and optical storage jukeboxes

Storage Manager

- Maintains end-to-end responsibility for the storage management process
- Determines backup, restore and data recovery strategies
- Establishes and monitors adequate backup, restore, and recovery procedures
- Ensures backup documentation exists and remains current

- Ensures the storage operators have the right skills and tools to perform backups, restores and recoveries
- Ensures accurate representation of storage resources in the CMDB
- Configures the specific backup and restore events to be monitored
- Configures storage tools and utilities according to service level requirements
- Ensures that storage resources are in good working order
- Coordinates installation and maintenance of system hardware and software
- Provides technical support for storage management systems
- Manages client/server storage management configurations
- Executes routine tasks to ensure smooth running of storage servers and peripherals
- Executes documented administration procedures for service quality assurance
- Executes appropriate storage management security procedures
- Confirms appropriate authorizations for system and data access
- Configures storage resources for test environment
- Adjusts system storage capacities (for example, hardware, file system, software parameters, and so on) based on service plans
- Executes change management work orders related to the storage resources
- Isolates and resolves faults associated with storage resources
- Participates in production testing of storage resources
- Installs patches related to storage management
- Participates in pilot testing of storage resources
- Ensures sufficient data storage space exists for business and utility applications
- Ensures storage management system administration procedures are in place prior to service activation
- Across multiple shifts, detects storage management events and raises alerts
- Making sure that backup results match expectations
- Executing end-user backup and restoration

Voice Communications Technician
- Ensures that the communications infrastructure is in place and in good working order
- Installs and maintains telephones, voice mail, and other communication equipment

Security Role Cluster Functional Areas

Anti-Virus Technician

- Understands the systems present and the type of vulnerabilities to which they are susceptible

- Ensures that anti-virus systems are in place and operating correctly

Application Security Technician

- Ensures that only authorized users gain access to critical business applications

Database Security Technician

- Ensures that data is confidential

- Ensures that data is available only to authorized personnel

- Ensures that database auditing and journaling are in place where appropriate

Egress Security Technician

- Ensures that critical utilities are unadulterated and free from tampering

- Ensures that proprietary information is disposed of in a secure way and rendered inaccessible

- Ensures that corporate refuse is disposed of in accordance with environmental regulations

Facilities Security Technician

- Ensures that only authorized personnel gain physical access to the building and/or computing assets

- Creates emergency response plans so that personnel and assets are safe in the event of a mishap

Hardware Security Technician

- Ensures that hardware computing resources are secure from pilfering and sabotage

Messaging Security Technician

- Ensures that messages are confidential and free from tampering and repudiation

Network Security Technician

- Ensures that network communications are secure and free from tampering and/or eavesdropping

Operating System Security Technician

- Ensures that strong security measures are in place including but not limited to:
    - o Strong passwords
    - o Encrypted file systems
    - o Biometric authentication systems
- Ensures that all users and/processes default to the least privilege required

Personnel Security Technician

- Ensures that only authorized personnel are granted access to critical systems and facilities
- Conducts background checks on employees to verify identity

Security Compliance Officer

- Audits the efforts of the Personnel Security Technician, Anti-Virus Technician, Application Security Technician, Database Security Technician, Messaging Security Technician, Operating System Security Technician, Hardware Security Technician, Network Security Technician, Facilities Security Technician, Egress Security Technician, and Outsourcing Manager for compliance with the standards set by the Security Manager
- Evaluates risks to the Enterprise as a result of the security audit

Security Manager

- Manages personnel and career development of security staff
- Performs risk analysis
- Tracks incident handling and reporting
- Audits the system for intrusion
- Performs audit tracking and reporting
- Has representative on the Change Advisory Board
- Implements security measures for users
- Develops security processes
- Defines policies for data retention and secure data disposal
- Provides effective network domain security design and management
- Tests and implements strategic security technology
- Monitors and assesses network vulnerability
- Monitors and assesses 3rd party vulnerabilities
- Provides fast, real-time network intrusion response
- Manages authentication and access methods requirements
- Manages user policy usage and requirements (such as a password policy)
- Manages external and physical security requirements (such as access to computer rooms)
- Manages secure messaging requirements

- Provides ongoing technical support and subject matter expertise for security initiatives within the company
- Evaluates proposed releases for proper security
- Identifies security considerations associated with the planned release
- Develops and implements security changes in coordination with other release team members
- Manages recommendations for system security during all phases of the release process

Partner Role Cluster Functional Areas

Contract Manager
- Creates and maintains underpinning contracts (UCs) with suppliers
- Defines roles and responsibilities

Outsourcing Manager
- Evaluates partner offerings for applicability to need
- Negotiates and manages costs associated with partnerships.
- Determines which partners will be the primary source of service and which will be the secondary or backup partners
- Manages IT procurement and purchasing functions
- Monitors the performance of provider services
- Works with the partner to optimize performance
- Assesses and minimizes the security risk that a supplier poses
- Audits suppliers for security compliance
- Creates contingency plans in the event that one or more partners fails to meet contractual obligations

Partner Account Manager
- Provides account and relationship management to IT vendor and outsource partners
- Defines the processes and procedures for dealing with partners

Vendor Manager
- Manages vendor agreements
- Initiates dormant contracts
- Co-coordinates vendor interaction during a contingency situation
- Provides updates to the facility manager during a contingency situation
- Provides updates on vendor changes, communications, and dormant contract execution to fail-over manager and facility manager