

Technical Competency Dictionary for the IT Community

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Introduction

Competencies are *observable* abilities, skills, knowledge, motivations or traits *defined in terms of the behaviours* needed for *successful* job performance. Often competencies reflect very general attributes common to all jobs (e.g., analytical thinking, problem solving, client orientation). However, the goal of the present exercise was to identify technical competencies - competencies required from incumbents occupying various jobs/roles in the IT Community that reflect the unique knowledge and skill set expected from these IT employees – that would complement the *Behavioural Competency Dictionary*. The resulting *Technical Competency Dictionary for the IT Community* was developed in partnership with subject matter experts in the IT Community and is the outcome of numerous interviews and discussions with CS representatives in different roles and levels from several large departments.

How Are the Competencies Structured?

For all competencies in the dictionary, a brief definition is provided as well as a list of points of knowledge required. Each competency also includes a proficiency scale that indicates the full range of expression of the competency. Each proficiency scale has five levels indicating the depth and breadth to which knowledge and skill are required in the job. Each proficiency level is described in terms of behavioural indicators. **The behaviours at each level of the scale are illustrative rather than definitive; that is, other examples of behaviour are possible and can be used at each level.** Each competency scale is cumulative which means that, although behaviours from lower levels are not repeated at higher level, they nonetheless apply.

1. Introductory	Demonstrates introductory understanding and ability and, with guidance, applies the competency in a few simple situations.
2. Basic	Demonstrates basic knowledge and ability and, with guidance, can apply the competency in common situations that present limited difficulties.
3. Intermediate	Demonstrates solid knowledge and ability, and can apply the competency with minimal or no guidance in the full range of typical situations. Would require guidance to handle novel or more complex situations.
4. Advanced	Demonstrates advanced knowledge and ability, and can apply the competency in new or complex situations. Guides other professionals.
5. Expert	Demonstrates expert knowledge and ability, and can apply the competency in the most complex situations. Develops new approaches, methods or policies in the area. Is recognized as an expert, internally and/or externally. Leads the guidance of other professionals.

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1. Application Development/Support and Maintenance¹

Knowledge and ability to design, define, construct, enhance, support and maintain application software on one or more platforms.

Knowledge requirements:

- Systems Analysis and Design
 - Requirements analysis
 - General/external design (includes design principles)
 - Use of established techniques to assist in the analysis of business data/information flows and database construction (e.g., data and functional modeling)
- Application Development and Commercial Off-The-Shelf (COTS) Management
 - Programming languages (e.g., software language structures, machine, assembly, procedural, non-procedural, object-oriented languages)
 - Standards and methods used in developing and maintaining a repository of information and processes (e.g., development standards including programming, user interface, design, naming, specifications)
 - System development processes, tools and methodologies (e.g., Systems Development Life Cycle including principles, best practices and standards used in designing and maintaining a formal procedure and a related repository of information)
 - Unit testing processes and practices
 - Application development tools (e.g., COTS development tools, technical productivity tools, workstation operating systems)
 - Policies and practices related to office productivity tools
 - Policies and practices related to website design and use of Inter/Intranet technologies within the Public Service

¹ This competency does not include data management or database management (See Competency 4).

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Demonstrates a basic level of understanding of software specifications or design techniques. • Demonstrates a basic understanding of programming concepts. • Demonstrates a general familiarity with one or more programming languages and/or methodologies. • Understands the importance of testing, documentation and production assurance. • Knows where to look for standards. 	<ul style="list-style-type: none"> • Demonstrates a working knowledge of one or more programming languages. • Writes or adapts software modules for testing and integration. • Understands and employs basic development methods and standards. • Tests/debugs program modules. • Uses a testing tool and prepares basic test cases. • Understands the migration cycle and prepares program for migration. • Prepares operational documentation. 	<ul style="list-style-type: none"> • Demonstrates a detailed knowledge of several programming environments and a good working knowledge of hardware and software interfaces. • Writes original multi-module/complex programs or applies reusable modules. • Designs, tests and integrates software modules and resolves programming errors using various debugging tools and techniques. • Provides support, guidance and production assurance for common problems. • Conducts impact analysis for proposed changes to or problems with the system. • Prepares technical documentation (e.g., user guides, technical specifications). • Undertakes routine analysis and works with designers and analysts to clarify and improve specifications or to identify alternative programming solutions. • Enforces standards (e.g., at walkthroughs). 	<ul style="list-style-type: none"> • Demonstrates in-depth knowledge and capability in software construction, testing, infrastructure, configuration, a wide range of system development methodologies and operating standards. • Demonstrates knowledge in multiple applications, data management systems and technologies or in a single area of expertise. • Demonstrates application and corporate knowledge, and understands how a change would affect multiple applications. • Makes recommendations/decisions in application and program design, standards and program enhancements. • Debugs very complex or urgent problems. • Analyzes and models business functions, processes and information flow within or between systems. • Provides guidance/mentors on programming practices and techniques to individuals and cross-functional teams. 	<ul style="list-style-type: none"> • Demonstrates expert knowledge of software design, construction, programming trends, programming and scripting languages across government in multiple applications and data management systems or in a single area of expertise. • Provides effective strategic direction to enterprise-wide application design. • Guides and oversees multiple-concurrent software construction projects. • Works with users at all levels to define system requirements and specify appropriate system environments to meet operational needs and system performance objectives. • Presents software construction disciplines to peers in public forums. • Develops policy and standards for software construction.

2. Architecture

Knowledge and ability to apply architecture theories, principles, concepts, practices, methodologies and frameworks.

Knowledge requirements:

- Enterprise Architecture/Information Technology (IT) Strategy
 - Implementation/enforcement of policies and support
 - Architecture functions and the interrelationships with the organization's vision
 - Architecture direction, policies and practices with a focus on Government of Canada priorities
- Information Architecture
 - Organization of information to effectively support the work of the organization
 - Creation of an entity relationship model and an integrated function or process dependency model
 - Transaction services architecture, configuration and interfaces
 - Relationship between the information architecture and other architectures
- Systems Architecture
 - Design of the systems architecture and how its components are connected and operate with each other and other applications
 - Relationship between the systems architecture and other architectures (e.g., integrating technology and business)
- Technology Architecture
 - Design of the fundamental hardware, software and telecommunications systems that provide the infrastructure on which business applications are developed and run (e.g., network topologies)
 - Interrelationships of the various technologies and their respective roles
 - Technical standards
 - Relationship between the technology architecture and other architectures
- Government and Department Policies and Standards
 - Business policy and standards development
 - Privacy Act
 - TBS Business Transformation Enablement Program (BTEP)
 - Management of Government Information (MGI)

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Possesses basic understanding of architecture principles. • Reads and understands architecture specifications and models. • Distinguishes between different architecture domains. 	<ul style="list-style-type: none"> • Creates basic models based upon specifications. • Defines key terms and concepts. 	<ul style="list-style-type: none"> • Focuses on a single area of expertise. • Produces analytic and candidate design models to be used for further analysis (e.g., telecommunications, networks). • Demonstrates awareness of other architectures. • Validates models created by projects and/or junior staff. • Signs off functional models. 	<ul style="list-style-type: none"> • Demonstrates good understanding of architecture across the business lines and how they interact but focuses on a single architecture. • Produces frameworks for a single architecture. • Assesses new requirements and makes design recommendations. • Signs off architecture models. • Manages transformations. • Defines metadata models and information models. • Monitors standards. 	<ul style="list-style-type: none"> • Understands how architecture relates to the organization's vision, how new business fits in the current business lines, the integration of business and technology, and relates government priorities to target architectures. • Builds corporate data models. • Delivers and signs off frameworks for architectures and integration models. • Recommends priorities for business based upon the architecture. • Understands and applies TB standards (e.g., ISO, WC3 Quality standards). • Addresses governance issues. • Defines metadata models at the enterprise level, information models and the interoperability model. • Extends the body of knowledge and contributes to government standards.

3. Business Analysis

Knowledge and ability to apply the principles of business analysis in the planning, reengineering, requirement gathering for government business environments, operations, processes, and practices.

Knowledge requirements:

- Government/business knowledge in various application areas (e.g., financial/accounting, human resources, purchasing, supply, policing, corrections)
- Common government/business management and decision-making concepts, principles, activities and practices (e.g., Government and corporate planning cycles and processes, accountability and budgetary cycles and processes)
- Business architecture (at a project level) and how it augments organizational design, planning systems and financial controls
- Impact analysis and environmental scan methods, techniques and tools used to evaluate an organization's strengths and challenges
- Business case/cost benefit methodology and standards including return on investment (ROI) and total cost of ownership (TCO)
- Typical organization structures, job functions, work activities and workflow
- Business process analysis and business process reengineering methods and design benefits, methodologies and tools; roles in support of business change
- Costing and cost recovery
- Industry, business line and the technical aspects of the business line
- Relationship between the business architecture and other architectures
- Transaction processing theory and principles, flow and design
- Government and Department policies and standards such as:
 - Business policy and standards development
 - Privacy Act
 - TBS Business Transformation Enablement Program (BTEP)
 - Management of Government Information (MGI)

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Demonstrates awareness of business rules and concepts. 	<ul style="list-style-type: none"> • Understands business lines. • Understands basic government and departmental services. • Drafts simple requirements. 	<ul style="list-style-type: none"> • Understands client business requirements, business roles, business planning and business processes. • Understands and works within governance principles. • Understands audit and compliance principles, change management principles and the impact of changes. • Understands how technologies can enable business processes. • Translates business requirements into technical requirements. • Develops clear requirement statements. • Develops simple business cases. • Carries out simple business process reengineering, models and redesign processes. 	<ul style="list-style-type: none"> • Validates business requirements, applies government and corporate priorities. • Gathers/refines complex business requirements, recommends or makes decisions on business requirements/interdependencies. • Develops complex business cases. • Carries out impact analyses and environmental scans to make recommendations. • Leads business process reengineering. • Presents and defends complex positions and strategies for business decisions, processes and plans. • Guides other business analysts. • Advises on compliance, governance structures and audit principles. 	<ul style="list-style-type: none"> • Works at the "integration level" by understanding the business architecture and its relationship to other architectures. • Makes recommendations to senior management on strategies and plans. • Carries out environmental scans of architecture. • Assesses corporate impacts of changes and recommends strategies to senior management. • Develops complex business cases across multiple business lines and platforms. • Sets standards for compliance and governance structures.

4. Database Design and Management

Knowledge and ability to apply the methods, practices and policies that are used in the design and the management of databases.

Knowledge requirements:

- Concepts, policies, principles, theories, practices and techniques associated with information management and information technology as it relates to database design and management
- Relationship between database design/management and application performance
- Database design and architecture - logical structure and physical structure (e.g., functional, metadata and process models)
- Database types (e.g., data warehouse, decision support, operational, query, ERP and relationship to technologies)
- Data security and recovery
- Database integrity, capacity planning, performance and tuning
- DBMS and data warehouse principles, best practices and standards
- Interoperability
- Database software installation processes and techniques
- Database tools to design and manage databases (e.g., data management tools, data modeling tools, database integration tools)
- Languages for data modeling, manipulation, control and database query
- Database trends and directions

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Demonstrates basic understanding of database management, logical design concepts and levels of database security. • Understands the difference between different database structures (e.g., relational vs. network). • Comprehends database design (e.g., diagrams, schemas, models). • Demonstrates basic understanding of data manipulation language (DML). • Demonstrates an awareness of performance issues (e.g., distribution of data, size definitions). 	<ul style="list-style-type: none"> • Understands a single database management system (DBMS), its components and how they relate to each other. • Demonstrates a good knowledge of data manipulation language (DML) and data definition language (DDL). • Codes/tests basic database access modules (e.g., stored procedures). • Troubleshoots, at a basic level, to understand database problem and identify where to direct it (e.g., basic database accessibility). • Recognizes the importance of database basic recovery and, with guidance, performs backup and recovery. • Understands database release management, applications business rules, data integrity issues, database security implementation, workload manager and interaction with DBMS (e.g., CICS, NT). • Performs data population, debugging and testing. • Conducts basic impact analysis for database change management. 	<ul style="list-style-type: none"> • Demonstrates working level understanding of a single DBMS relevant operating systems, applications business rules and its dependencies with other applications, databases and/or business partners. • Applies wide range of concepts to the corporate/vendor environment (e.g., database security and/or individual profiles). • Makes recommendations on logical/physical models (e.g., converts from logical model, implements and maintains physical model to meet storage, availability, and performance requirements). • Develops, codes, tests and reviews complex database access modules. • Solves problems that impact on the business or service, resolves data integrity issues and implements data integrity safeguards, and uses diagnostic and monitoring tools to prevent problems/enhance performance and availability. • Demonstrates a solid knowledge of system testing and integration environments. • Develops, selects, recommends and implements strategies for backup and recovery, data population and migration. • Conducts general impact analysis on database change management. 	<ul style="list-style-type: none"> • Demonstrates broad understanding of multiple DBMS or an in-depth knowledge of one or more DBMS. • Develops logical models incorporating business requirements such as high availability, redundancy and disaster recovery into the logical/physical database design. • Researches, pilots, evaluates new technologies and standards, identifies how they will integrate with the corporate network and recommends strategies. • Solves unusual problems or problems with a significant impact on the business. • Deals with major and/or multiple application groups. • Creates or reviews certification testing. • Develops standards and procedures for implementing new database technology. • Mentors people and provides input/guidance to cross-functional teams. 	<ul style="list-style-type: none"> • Demonstrates expert knowledge of data management, data stewardship, government-wide data management initiatives and trends in data management and how they can be applied. • Holds an enterprise-wide view and/or is regarded as the subject matter expert in one or more areas of expertise, and provides effective strategic direction to enterprise-wide data management. • Develops enterprise-wide multi-disciplinary architectural documents translating business data requirements into topographical format. • Demonstrates broad-based knowledge of information technology (e.g., programming, data management, platforms). • Develops business cases for enterprise-wide data management initiatives as a direct response to business drivers. • Guides and oversees multiple-concurrent data management projects. • Conducts procurement for data management solutions and related services. • Develops strategies, policy and standards for corporate data management and contributes to standards working groups - governmental and/or industry.

5. Infrastructure/Platforms²

Knowledge and ability to support the enterprise computing infrastructure (e.g., enterprise servers, client server, storage devices and systems, hardware and software) in the provision, management, storage, operation, scheduling, support and maintenance of the infrastructure.

Knowledge requirements:

Principles, practices, standards, methods and techniques related to interoperability of hardware/software configuration controls

- Platform environment (e.g., client-server environment, enterprise server/mainframe environment)
- Storage and retrieval (e.g., area network, mainframe storage, media storage, virtual storage)
- Systems hardware and its characteristics (e.g., mainframe computers, mini and micro-computers, CPU, memory, disk, registers, bus, channel)
- Hardware/software and connection, implementation and maintenance
- Operating systems, communications and software utilities used on enterprise server/mainframe and distributed computer systems
- Cooperative processing (two or more computers simultaneously processing portions of the same program or operating on the same data such as multiple-CPU systems, distributed systems)
- Monitoring of systems software (i.e., the operating system and all utility programs that manage computer resources at a low level) including compilers, loaders, linkers, and debuggers
- Operations performance monitoring and capacity planning of the delivery platform
- Treasury Board and corporate IT standards and policies regarding the development and support of infrastructure systems and networks

² This competency does not include network/telecommunication systems (See competency 8).

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Demonstrates awareness of the platform principles and procedures. • Understands need for capacity planning and performance management. • Operates the platform at a simple level under supervision. • Demonstrates awareness of the standards for the platform. 	<ul style="list-style-type: none"> • Understands the platform technology and concepts. • Understands how basic concepts relate to each other and applies them. • Understands how the platform integrates with other environments, at a basic level, from an end-user perspective. • Operates the platform at a simple level. • Troubleshoots basic physical or software problems. • Understands and applies the standards. 	<ul style="list-style-type: none"> • Understands how the platform integrates with other environments (e.g., network). • Participates in day-to-day operations (e.g., monitoring operations of the platform). • Uses performance data collection tools and techniques. • Installs software and hardware on the platform. • Solves routine problems. • Solves typical hardware and software problems. • Uses diagnostic tools to solve complex problems. • Executes standards. 	<ul style="list-style-type: none"> • Demonstrates in-depth knowledge of an area of expertise. • Contributes to high-level architecture. • Evaluates/pilots new technologies, assesses the results, identifies how they integrate with the platform and implements them. • Carries out performance measurement and capacity planning. • Incorporates business requirements such as high availability, redundancy and disaster recovery into platform design. • Resolves complex problems. • Develops and monitors/enforces standards and procedures for new technology configuration and implementation. • Mentors/guides individuals and cross-functional teams. 	<ul style="list-style-type: none"> • Demonstrates expert knowledge of platform principles, technology, government-wide technology initiatives and technological trends. • Demonstrates an intimate knowledge of the environment, interdependencies and impact of change. • Provides effective strategic direction to enterprise-wide platform design and initiatives. • Develops enterprise-wide multi-disciplinary architectural and design documents. • Resolves very complex problems and recommends capacity and performance improvements. • Conducts procurement for platform hardware and services. • Sets standards and technology direction for the platform. • Leads the development of people in the infrastructure domain.

6. IT Procurement and Asset Management

Knowledge and ability to evaluate, negotiate, procure, track, manage IT assets including software licenses and computer leases:

Knowledge requirements:

Vendor liaison/management, service agreements, warranties and lease agreements

- Procedures related to procurement and contract administration
- Processes and procedures necessary to critically evaluate products, services and claims
- Processes involved in vendor negotiations for substantial and/or long-term contracts for hardware, software and licence agreements, support and services
- Systems and applications for procurement (e.g., NMSO, DISO, Software Acquisition Reference Centre, Request for Software Discounts and Supply Arrangements)
- Roles and responsibilities of TBS and PWGSC related to asset procurement and management
- Corporate and Government of Canada legislation, standards and policies (e.g., regulating software licence agreements and renewals, disposal, procurement ethical practices and security policies)
- Licence management
- Policies, guidelines and procedures for IT asset management
- IT asset management life cycle (e.g., planning, maintenance, retirement and disposal)
- Negotiation and contracting processes and practices
- Federal legislative and policy framework related to IM/IT procurement for goods and services
- Departmental processes for acquisition of goods and services, including drafting of Statements of Work (SOW), Requests for Proposals (RFPs), evaluation of responses, contract negotiations and management of contracts
- Remedial measures for IT equipment non-performance

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Demonstrates broad knowledge of Government of Canada and the role of PWGSC in procurement. • Understands the values and ethics involved in procurement. • Demonstrates basic understanding of procurement process for IT services and goods. 	<ul style="list-style-type: none"> • Understands Treasury Board and corporate processes, standards and governance structures. • Assists in gathering requirements from the business. • Understands internal procurement processes for IT services and goods. 	<ul style="list-style-type: none"> • Knows the procurement cycle and processes, gathering of information through RFIs and RFPs, roles of interdepartmental partners and the proposal/ evaluation processes. • Demonstrates a general knowledge of procurement and conducts low-level procurement. • Evaluates products and services and identifies the vehicle(s) to use. • Provides advice on reporting and inventory, policies and procedures. • Establishes partnerships with Finance. • Understands IT asset business and language. • Formulates and applies performance management guidelines to asset management. 	<ul style="list-style-type: none"> • Possesses a specific area of expertise and business knowledge of the life cycle for his/her asset area (e.g., sunset procedures). • Negotiates multi-level, multi-layer million dollar contracts. • Knows rules for Canadian and International governing bodies (e.g., NAFTA, Trade Tribunal, CITT) and negotiates CITT challenges. • Reviews, signs off and approves RFP/RFI documents. • Liaises with PWGSC to communicate requirements, terms and conditions. • Monitors and enforces values and ethics. • Consults with regions and senior management (e.g., leveraging assets, inventory and plans for sunset/refresh, professional services and training). • Mentors junior staff. 	<ul style="list-style-type: none"> • Demonstrates a very deep understanding of one area of expertise or a broad understanding of multiple areas and provides guidance to senior management. • Demonstrates a broad understanding of software licensing models, the market and how to leverage the knowledge. • Demonstrates an in-depth understanding of procurement, the industry, the vendor community and industry trends. • Possesses corporate knowledge and understands service levels. • Negotiates with vendors at a high/complex level. • Provides advice in large supply agreements. • Performs "total cost of ownership" analysis.

7. IT Project Management

Knowledge and ability to apply formal project management principles and practices during the planning, implementation, monitoring and completion of projects, ensuring effective management of scope, resources, time, cost, quality, risk and communications.

Knowledge requirements:

- Enhanced Management Framework for the management of information technology/projects
- Project management concepts, techniques, methods and tools and industry best practices in the management of projects in an IT environment (e.g., Project Management Body of Knowledge (PMBok))
- Project estimating and planning techniques
- Project progress monitoring
- Management of change, risk and problem
- Human resources management
- Government of Canada policies and standards

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Understands basic concepts (e.g., project goals, risk, scope, participants' roles, planning and the importance of project management principles such as time, cost and quality management). • Provides input to project plan. 	<ul style="list-style-type: none"> • Understands project reporting. • Develops simple project plans including work breakdown structure and estimates. • Identifies and escalates issues and potential delays. • Manages small, straightforward projects or specific components of larger projects. 	<ul style="list-style-type: none"> • Manages a complete multi-stage project in own area. • Identifies, allocates and manages resources needed to meet project objectives. • Develops and manages the project plan, including timelines, deliverables, milestones and costs. • Identifies potential roadblocks and risks and develops contingency plans to deal with them. • Oversees implementation of the project plan, monitors progress, resource usage and quality, and makes needed adjustments. 	<ul style="list-style-type: none"> • Manages complex, multifaceted/ interrelated projects that span own area or department boundaries. • Conducts comprehensive risk assessment and develops plans for eliminating or mitigating the risks identified. • Mentors other project managers. • Understands the impact of the project on the department as a whole. • Develops complex plans (e.g., with interdependencies or cross-department). • Implements standards. 	<ul style="list-style-type: none"> • Oversees/manages large, highly complex, diverse or strategic projects that impact the organization as a whole. • Develops departmental policies and standards. • Markets project management principles and benefits across the department. • Sets/evolves the vision of how project management should be done. • Changes project management practices. • Knows multiple project management disciplines.

8. Telecommunications (Data and Voice) Network

Knowledge and ability to implement the methods, practices and policies governing the design, analysis, development, management and use of the hardware and software used to transfer information such as data, voice, images and video.

Knowledge requirements:

- Theories and concepts, methods, policies and practices to design, develop, plan telecommunications network infrastructure systems (e.g., calculation of peak and mean bandwidth requirements, response time, propagation delays, priorities, traffic types, traffic flows (point-to-point, multicast, broadcast), error detection and protection, security, interoperability, growth, quality of service, availability)
- Installation, configuration, operation and maintenance of telecommunications infrastructure hardware and software
 - Telecommunication systems' operating systems, system software and utilities
 - Low level interfaces (e.g., modems, CSU/DSU)
 - Voice communication devices (e.g., Blackberry units, cell phones, gateways, routers, switches, PBX)
- Standards describing the structure of data exchange between systems (e.g., OSI seven layer reference model)
- Standards describing the format content and exchange mechanisms between systems, such as communication protocols (including protocols that relate to the convergence of technologies, such as Voice over IP), connection oriented versus connectionless protocols
- Classes of networking systems (e.g., Local Area Network (LAN), Metropolitan Area Network (MAN), Department Wide Area Network (DWAN), Wide Area Network (WAN), Virtual Private Network (VPN), Voice Network System, Remote Access Networks, associated hardware and software, operating systems and protocols)
- Network topologies (physical and logical) and their characteristics
- Classes of telecommunication media, such as wire based (e.g., copper, fibre) and wireless (characteristics of various frequency bands from HF to microwave)
- The purpose and use of different networks (e.g., Internet, Intranets, Extranets)
- Value added networks (i.e., services added within a communications network beyond data transfer such as message routing, resource management and conversion facilities)
- Performance analysis, diagnosis, capacity planning and data communications monitoring/management practices, protocols and tools
- Data, voice and video requirements and services
- Traffic and transmission management
- Common carrier services - data transmission and telephony service offerings provided by private sector companies
- Security, including specific methods, policies and best practices to secure information within the telecommunications network infrastructure
- Industry regulations and tariffs (e.g., CRTC)

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Demonstrates basic understanding of data communications and components, definitions, key concepts, communication protocols and platforms (e.g., Firewalls, Security, Frame Relay, SNA, ATM, Hubs/Routers/ Gateways switches, VOIP, ISDN, routing protocols). • Understands need for capacity planning and performance management. 	<ul style="list-style-type: none"> • Understands data communications routing and switching technology. • Understands how basic concepts relate to each other and applies them (e.g., vendor-specific standards). • Understands how data communications integrate with other environments (e.g., mainframe) and are distributed, at a basic level, from an end-user perspective. • Assists in the design of basic connections (e.g., connecting 100 people to a WAN or designing a small site (less than 50)). • Troubleshoots basic physical or software connectivity problems, network congestion (e.g., cables/connections, defective equipment, logging in to network equipment, checking configuration of routers/switches). • Uses data communications diagnostic tools. • Tests, configures, installs and supports hardware and software at any typical site. • Talks clients through troubleshooting. 	<ul style="list-style-type: none"> • Understands how data communications integrate with other environments such as mainframe, distributed, E-commerce, firewalls and external networks, at a component level. • Demonstrates and applies wide range of concepts to the corporate/vendor environment. • Understands vendor-specific network switching and routing products. • Translates multiple client network connectivity requirements and limitations into technical specifications for building/site designs. • Designs complex building environments using existing standards (e.g., complex site layouts (many buildings and requirements)). • Resolves typical hardware and software problems (e.g., connectivity, network congestion, protocols, uses diagnostic tools). • Conducts certification testing. • Executes standards. 	<ul style="list-style-type: none"> • Incorporate business requirements (e.g., high availability, redundancy, disaster recovery) into data communications design using analytical techniques. • Evaluates/pilots new technologies, identifies how they integrate with the corporate network and implements. • Resolves unusual or atypical network problems without clear precedents and/or that have significant impact or consequence on the business or service. • Creates or reviews certification testing. • Develops standards and procedures for new technology configuration and implementation. • Mentors/guides individuals and cross-functional teams. • Deals with major client groups (e.g., regional or national client). 	<ul style="list-style-type: none"> • Demonstrates expert knowledge of data communications principles, network technology, government-wide technology initiatives and technological trends. • Demonstrates broad-based knowledge of information technology. • Develops enterprise-wide multi-disciplinary architectural documents. • Develops business cases for enterprise-wide network technology initiatives as a direct response to business drivers. • Provides effective strategic direction to enterprise-wide network design. • Guides and oversees multiple-concurrent network projects. • Conducts procurement for network solutions network hardware and services procurements. • Develops policy and standards for networking technology and contributes to governmental and/or industry standards working groups (e.g., GOL, ITU, RC).

9. Security/Information and Application Protection

Knowledge and ability to ensure there are adequate technical and organizational safeguards to protect the continuity of IT infrastructure services by the implementation of IT security principles, methods, practices, policies and tools that are used in securing IT resources including information and operations security, physical security, business continuity/disaster recovery planning, methods to deal with security breaches and security assessment in a technical environment.

Knowledge requirements:

IT security principles methods, policies, practices and tools

- Information Protection/IT security principles, threat and risk assessment methodology, practices, procedures and tools (e.g., Government privacy and security related legislation and policies, biometric and cryptographic principles, firewalls, intrusion logs, encryption and digital (numeric) signature)
 - Theories, processes and methodologies involved in developing, implementing, monitoring and reporting IT security planning frameworks, policies, measures, counter-measures and monitoring programs, procedures and guidelines
Management tools such as data classification and risk assessment/analysis to identify threats, classify assets and to rate system vulnerabilities
 - IT software and hardware security requirements
 - Preparation and conduction of Privacy Impact Assessments (PIA), Statement of Sensitivity (SOS), Threat Risk Assessments (TRA), Vulnerability Assessments (VA)
 - Accreditation procedures, policies and practices
 - Security certification procedures
 - Security hardware and software
 - Treasury Board and corporate IT standards and policies regarding the development and support of infrastructure systems and networks, including security policies and operational standards
- IT Operations Security
 - Protection techniques for the entire facility, from the outside perimeter to the inside office space, including all of the information system resources and methods to deal with security breaches
 - Requirements of hardware, media and of the operators and administrators with access privileges to these resources
 - Application product level security, access management and remote access
 - Auditing and monitoring the mechanisms, tools and facilities to permit the identification of security events and to assess operations security capacity
 - Viruses
 - Computer crimes laws and regulations and the measures and technologies used to investigate computer crime incidents
 - Cryptographic, graphic and hardware applications
 - Business Continuity/Disaster Recovery Planning
 - Disaster recovery strategies, plans, tests and management
 - Preservation and business recovery planning, practices, policies and procedures
 - Rollback and contingency strategies, planning practices and tools
 - Business continuity analysis procedures and exercise frameworks
 - Activities within the response, recovery, restoration and resumption phases applicable to business continuity plans
 - Roles and responsibilities of IT operational functions during business continuity exercises
 - Federal government business continuity planning policies and programs, including Treasury Board Standards

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Demonstrates awareness of security requirements. • Demonstrates awareness of certification policies. • Demonstrates awareness of privacy requirements and standards. 	<ul style="list-style-type: none"> • Understands concepts of IT security and its application to computer systems architecture. 	<ul style="list-style-type: none"> • Executes security test plans. • Deals with low impact threats. • Acts to protect integrity of system data at operation level (e.g., single key incident). • Performs security certifications. • Provides advice on disaster recovery planning. • Participates in disaster recovery tests. • Recommends security safeguards. • Executes standards. 	<ul style="list-style-type: none"> • Demonstrates a broad understanding or very detailed area of expertise in security subject(s). • Demonstrates a broad knowledge of security policies and interprets policies. • Understands a specific security application or tool and how it works. • Conducts risk assessments. • Assesses security safeguards. • Deals with threats and serious incidents. • Deals with intrusions at a high threat level. 	<ul style="list-style-type: none"> • Demonstrates an expert understanding or very detailed area of expertise in multiple security subject(s). • Demonstrates expert knowledge of law, regulation and policies, and interprets policies and standards. • Is an expert in multiple security applications and tools. • Leads risk and security safeguards assessments. • Mitigates threats and serious security incidents at the enterprise level. • Consults on security issues and recommends corporate strategies. • Leads the development of enterprise policies and standards. • Directs employees and consultants and mentors others.

10. Testing

Knowledge and ability to perform testing of software and/or hardware using a systematic approach (i.e., the orderly progression of testing in which software elements, hardware elements or both are combined and tested until the entire system has been integrated).

Knowledge requirements:

- Quality assurance and control
- Testing approaches and strategies
- System and application testing methodologies, practices and principles (e.g., end-to-end)
- Testing/validation in relation to the systems development life-cycle
- Types of testing (e.g., volume, unit, compatibility, bandwidth, integration, system, end-to-end, web-stress)
- Testing standards (e.g., Treasury Board and department, International organization for standardization (ISO))
- Testing and readiness functions and assessments including release processes and packages, change control and system integration
- Testing tools including automated tools, test scripts and reporting/tracking tools
- Certification and accreditation of new applications

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Demonstrates awareness of testing principles and processes. • Understands testing terminology. 	<ul style="list-style-type: none"> • Tests and debugs software modules. • Conducts unit testing. • Understands testing methodologies and principles. • Understands standards for testing. • Executes test scripts. • Reports test results. • Understands and applies IT system security for applications. • Uses a testing tool. 	<ul style="list-style-type: none"> • Understands systems integration principles (i.e., the methods, practices and policies that are used during a systems integration process, including hardware, software, network and applications). • Understands release and certification processes. • Prepares test cases/scripts. • Carries out complex testing/validation (e.g., volume testing, integration testing). • Ensures other applications are not affected. • Matches results with expectations in the design document. • Troubleshoots/resolves issues. • Implements test tools. • Applies standards for testing. 	<ul style="list-style-type: none"> • Conducts application testing. • Conducts complex series test scenarios. • Prepares test plans and strategies. • Researches/tests testing tools and makes recommendations. • Develops test practices. • Implements and monitors standards for testing. • Tests standards. • Understands the impact of testing on the environment and other tests being carried out. • Ensures that the right/appropriate tests are being carried out. • Mentors others. • Guides application stakeholders in testing methods and tools. 	<ul style="list-style-type: none"> • Manages integration testing. • Sets standards for cycle testing. • Designs testing methodologies. • Develops test standards, best practices and policies.

11. Service Management Processes

Knowledge and ability to implement the methods, practices and policies governing the design, development and use of the IT support processes designed to keep the IT environment functioning efficiently, effectively and securely.

Knowledge requirements:

Service Management Principles

- Relationship between different IT support processes and between support processes and clients
- Implementation and management of services using the principles and methods associated with industry best practices (e.g., Information Technology Infrastructure Library (ITIL))
- Service level agreements
- Processes and practices to ensure the Agreement and Statements of Work or contracts are met while taking steps to minimize any adverse impact on service quality
- Government of Canada and department policies and standards (e.g., Service Management Life Cycle Framework)

Change Management

- Processes and practices to ensure changes to the IT infrastructure are introduced successfully and on a scheduled basis
- Planning, scheduling, distribution, application and tracking of changes to the IT environment

Configuration Management

- Management of the physical and logistical properties of resources and their relationships (e.g., physical connections and dependencies)
- Configuration management technologies that affect the IM/IT environment including the physical and logistical properties of resources

Release Management

- Processes and practices to ensure the introduction and maintenance of all IS/IT infrastructure and that existing infrastructure falls within the standards and the technology suppliers supported release levels

Problem Management

- Detection, reporting, analysis, recovery, resolution and tracking of problems

Help Desk/Client Support

- Concepts, techniques and practices of help desk operations and service delivery
- Provision of a single point of contact for all users of the IT infrastructure services
- Installation, configuration, troubleshooting and application software support
- Technical problem analysis, evaluation and solution proposal
- Techniques and practices for client queries, troubleshooting and problem resolution and prioritization

1. Introductory	2. Basic	3. Intermediate	4. Advanced	5. Expert
<ul style="list-style-type: none"> • Understands service management processes and concepts (e.g., incident management, change management, release management). • Understands concepts, techniques and practices of help desk operations and service delivery. 	<ul style="list-style-type: none"> • Understands and follows a process in problem management, change management or configuration management. • Provides IT help desk support services. • Gathers information from end-users to determine the nature of problems and resolve them. • Monitors SLAs and escalates problems. • Performs initial evaluation of problem and routes as necessary. • Understands the requirements of process (e.g., involvement of service management early in the process). 	<ul style="list-style-type: none"> • Understands interrelationships and interdependencies between service management processes. • Installs, configures, troubleshoots and supports application software. • Analyzes, evaluates and diagnoses technical problems and proposes solutions. • Manages process ensuring it is followed (e.g., change, problem, testing, costing, backup and recovery, QA release). • Schedules release after ensuring absence of conflicts. • Serves as a point of escalation. • Conducts customer satisfaction surveys. • Guides others in processes. • Implements changes to processes. 	<ul style="list-style-type: none"> • Implements and manages services using the principles and methods associated with Information Technology Infrastructure Library (ITIL) and other industry best practices. • Identifies who to call for severe or complex problems. • Manages the provision of help desk services and problem resolution. • Analyzes problem trends and makes recommendations. • Develops service management processes. • Writes/negotiates SLAs for operational level agreements and internal SLAs. • Develops customer satisfaction surveys. • Sets guidelines for others to follow. 	<ul style="list-style-type: none"> • Negotiates, develops, implements and manages service level agreements. • Develops service management standards, practices and policies. • Builds and maintains a network of experts. • Develops SLA templates. • Negotiates complex SLAs. • Provides guidelines for service management (e.g., recommends changes based upon results of a customer satisfaction survey). • Recommends continual improvements in service management strategy and processes.