

**Table C1: Skill list and definitions (alphabetical order)**

Definitions for most skills were provided in the survey. They are presented below.

- **Artificial Intelligence (AI):** principles, methods, and tools used to design systems that perform human intelligence functions.
- **Backup & recovery**
- **Biometrics**
- **Borland JBuilder**
- **Business continuity planning:** knowledge of how to build contingencies and strategies for minimizing financial and operational losses following service interruptions caused by natural, technological, and attack-related emergencies.
- **Business process analysis:** knowledge of different methods, metrics, tools, and techniques used to assess business processes.
- **C**
- **C ++**
- **Call center activities:** organizing and using a variety of technologies and techniques to improve the management and servicing of inbound and outbound phone calls serving internal customers (e.g., help desks) or external customers (e.g., customer service and support centers).
- **Capacity Management:** principles and methods for monitoring, estimating, or reporting actual performance or the performance capability of information systems or components.
- **CASE tools**
- **Cellular technologies**
- **Change management:** management practices used to ensure a smooth transition and minimal disruption during a system implementation, and during process changes introduced in an organization.
- **COBOL**
- **ColdFusion**
- **Collaboration software (e.g. Lotus Notes, etc.)**
- **Computer forensics:** knowledge of tools and techniques used in data recovery and preservation of electronic evidence.
- **Content management:** processes and technologies used to support the evolutionary life cycle of digital information, which includes the creating, editing, storing, terminology filing, organizing and publishing content on the web.
- **Contract management & vendor relations:** knowledge of how to work with legal counsel on contracts and maintain relationships with vendors. Participating in project negotiations and helping IT managers make informed decisions on which vendor can offer the best deal and the best service for a particular project. Dealing with invoices and back-end contract activity.
- **Cryptography**
- **Customer Relationship Management (CRM):** methodologies and tools to help manage customer relationships in an organized way, including strategies and software that optimize performance and customer satisfaction.
- **Customer service:** working with clients and customers to assess their needs, provide information or assistance, resolve problems, or satisfy expectations. Keeping on top of the organizational climate and mission changes and remaining sensitive to customer needs and concerns.
- **Data warehousing:** principles of data warehouses, including the population and maintenance of a central repository, in addition to knowing about the migration of data from legacy database systems into a data warehouse.
- **Database applications & development techniques:** activities related to the development of database applications for single or distributed database systems including web and desktop-based transactions, automated reports, stored procedures, triggers, etc.
- **Database design & development standards:** knowledge of the principles, methods, and tools for relational database design and development including normalization, conceptual data modeling (entity relationship diagram), data integrity, query, and physical implementation using SQL.
- **Decision support systems:** knowledge of decision support systems (DSS), and how to design and develop of a wide range of tools and technologies which are used to analyze business data in order to help users make business decisions more easily.
- **DHTML/ HTML/ XHTML**
- **Disaster recovery & planning:** advanced planning and preparations to minimize loss and ensure continuity of critical business functions in the event of disaster. Creating a document that defines the resources, actions,

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| <p>tasks, and data required to manage the business recovery process.</p> <ul style="list-style-type: none"> <li>• <b>Eclipse</b></li> <li>• <b>Encryption</b></li> <li>• <b>Enterprise Resource Planning (ERP) systems:</b> activities related to the integration of all units and functions across an organization onto a single computer system that can serve all those functions' particular needs. Integration can include databases, tools, interfaces and applications.</li> <li>• <b>Financial Management:</b> preparing, justifying and/or administering the budget for program areas; planning, administering, and monitoring expenditures to ensure cost-effective support of programs and policies; assessing financial condition of an organization.</li> <li>• <b>Firewalls</b></li> <li>• <b>Fortran</b></li> <li>• <b>Geographic Information Systems (GIS)</b></li> <li>• <b>Hardware &amp; maintenance support</b></li> <li>• <b>Help desk activities:</b> providing technical support for hardware and software to technology users either by telephone, fax or e-mail, or through listings of typical questions and answers. Involves solving problems directly or forwarding problems to appropriate experts.</li> <li>• <b>IBM mainframe</b></li> <li>• <b>IBM WebSphere Studio</b></li> <li>• <b>IBM/ DB2</b></li> <li>• <b>Identity management &amp; directory services:</b> knowledge of how to map logical names to physical addresses in a network. In addition to address naming, directory services include network resource location and mapping.</li> <li>• <b>Internal controls:</b> knowledge of internal controls policies and procedures; promotion of operational efficiency and effectiveness; safeguarding assets; and ensuring the reliability of accounting data. Internal controls encompass both administrative and accounting controls.</li> <li>• <b>Intrusion detection</b></li> <li>• <b>IT asset management:</b> knowledge of the systematic practices which effectively manage IT assets throughout the life cycle phases of requisition, procurement, deployment, maintenance and retirement.</li> <li>• <b>IT procurement:</b> knowledge of various types of IT contracts, techniques for contracting or procurement, and contract negotiation and administration.</li> <li>• <b>IT project portfolio management:</b> systematic approach to categorize and evaluate which set of projects to pursue in order to achieve the goals and objectives of the organization.</li> <li>• <b>IT risk assessment &amp; management:</b> risk assessment, risk mitigation, and IT evaluation and assessment that allow IT managers to balance the operational and economic costs of protecting IT systems and that help justify budget expenditures.</li> <li>• <b>IT strategic planning:</b> knowledge of the processes of comprehensive, integrative IT planning that consider, at a minimum, the future of current decisions, overall policy, organizational development, and links to operational plans.</li> <li>• <b>Java</b></li> <li>• <b>JavaScript</b></li> <li>• <b>Java studio</b></li> <li>• <b>Joint Application Development (JAD):</b> an application development process, aimed at achieving high levels of functional quality through the participation of clients/end users.</li> <li>• <b>Knowledge Management (KM):</b> knowledge of how organizations capture, organize, and store knowledge and experiences of individual workers and groups and make this information available to others in the organization.</li> <li>• <b>Leadership:</b> influencing, motivating, and challenging others; adapting leadership styles to a variety of situations.</li> <li>• <b>Linux operating systems</b></li> <li>• <b>Mac OS/ OS X operating systems</b></li> <li>• <b>Mainframe operations</b></li> <li>• <b>Managing agency staff:</b> planning, distribution, coordination, and monitoring of work assignments of agency staff. Evaluating work performance, providing feedback on performance and conducting workforce planning.</li> <li>• <b>Managing consultant staff:</b> planning, distribution, coordination, and monitoring work assignments of consultants. Evaluating work performance and providing feedback on their performance.</li> <li>• <b>Metadata management:</b> knowledge of how to manage metadata and the ability to describe how and when and by whom a particular set of data was collected, and how the data was formatted.</li> <li>• <b>Microsoft Access</b></li> <li>• <b>Microsoft SQL</b></li> <li>• <b>Mobile computing</b></li> </ul> |
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- **Modeling & simulation:** mathematical modeling and simulation tools and techniques to plan and conduct tests and evaluations of programs, evaluate design alternatives, and understand systems support decisions involving requirements.
- **MYSQL**
- **Negotiation & conflict resolution:** persuading others to accept recommendations, cooperate, or change their behavior; working with others towards an agreement; negotiating to find mutually acceptable solutions; knowledge of formal conflict resolution techniques.
- **Network architecture & design principles:** knowledge of how networks are effectively structured and designed including knowing the right connections for the Internet, intranets, extranets, local area networks, and wide area networks.
- **Object-oriented analysis & design principles:** understanding the iterative, object-oriented approach to analysis and design, using modeling techniques (e.g. use cases, class diagrams) and concepts such as objects, classes, encapsulation, abstraction, inheritance, and polymorphism.
- **Open systems server administration**
- **Oracle**
- **Oracle JDdevelopment studio**
- **Oral Communication:** making clear and convincing oral presentations (to individuals or groups) by speaking clearly, understanding the audience, and listening effectively to questions or comments.
- **Organizational awareness & business knowledge:** understanding and working effectively within the organization's mission and functions (including programs, policies, procedures, rules, and regulations), as well as within its social, political, and technological systems.
- **Perl/ CGI**
- **PHP**
- **Public Key Infrastructure (PKI)**
- **Planning & evaluation:** organizing work, setting priorities, and determining resource requirements; setting short- or long-term goals and strategies to achieve them; coordinating with other organizations to accomplish goals; monitoring progress and evaluating outcomes.
- **PowerBuilder**
- **Principles of operating systems:** knowledge about the fundamentals of basic operating systems tasks, such as recognizing keyboard input, sending output to the display screen, tracking files and directories on disk, and controlling peripheral devices.
- **Principles of programming:** knowledge about general programming concepts independent of specific languages. Concepts include general programming constructs, problem specification and deconstruction techniques, data structure, algorithm design and implementation.
- **Project management:** knowledge, skills, tools, and techniques to direct and coordinate human and material resources at all phases in a project: origination, initiation, planning, execution and control, and closeout. Balancing competing demands and mitigating risks to ensure an acceptable product is delivered to stakeholders and sponsors within budget, scope, time, and quality standards.
- **Rapid Application Development (RAD) / Prototyping:** knowledge of Rapid Application Development (RAD) to create applications more quickly through such strategies as using fewer formal methodologies and reusing software components.
- **Quality assurance:** principles, methods, and tools of quality assurance and quality control used to ensure that a product meets or exceeds functional requirements and standards.
- **Records management:** activities related to the physical or digital maintenance of public records from creation through destruction.
- **Requirements analysis:** principles and methods to identify, analyze, specify, design, and manage functional and infrastructure requirements (i.e., translating functional requirements into technical requirements and/or presenting alternative technologies or approaches).
- **Satellite technologies**
- **SQL**
- **Structured system analysis & design principles:** understanding the sequential approach to systems analysis and design (problem definition, feasibility study, fact gathering and analysis, business systems options, requirements definition, logical and physical design) using appropriate techniques and conventions for each stage such as data flow and entity relationship diagrams.
- **Supervisory skills:** working with employees to set and communicate performance standards by setting clear goals; dealing effectively with organizational performance problems as well as with individual employee problems.
- **Support for desktop applications**
- **Systems implementation:** deployment of a new information system including execution, educating users, placing the system into production, confirming all required data are available and accurate, and validating that

- business functions that interact with the system are functioning properly.
- **System security applications:** knowledge of methods, tools, and procedures to protect information systems and data, as well as understanding how to develop information security plans and provide or restore security of information systems and network services.
  - **Systems architecture:** methodologies used in the design and development of information systems, including the physical structure of a system's internal operations and interactions with other systems.
  - **Systems integration:** principles, methods, and procedures for integrating and optimizing multiple information systems and system components such as computers, instrumentation, and equipment to share data or applications with other components in the same or other functional areas.
  - **Systems life cycle planning principles:** knowledge of the overall process of developing information systems through a multi-step process from investigation of initial requirements through analysis, design, implementation and maintenance.
  - **Technical documentation:** knowledge of procedures for developing and maintaining technical and operational support documentation.
  - **Technology training activities:** activities to provide technology training to others, such as: IT curriculum planning and management, IT training vendor selection and monitoring, IT content development, and the delivery of IT training.
  - **Telephone/ PBX**
  - **Testing & evaluation:** principles, methods, and tools for analyzing and developing systems' test and evaluation procedures and technical characteristics of IT systems, including identifying critical operational issues.
  - **Unified messaging services (e.g., email, voice, text)**
  - **Unified Modeling Language (UML)**
  - **Unisys mainframe**
  - **Unix**
  - **Visual Basic**
  - **Visual Basic Script**
  - **Video imaging**
  - **Visual Studio .NET**
  - **Voice over IP**
  - **Web servers**
  - **Web/ IP**
  - **Web- based graphics & multimedia**
  - **Website accessibility:** knowledge of tools, equipment, and technologies used to make websites accessible to all users, especially those with disabilities.
  - **Web design & development:** planning and production of websites, including, but not limited to information structure, layout and visual design of graphics, text and images, networked delivery, and technical development.
  - **Website management:** management and maintenance of an enterprise's web site or portal. Understanding how to develop and update web pages, perform backups, and ensure user access to the site, monitoring site traffic and knowing if site capacity meets traffic demands.
  - **Website privacy:** protection of web visitors' information on the web site. Developing policies and software to authenticate users and authorize their access to certain content, establishing rules for the types of information that can be displayed to users, implementing enterprise privacy policies, and examining web logs and statistics to detect intrusion.
  - **Website search & administration:** installation and maintenance of an enterprise's search capability for public or internal web sites including installing software or devices, establishing crawl parameters to ensure that proper documents are included or excluded from results, establishing policies and procedures regarding logs, archives, and reports, and analyzing search statistics to allow for an improved search experience for visitors.
  - **Wide Area Networks (WAN)**
  - **Windows operating systems**
  - **Windows network operating systems**
  - **Wireless technologies**
  - **Workflow management:** knowledge of workflow management approaches for internal and external process integration and automated events. Internal and external process integration allows for the definition of business processes that span applications and automated events enable automated tasks to be performed.
  - **Written communication:** presenting information, analysis, ideas, and positions in writing in a clear and convincing manner. Organizing ideas in a clear, appropriate, and grammatically correct written manner.
  - **XMI/ XSL**

## Appendix C: Skill Definitions

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