# Technology Reference Model Framework – High Level Overview

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# Purpose

The Oregon Technology Reference Model (TRM) Framework represents various technologies that support business and technology capabilities. There are two views of the TRM: business view and technical view.   The TRM is a general tool for mapping technologies to business and technical capabilities; it is maintained by OSCIO Enterprise Alignment program to support a variety of efforts such as "Basecamp" for Strategic IT Sourcing, Architectural Assessments for IT projects, Enterprise Technology Standards and Future State Reference Architectures.

# Background

The State of Oregon is focused on transitioning from its current state with legacy, outdated and fragmented technology environment to one that is more current with industry, more agile to support business needs on a timely basis, and supports greater interoperability to achieve more seamless, responsive services.  As this transition happens, it is important that agencies begin thinking about their needs in the context of "capabilities" rather than solely unique program-specific, customized functionality.  This focus on capabilities will:
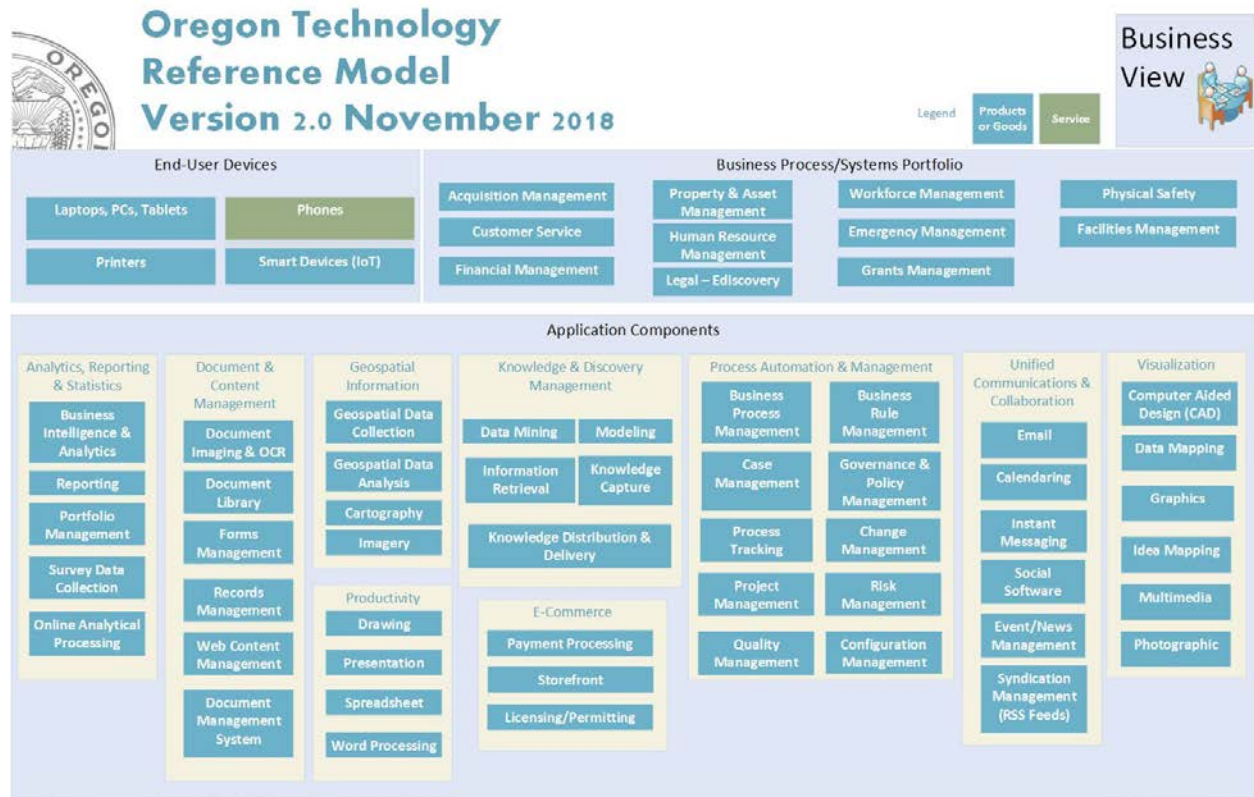
- Assist organizations to better understand and effectively integrate with the total enterprise ability to achieve strategic and current operational objectives; and

- Develop and provide solutions that focus on a set of functionalities and activities in the enterprise's strategic and current operational contexts.

To promote a consistent view of capabilities, the OSCIO is leveraging the [Federal Enterprise Architecture (FEA) v2](#) Framework as the starting point to help define Oregon's business, application and infrastructure framework. The primary areas of FEA V2 that were leveraged and defined as follows:

- *Business Reference Model (BRM) describes an organization through a taxonomy of common mission and support service areas instead of through a stove-piped organizational view, thereby promoting intra- and inter-agency collaboration.*

- *Application Reference Model (ARM) categorizes the system- and application-related standards and technologies that support the delivery of service capabilities, allowing agencies to share and reuse common solutions and benefit from economies of scale.*

- *Infrastructure Reference Model (IRM) categorizes the network/cloud related standards and technologies to support and enable the delivery of voice, data, video, and mobile service components and capabilities.*

# Oregon Technology Reference Model - Business View

This view represents the major groupings of technical goods, products or services that are directly tied to end-user or business functions.

## Oregon Technology Reference Model Version 2.0 November 2018

**Business View**

Legend: Products or Goods | Service

### End-User Devices

| | |
|---|---|
| Laptops, PCs, Tablets | Phones |
| Printers | Smart Devices (IoT) |

### Business Process/Systems Portfolio

| | | | |
|---|---|---|---|
| Acquisition Management | Property & Asset Management | Workforce Management | Physical Safety |
| Customer Service | Human Resource Management | Emergency Management | Facilities Management |
| Financial Management | Legal – Ediscovery | Grants Management | |

### Application Components

**Analytics, Reporting & Statistics**
- Business Intelligence & Analytics
- Reporting
- Portfolio Management
- Survey Data Collection
- Online Analytical Processing

**Document & Content Management**
- Document Imaging & OCR
- Document Library
- Forms Management
- Records Management
- Web Content Management
- Document Management System

**Geospatial Information**
- Geospatial Data Collection
- Geospatial Data Analysis
- Cartography
- Imagery

**Productivity**
- Drawing
- Presentation
- Spreadsheet
- Word Processing

**Knowledge & Discovery Management**
- Data Mining
- Modeling
- Information Retrieval
- Knowledge Capture
- Knowledge Distribution & Delivery

**E-Commerce**
- Payment Processing
- Storefront
- Licensing/Permitting

**Process Automation & Management**
- Business Process Management
- Business Rule Management
- Case Management
- Governance & Policy Management
- Process Tracking
- Change Management
- Project Management
- Risk Management
- Quality Management
- Configuration Management

**Unified Communications & Collaboration**
- Email
- Calendaring
- Instant Messaging
- Social Software
- Event/News Management
- Syndication Management (RSS Feeds)

**Visualization**
- Computer Aided Design (CAD)
- Data Mapping
- Graphics
- Idea Mapping
- Multimedia
- Photographic

**Major business capability domains are:**

- **End-user Devices:** A personal computer (desktop or laptop), smart device (e.g. smart phone or tablet), printer, or removable storage media that can store information.
- **End-user Applications:** General business productivity and visualization software used by standard end-users.
- **Business Process/Systems Portfolio**: Systems are discrete sets of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information in support of a specific business process.
- **Applications:** Application components are self-contained software that can be aggregated or configured to support (or contribute to achieving) many different business objectives.

# Oregon Technology Reference Model – Technical View

This view represents the major groupings of technical goods, products or services that provide underlying support to business solutions and tools.
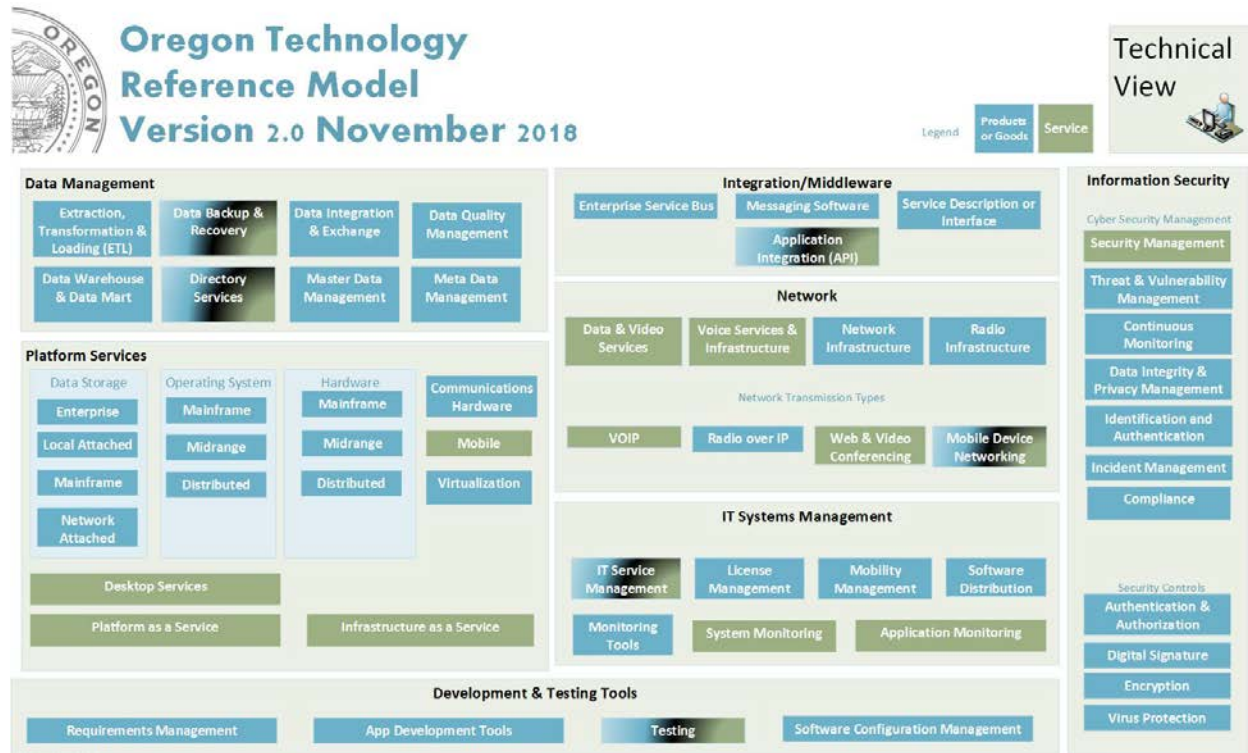


**Major technical capability domains are:**

- **Integration/Middleware:** Middleware is computer software that provides services to software applications beyond those available from the operating system. It can be described as "software glue". Middleware makes it easier for software developers to implement communication and input/output, so they can focus on the specific purpose of their application.

- **Data Management:** Application components are self-contained software that can be aggregated or configured to support (or contribute to achieving) data and information management business needs.

- **Platform Services:** The Platform Domain includes a hardware architecture and a software framework, where the combination allows software, particularly application software, to run.

- **Network:** The Network section of the IRM addresses how a particular IT asset is accessed and used within the enterprise.

- **Information Security:** Application components are self-contained software that can be aggregated or configured to support (or contribute to achieving) information security management & controls.

- **IT Systems Management:** Tools used by IT to support and maintain the technical services and service delivery.

- **Development & Testing Tools:** Includes tools related to all areas of software development including programming editors, frameworks, systems development methodologies, software testing, and software configuration management.

Appendix A: Technology Reference Model (TRM) Definitions
Most definitions for the categories within the Oregon TRM are derived from the Federal Enterprise Architecture (FEA) v2.

| Domain | Area | Category | Definition |
|---|---|---|---|
| End-user Devices | | Laptops, PC, Tablets, Printers | Major category that represents common consumer-based technology devices. |
| | | Phones | Major category of devices and services related to telephony and telecommunications. |
| | | Smart Phones | A cellular phone that performs many of the functions of a computer, typically having a touchscreen interface, Internet access, and an operating system capable of running downloaded applications. |
| Business Process/ Systems Portfolio | Acquisition Management | | Major category of business processes which represent functions such as invoice tracking & approval (manages inflow & outflow of "products", as well as data about the level of "products" on hand), procurement (used in acquisition of goods or services and management of the contracts), and vendor management (used to build a list of vendors or measure satisfaction of relationships). |
| | Customer Service | | Major category of business processes which represent functions such as call center/help desk (supports the management of service center to respond to government and contract employees' technical and/or administrative questions), and/or issue tracking (supports activities associated with providing an agency's customers with information regarding the agency's service offerings and managing the interactions and relationships with those customers). |
| | Financial Management | | Major category of business processes which represent functions such as accounts payable, accounts receivable, budget planning & execution, financial audit, general ledger, payroll and travel. |
| | Property & | | Major category of business processes |

| | Asset Management | | which represent functions such as facilities management, inventory management, logistics & transportation, media & facilities reservations, and warehouse management. |
| --- | --- | --- | --- |
| | Workforce Management | | Major category of business processes which represent functions such as resource planning & allocation, skills management, and team & organizational management. |
| | Human Resource Management | | Major category of business processes which represent functions such as awards, benefits, education/training, employee personnel records, staff acquisition, retirement, and time & attendance. |
| | Legal | E-discovery | Software that supports the analysis of electronically stored information and its exchange, including digital forensics analysis. |
| | Grants Management | | Software that supports the administration and monitoring of grants. |
| | Emergency Management | | Software that supports the continuity of operations for an organization's business through the identification of surge or temporary personnel in addition to federal staff.<br><br>Software that enables designated individuals to communicate critical information to many individuals across multiple devices. |
| | Physical Safety | | Software that supports the management of, and mechanisms for, interaction and oversight for controlling biological, chemical, and radiological materials and wastes. This includes addressing identification of materials that need special handling and processes to minimize the risk of their unsafe use and improper disposal. |
| | Facilities Management | | Software that supports facilities management including the maintenance, administration, certification, and operation of office buildings that are possessions of the State. |

| Application Components | Analytics, Reporting & Statistics | Business Intelligence & Analytics | Software to support identifying, extracting, and analyzing business data, such as performance and cost metrics to support better business decision-making. |
|---|---|---|---|
| | | Reporting | Software tools that support the creation and display of individually designed and structured reports with self-service access to meaningful data. |
| | | Portfolio Management | Software that provides the set of capabilities to support the administration of a group of investments held by an organization. |
| | | Survey Data Collection | Software that supports methods to collect information from a sample of individuals in a systematic way for empirical research in social sciences, marketing and official statistics. |
| | | Online Analytical Processing | Software that supports a process to swiftly answer multi-dimensional analytical (MDA) queries and enable users to interactively analyze multidimensional data from multiple perspectives. An OLAP consists of three basic analytical operations: consolidation, drill-down, and slicing and dicing. |
| | Document & Content Management | Document Imaging & OCR | Software that supports the document scanning and the interpretation of images into text. |
| | | Document Library | On line repository of documents, letters, speeches, web sites, books, or articles to be shared. |
| | | Forms Management | Software that supports the creation, modification, and usage of physical or electronic documents used to capture information within the business cycle. |
| | | Records Management | Software that supports the management and stewardship of a type of information by the federal government in order to facilitate communication and information archival. |
| | | Web Content Management | Software that provides content authoring, content review and approval, tagging and aggregation, content publishing and |

| | | | delivery, and syndication management. |
|---|---|---|---|
| | | Document Management System | Software used to track, store and retrieve electronic documents and/or images of paper documents. It is usually capable of keeping track of the different versions created by different users (history tracking). |
| | Geospatial Information | Geospatial Data Collection | Software that supports the collection or management of geospatial information. |
| | | Geospatial Data Analysis | Supports the application of statistical analysis and other informational techniques to geographically based data. |
| | | Cartography | Software that supports the creation of maps. |
| | | Imagery | Software that supports the collection of information via satellite and aerial photography. |
| | Productivity | Drawing | Software used to create or edit a graphical object. |
| | | Presentation | Software used to display information, normally in the form of a slide show. |
| | | Spreadsheet | Software used to create, update and/or read a two-dimensional matrix of rows and columns. |
| | | Word Processing | Software used for the composition, editing, formatting and/or possibly printing of print material. |
| | Knowledge & Discovery Management | Data Mining | Software that provides for the efficient discovery of non-obvious, valuable patterns and relationships within a large collection of data. |
| | | Information Retrieval | Software that provides access to data and information for use by an organization and its stakeholders. |
| | | Modeling | Software to develop descriptions that adequately explain relevant data for the purpose of prediction, pattern detection, exploration or general organization of data. |
| | | Knowledge Capture | Software that facilitates collection of data and information. |
| | | Knowledge Distribution & Delivery | Software that supports the transfer of knowledge to the end customer. |

| | | Process Automation & Management | Business Process Management | Software that allows organizations to abstract business process from technology infrastructure and support the managerial approach through enabling technology, bridging organizational and technology silos. Business Process Management applications and software include items such as: Process Engine, Business Analytics, Content Management, and Collaboration Tools. |
|---|---|---|---|---|
| | | | Business Rule Management | Software used to define, deploy, execute, monitor and maintain the variety and complexity of decision logic that is used by operational systems within an organization or enterprise. This logic, also referred to as business rules, includes policies, requirements, and conditional statements that are used to determine the tactical actions that take place in applications and systems. |
| | | | Case Management | Software that manages the life cycle of a particular claim or investigation within an organization to include creating, routing, tracing, assignment and closing of a case as well as collaboration among case handlers |
| | | | Governance & Policy Management | Software the supports decisions, actions, business rules and other matters that govern an organization |
| | | | Process Tracking | Software that monitors the activities within the business cycle |
| | | | Change Management | Software that controls the process for updates or modifications to the existing documents, software or business processes of an organization. |
| | | | Project Management | Software that provides capabilities for cost estimation and planning, scheduling, cost control and budget management, resource allocation, collaboration, communication, quality management and documentation or administration systems, which are used to deal with the complexity of large projects. |

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| | | Risk Management | Software that allows planners to explicitly address uncertainty by identifying and generating metrics, setting parameters, prioritizing, and developing mitigations, and tracking risk. |
| | | Quality Management | Software that ensures an organization or product is consistent based on quality planning, quality control, quality assurance and quality improvement. |
| | | Configuration Management | Software that controls the hardware and software environments, as well as documents of an organization. |
| | E-Commerce | Payment Processing | Includes disbursements of funds, via a variety of mechanisms, to government and private individuals, federal agencies, state, local and international governments, and the private sector, to effect payment for goods and services, or distribute entitlements, benefits, grants, subsidies, loans, or claims. |
| | | Storefront | Solution for those who want to host a website that advertises products or services and for which consumer transactions are generated online. |
| | | Licensing/Permitting | Licensing and Permitting involves activities associated with granting, revoking, and the overall management of the documented authority necessary to perform a regulated task or function. |
| | Unified Communications & Collaboration | Email | Software that supports the transmission of memos and messages over a network. |
| | | Calendaring | Software that provides users with an electronic version of a calendar, an appointment book, address book, and/or contact list. |
| | | Instant Messaging | Software that supports text, voice and/or video communications between two or more users. |
| | | Social Software | Software that supports the capturing, storing and presentation of communication, usually written but may include audio and video as well. |

| | | | Interactive tools handle mediated interactions between a pair or group of users. They focus on establishing and maintaining a connection among users, facilitating the mechanics of conversation and talk. |
|---|---|---|---|
| | | Event/News Management | Software that provides users with frequently updated content to which they subscribe. |
| | | Syndication Management (RSS Feeds) | A family of web feed formats used to publish frequently updated works, such as blog entries, news headlines, audio, and video, in a standardized format. |
| | Visualization | Computer Aided Design (CAD) | Software that supports the use of computer technology for the process of design and design-documentation and includes software or environments which provide the user with input-tools for the purpose of streamlining design processes; drafting, documentation, and manufacturing processes. |
| | | Data Mapping | Software that supports the process of creating data element mappings between two distinct data models. Data mapping is used as a first step for a wide variety of data integration tasks. |
| | | Graphics | Software that enables a person to manipulate static, animated or video visual images on a computer. |
| | | Idea Mapping | Software that is used to create diagrams of relationships between concepts, ideas or other pieces of information. |
| | | Multimedia | Software to manage, develop and manipulate content from a combination of different content forms such as text, audio, still images, animation, video, or interactivity. |
| | | Photographic | Software that supports the capture, storage, and manipulation of photographic images. |
| Integration/ Middleware | | Enterprise Service Bus | Software used for designing and implementing the interaction and communication between mutually |

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| | | | interacting software applications in Service Oriented Architecture (SOA). |
| | | Messaging Software | Software that enables passing of information message between different systems and IT assets using different communications technologies. |
| | | Service Description or Interface | Software that enables various services available in SOA. It is designed to be interrogated by Simple Object Access Protocol (SOAP) messages and to provide access to Web Services Description Language (WSDL) documents describing the protocol bindings and message formats required to interact with the web services listed in its directory. |
| | | Application Integration (API) | **Source code based specification intended to be used as an interface by software components to communicate with each other. An application programming interface (API) may include specifications for routines, data structures, object classes, and variables (e.g., per Wikipedia).** |
| Data Management | | Extraction, Transformation & Loading (ETL) | Software that supports the extraction of data from a database, the manipulation and change of data to a different format and the population of another database with the data. |
| | | Data Backup & Recovery | Software that creates copies of data which may be used to restore the original after a data loss event or to restore and stabilize data sets to a consistent, desired state. |
| | | Data Integration & Exchange | Software services that enable elements of distributed business applications to interoperate and the software development necessary to facilitate such integration. These elements can share function, content, and communications across heterogeneous computing environments. |
| | | Data Quality Management | Software to ensure that data are fit for their intended uses in operations, decision making and planning and to ensure internal consistency of the data. |

| | | Data Warehouse & Data Mart | Database used for reporting and analysis, where the data stored in the warehouse is uploaded from the transactional systems. |
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| | | Directory Services | Software that supports the listing of employees and their whereabouts. |
| | | Master Data Management | Software that supports a set of processes and tools that consistently define and manage the non-transactional data entities of an organization, which may include reference data. It has the objective of providing processes for collecting, aggregating, matching, consolidating, quality-assuring and distributing such data throughout an organization to ensure consistency and control in the ongoing maintenance and application use of this information. |
| | | Meta Data Management | Software that supports the maintenance and administration of data that describes data. |
| Platform Services | Data Storage | Enterprise | Enterprise data storage services provide highly-available, secure, and reliable disk storage for use by system operating systems, applications, application data, and for user files.  This service is available to physical and virtual systems. |
| | | Local Attached | Local Storage is considered dedicated storage: Storage on individual equipment (e.g. solid state drive, external storage array) or on a disk accessible by a single host. Local attached (non SAN) storage is exclusively for the Windows and Linux server environments. This service is mostly consumed in field / remote offices. |
| | | Mainframe | Mainframe storage is available through: 1. Disk – fully redundant, fastest recovery. 2. Tape – fully redundant, Virtual Tape Storage (VTS). |
| | | Network Attached | Use of network attached storage (NAS) to store data, which is infrequently accessed or changed, to provide a lower cost storage solution. NAS Services offer centralized storage of data that provides |

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| | | | faster deployment, easier maintenance, and fewer staff requirements for support. The device is connected to the network, access to the device is controlled by network and firewall configurations. Deduplication is not a capability of this service. No security scanning is offered, resulting in additional customer requirements to use this as a storage solution. The NAS Services are used to support ETS backup services only. |
| | Operating System | Mainframe | A mainframe or supercomputer operating system is, in simplest terms, a collection of programs that manage a computer system's internal workings - its memory, processors, devices, and file system. Mainframe operating systems are tailored to meet the substantially different architectures and purposes of mainframes as high-volume transaction processing devices, or the purposes of supercomputers as high-volume algorithmic processors. |
| | | Midrange | A midrange computer operating system is, in simplest terms, a collection of programs that manage a computer system's internal workings - its memory, processors, devices, and file system. Midrange computers are almost universally known as servers to recognize that they often "serve" applications to end users at "client" computers, that they use a client/server computing model. |
| | | Distributed | Operating systems that support the distributed server environment. |
| | Hardware | Mainframe | A Mainframe is a high-performance computer used for large-scale computing purposes that require greater availability and security. It often serves many connected terminals and is usually used by large complex organizations. |
| | | Midrange | Midrange computers encompass a very broad range and reside in capacity |

| | | | between high-end PCs and mainframes. Formerly called "minicomputers", which were hosts to dumb terminals connected over dedicated cables, most midrange computers today function as servers in a network. |
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| | | Distributed | Distributed computing is a field of computer science that studies distributed systems. A distributed system is a software system in which components located on networked computers communicate and coordinate their actions by passing messages. The components interact with each other in order to achieve a common goal. |
| | | Communication Hardware | Communications Hardware refers broadly to hardware intended primarily to create a link to the network from the user or another computational device. |
| | | Mobile | As with other operating systems, a mobile computing device Operating System (OS) is a computer program, implemented in either software or firmware, which acts as an intermediary between users of a computer and the computer hardware. The purpose of an OS is to provide an environment in which a user can execute applications. |
| | | Virtualization | In computing, virtualization is the creation of a virtual (rather than actual) version of something, such as a hardware platform, Operating System (OS), storage device, or network resources. This section of the IRM categorizes those mechanisms to create virtual platforms. |
| | | Desktop Services | IT support & maintenance for general end-user technologies (hardware and/or software). |
| | | Platform as a Service | A category of cloud computing services that provides a platform allowing customers to develop, run, and manage web applications without the complexity of building and maintaining the |

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| | | | infrastructure typically associated with developing and launching an app. |
| | | Infrastructure as a Service | A cloud computing form that provides computing resources over the Internet. Cloud IaaS providers host infrastructure components for users. |
| Network | | Data & Video Services | A data network type is an electronic communications process that allows for the orderly transmission and receptive of data, such as letters, spreadsheets, and other types of documents. What sets the data network apart from other forms of communication, such as an audio network, is that the data network is configured to transmit data only. This is in contrast to the audio or voice network, which is often employed for both voice communications and the transmission of data such as a facsimile transmission. Video networks can be dedicated links devoted to video for large video conferencing installations. As with Voice traffic, Video is often a type of traffic carried on data networks using some form of packet-switching technology. Video traffic is distinct from Data traffic in the delivery requirements (it needs to arrive nearly synchronously and be assembled in order without drop-outs) and bandwidth usage (which is very high). |
| | | Voice Services & Infrastructure | Voice networks are sometimes dedicated, as in the original public switched telephone network (PSTN), but have changed to be a type of traffic carried on data networks using some form of packet-switching technology. Voice traffic is distinct from Data traffic in the delivery requirements (it needs to arrive nearly synchronously and be assembled in order without drop-outs) and bandwidth usage (which is high). |
| | | Infrastructure | For the purposes of the IRM, Infrastructure, as used here, is a broad |

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| | | | term covering the various forms of basic hardware and software that comprise the foundation of a network. |
| | | Radio Infrastructure | Radio networks are transmitted through free space by radio waves. There are two types of radio networks currently in use around the world: the one-to-many broadcast network commonly used for public information and mass media entertainment; and the two-way type used more commonly for public safety and public services such as police, fire, taxicabs, and delivery services. Many of the same components and much of the same basic technology applies to both. |
| | | VOIP | Internet telephony refers to communications services — voice, fax, SMS, and/or voice-messaging applications — that are transported via the Internet, rather than the Public Switched Telephone Network (PSTN). The steps involved in originating a VoIP telephone call are signaling and media channel setup, digitization of the analog voice signal, encoding, packetization, and transmission as Internet Protocol (IP) packets over a packet-switched network. On the receiving side, similar steps (usually in the reverse order) such as reception of the IP packets, decoding of the packets and digital-to-analog conversion reproduce the original voice stream. |
| | | Radio over IP | Radio over Internet Protocol (RoIP) is similar to VoIP, but augments two-way radio communications rather than telephone calls. From the system point of view, it is essentially VoIP with PTT (Push To Talk). To the user it can be implemented like any other radio network. With RoIP, at least one node of a network is a radio (or a radio with an IP interface device) connected via IP to other nodes in the radio network. The other |

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| | | | nodes can be two-way radios, but could also be dispatch consoles either traditional (hardware) or modern (software on a PC), POTS telephones, softphone applications running on a computer such as a Skype phone, PDA, smartphone, or some other communications device accessible over IP. RoIP can be deployed over private networks as well as the public Internet. |
| | | Web & Video Conferencing | Web conferencing refers to a service that allows conferencing events to be shared with remote locations. In general the service is made possible by Internet technologies, particularly on TCP/IP connections. The service allows real-time point-to-point communications as well as multicast communications from one sender to many receivers. It offers information of text-based messages, voice and video chat to be shared simultaneously, across geographically dispersed locations. Applications for web conferencing include meetings, training events, lectures, or short presentations from any computer. Videoconferencing is the conduct of a videoconference (also known as a video conference or video teleconference) by a set of telecommunication technologies which allow two or more locations to communicate by simultaneous two-way video and audio transmissions. It has also been called 'visual collaboration' and is a type of groupware. |
| | | Mobile Device Networking | Mobile Device Networking covers the sets of standards commonly used for mobile devices and mobile telecommunication services and networks that comply with specifications by the International Telecommunication Union. Such standards find applications in wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls and |

| | | | mobile TV, among others. |
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| Information Security | Cyber Security Management | Security Management | Major category of information security services to protect networks, computers, programs and data from attack, damage or unauthorized access. Services may include: threat and vulnerability management, continuous monitoring, data integrity and privacy management, identification & authorization, cryptography, incident response, audit trail capture & analysis, and certification & accreditation. |
| | | Threat & Vulnerability Management | Threat and Vulnerability Management involves all functions pertaining to the protection of federal information and information systems from unauthorized access, use, disclosure, disruptions, modification, or destruction, as well as the creation and implementation of security policies, procedures and controls. It includes all risk and controls tracking for IT systems. |
| | | Continuous Monitoring | Continuous Monitoring includes all activities related to the real-time monitoring of security controls employed within or inherited by a system. (see Appendix G of NIST Special Publication 800-37) |
| | | Data Integrity & Privacy Management | Data Integrity and Privacy Management involves the coordination of data collection, storage, dissemination, and destruction as well as managing the policies, guidelines, and standards regarding data management, so that data quality is maintained and information is shared or available in accordance with the law and best practices |
| | | Identification and Authentication | Defines the set of capabilities to support the management of permissions for logging onto a computer, application, service, or network; includes user management and role/privilege management. This includes Identification |

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| | | | and Authentication for digital signatures. |
| | | Incident Management | Software that supports the set of capabilities to provide active response and remediation to a security incident that has allowed unauthorized access to a government information system. |
| | | Compliance | **Software, processes, and procedures to ensure compliance with applicable laws, rule or order issued by an executive authority, or regulatory agency of a government and having the force of law, as intended through the supervision and oversight of operations and programs, the protection of systems and resources, and the prevention of waste, fraud and abuse.** |
| | Security Controls | Authentication & Authorization | Software that supports obtaining information about parties attempting to log on to a system or application for security purposes and the validation of those users. |
| | | Virus Protection | Software used to prevent, detect, and remove self-replicating programs that run and spread by modifying other programs or files. |
| | | Digital Signature | Software to use and manage electronic signatures to support. |
| | | Encryption | Software to convert plaintext to ciphertext through the use of a cryptographic algorithm. |
| | | Virus Protection | **Software used to prevent, detect, and remove self-replicating programs that run and spread by modifying other programs or files.** |
| IT Systems Management | | IT Service Management | This is the set of tools that supports the maintenance and continuous improvement of the IT environment with a focus on customer needs and IT services. Functions support workflow and linking between incident, change, problem, and service request records with each other and with records of configuration items. |
| | | License Management | Software that supports enterprise license |

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| | | | management. It supports the purchase, upgrade and tracking of legal usage contracts for system software and applications, written computer programs, and components. |
| | | Mobility Management | Software that supports the administration of mobile devices, such as smartphones, tablet computers, laptops and desktop computers. |
| | | Software Distribution | Software that supports the process of delivering software to the end user. |
| | | Monitoring Tools | Software that continuously records performance, capacity use, throughput of computer hardware or software and provides notification about deviations from normal. |
| | | System Monitoring | Tools that monitor system (server & network) performance and events. |
| | | Application Monitoring | Tools that monitor application performance and events. |
| Development & Testing Tools | | Requirement Management | Software used to document, analyze, trace, prioritize and agree on requirements for an initiative and communicate with the relevant stakeholders. |
| | | App Development Tools | A programming tools or software development tools that software developers use to create, debug, maintain, or otherwise support other programs and applications. |
| | | Testing | Software that supports testing throughout the various testing levels, testing types and testing process/methodologies. Tools also collects or generate various testing artifacts including but not limited to traceability matrix, test cases and test scripts. |
| | | Software Configuration Management | **Software to track and control changes in the software including the establishment of baselines and revision control** |