The Department of Public Works

Technical Architecture

Comprising
The Technical Reference Model
Enterprise Architecture Principles
Technical Standards

Version 1.4

The Office of Information Technology Services,
Enterprise Architecture Services

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The Technical Reference Model

Purpose

The Technical Reference Model (TRM) of the Department of Public Works (DPW) Enterprise Architecture (EA) provides a model, or framework, that describes the relationships among information technology (IT) services and interfaces. The TRM, as well, provides a common vocabulary for categorizing services and interfaces. Utilization of the TRM improves systems development and integration through standards based technology services and products. It provides a framework for software reuse and resources sharing, and improves the interoperability of DPW systems through common infrastructure components and services. Relating to the user, it provides for increasing user productivity through consistent user interfaces, integrated applications, and data sharing. The services are collections of prevalent, functionally described "components" and not actual hardware or software components. The commonplace vocabulary and structure allows open systems and interoperability issues to be understood by all of DPW and stakeholders, not just by the Office of Information Technology Services personnel. Standards bodies or organizations for open systems are referred to. This model relates the expected use or role of an enterprise, or departmental, IT standard and the functional relationship of actual system components, in terms of services and interfaces. The framework identifies and focuses attention on the "plug and play" open systems' interfaces and interoperability interfaces of interest to the department.

The provision of the TRM, along with the Enterprise Architecture Principles, and Technical Standards supports the OITS strategic mission to provide best-in-class information technology solutions, and supports its goals to institute standard processes, stabilize the environment, and build core competencies.

Goals

The principal goal of the DPW EA TRM is to provide an integrated framework that can be used to address interoperability and standards issues across DPW and understood by all administrations. The structure of the framework is flexible to meet the needs of DPW and to adapt to changing technology. The model is based on the Application Portability Profile (APP) by the National Institute of Standards and Technology (NIST), with specific reference to the Department of Defense (DoD) and U.S. Treasury Department TRMs, and is compatible with other Federal Government models. Actual standards provided are selected from national, international and federal standards bodies.

The DPW EA TRM provides a departmental classification of system components and interfaces into service areas, services, and interfaces of interest to DPW. Descriptions of all the categories are provided with graphical depictions of the relationships of classification categories. The graphic is a tool for easy reference and visualization of the classification scheme. Detailed relationships should be referenced through the written material, without undue focus on the exact details of the graphic.

Scope

The focus in the initial iteration of the DPW EA TRM, or version 1, will be on identification of model components, services, and interface categories of interest. This is provided in a reference structure that is expandable and evolving. The set of categories will evolve during the development of the DPW EA and Application Architectures. The immediate use of the TRM will be to organize IT standards that apply DPW-wide and to identify "plug and play" open systems interfaces and interoperability areas. The aim is on the technical, systems relationships of IT systems and their components, and not on IT management processes, systems operations or development processes. Development processes will be incorporated into future TRM releases. As development work in planned projects is established in OITS, these processes can be incorporated in later versions of the TRM.

Overview of the TRM

The basic structure is defined in this section. The model is introduced through the Services View. This view is based on existing industry standards. DPW administrations can use this view to identify and define the services and interfaces of interest to them in terms of describing standard component functionality or interface usage.

Services View

The Services View is the APP and the industry standard, the Institute of Electrical and Electronics Engineers (IEEE) Guide to the POSIX Open System Environment (1003.0). This model is based on three entities and their interfaces as illustrated in Figure 1 - Services View.

The application software entity includes the business unique application services, common across multiple missions. The application platform entity is the set of resources that support the services on which application software will execute. The application platform concept only implies the basic requirement to supply services at the interfaces. This concept can be restricted to a single hardware box or expanded to include a virtual platform that extends across a network in support of distributed applications.

The external environment entity contains services (networks, storage, etc.) with which the application platform exchanges information. (Note: A LAN may be part of the application platform if the application platform is the virtual platform needed to support distributed applications across the LAN). In succeeding versions of the TRM, the services available through the Application Program Interface (API) can be further categorized into categories such as System Services APIs, Communication Services APIs, or Information Services APIs. The services available through the External Environment Interface (EEI) can be further categorized as Communications Services EEIs, Information Services EEIs, and Human/Computer Interaction Services EEIs.

Services View
Of the Technical Reference Model

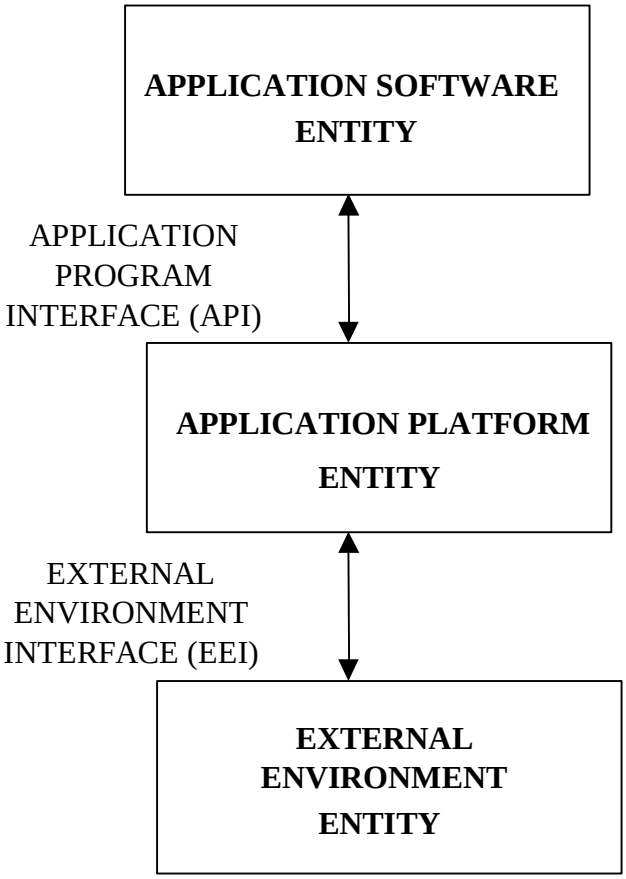

Figure 1 – Services View

Services

Figure 2 shows the Detailed Services View with detailed services, and components or major service areas. For the application platform, the classification of some system support services into sub-areas has dual roles. The services, security and distributed computing services maybe identified as "cross-cutting" or "cross-category" services in the application platform and external environment. See Appendix A: Technical Reference Model Terminology for a description of the model terms.

Detailed Services View

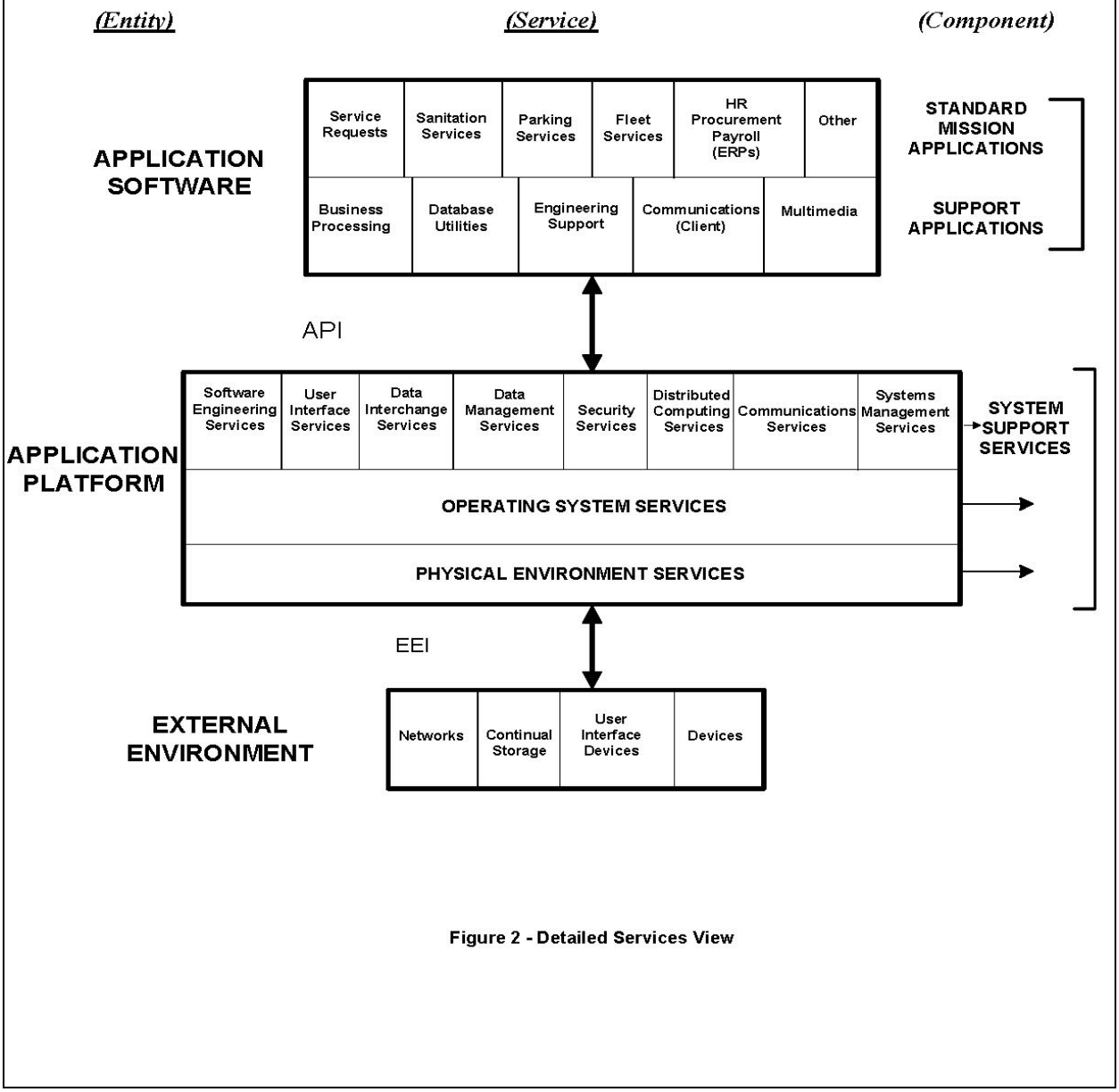

Figure 2 - Detailed Services View

Components of the TRM

This section describes the components, or major service areas of the Technical Reference Model. This set of services will evolve in future versions as technology changes, and as the DPW Application Architecture evolves. Detailed definitions of the components and services are in Appendix B.

Application Software - Mission Area Applications

The following are standard mission area applications used in the DPW Programs:

- Solid Waste (DPW Works)
- Parking Services (TIMS)
- Fleet Services (Faster)
- Departmental - service requests (DPW Serves)
- Other (Track-It)

In addition, during FY2003-2004, DPW will install and implement enterprise resource planning (ERP) systems that will be used across the administrative areas of the department. The installed products will become standard, District-wide, applications with their interfaces for Program applications for the following services:

- payroll
- human resources
- procurement

Application Software - Support Applications

The following services are described for proposed standard products or interfaces for support applications:

- Multimedia –includes text and document processing, presentation graphics, and image processing
- Communications (client level) – includes web browsers, and e-mail clients (e.g. Internet Explorer)
- Business Processing – includes calendar, project management, and spreadsheet capabilities
- Database Utilities – includes report generation and query processing (client level)
- Engineering/Management Support – includes decision support, statistical analysis services for users, and expert systems (RouteSmart)

Application Platform - System Support Services

The following service are described for proposed standard products or interfaces for application platform:

- Software Engineering Services – tools appropriate to the development and maintenance of applications
- User Interface Services – includes user interfaces with an information technology system
- Data Interchange – includes document interchange and compression
- Data Management –includes database management system and transaction processing
- Security – includes firewall, intrusion detection, and security labeling
- Distributed Computing – includes remote access and object request brokers
- Communications – includes network protocols such as http, and wireless LAN standards
- System Management – includes resource usage statistics and audit information

Application Platform - Operating System Services

Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. Application programmers will use operating system services to access operating system functions. To separate sensitive data within an information system, the kernel must include mechanisms to control access to that information and to the underlying hardware. Operating system services include the following:

- Kernel operations, real-time extensions, clock/calendar services, fault management, shell and utilities, operating system object services and media handling services

Application Platform - Physical Environment Services

Physical Environment services are hardware-based services that include the interfacing software services provided by device drivers that supports digital/analog signals between components. Some hardware devices have software (device drivers) embedded in them to enable the computer system with digital/analog timing sequences to operate in a correct manner. It should be noted that hardware-based services appear in two places in the TRM: as part of physical environment services and as part of the external environment. The TRM does not allocate any specific services to either one of these. The general notion is that services provided by the hardware that is part of a particular system are considered physical environment services, while the external environment provides the services of hardware outside that system. However, it is recognized that what constitutes a system is a matter of perspective. For this reason, the physical environment services contained in and supporting application platform services may also be found to exist in the external environment:

- The general physical services required in an application platform include hardware interconnection -devices, backplanes, data storage, and power supplies.

External Environment

The external environment provides the services of hardware outside particular systems includes:

- Devices, communications infrastructure (including networks: routers, hubs, switches, etc.), systems/models, user interface

Enterprise Architecture Principles

The enterprise architecture will be based on principles and standards that focus on leveraging open standards, improving interoperability, resource sharing, and effective customer management to support the overall mission of the Department of Public Works. It provides a basis for decision-making regarding IT investments. Standards will benefit DPW by reducing acquisition and maintenance costs, eliminating unnecessary interfaces, reducing the need for formal and ad hoc user training, and providing for more effective configuration management and maintenance. Minimizing the support and servicing of disparate or non-compatible products will effect the management and maintenance. The DPW architecture is influenced by the Office of the Chief Technology Officer, and the products and services used in a technology enabled environment.

Business Principles

Principle 1	Business processes, citizen and organizational needs drive technology investments.
Principle 2	The Information Technology Steering Committee approves major IT investments through business cases and assessments.
Principle 3	Program and customer service delivery is accomplished through optimum use of electronic government mechanisms.

Information and Data Principles

Principle 1	Information is an asset, properly and securely managed with internal and public access available from any place, at any time, and in the right format in accordance with privacy and security rules.
Principle 2	Data are collected once and where cost effective, maintained and shared in accordance with established standards.

Technology Principles

Principle 1	Technology solutions use mature, proven, and cost-effective technologies to deploy solutions.
Principle 2	Technology components of the DPW's enterprise architecture are standardized across administrations and offices wherever common DPW business requirements exist.

Principle 3	The technology infrastructure is based on open systems standards to assure universal access and interoperability.
Principle 4	DPW technical solutions will leverage OCTO standards and services.
Principle 5	The technology architecture will minimize technical diversity.

Application Principles

Principle 1	Commercial off-the-shelf technology solutions are used wherever possible rather than customized, or in-house solutions to meet business and information requirements.
Principle 2	Applications are a shared DPW resource, and are available to any administration having similar business needs for leveraging DPW IT investments and reducing costs and duplication.
Principle 3	Applications are developed with the active participation of customers, employing methods that reduce risk, and emphasize quality and timeliness.
Principle 4	Applications are designed for long-term viability, low-cost maintenance, and architectural compatibility within DPW and the District.

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Recommended Technical Standards

DPW Technical Architecture Profile

SERVICE AREA	SERVICE	Appropriate STANDARD (S)
Standard Mission Applications	Other Applications	
	-Asset management and help desk	Remedy
Support Applications	Communications	
	-Web browser	Internet Explorer Version 6.X or better
	-Fax	WinFax
	Database Utilities	
		Crystal Reports, Advanced version 9
	Multimedia	
	-text and document processing	Office 2003 Professional Edition
	-forms	JetForms
		OmniForms
	-geographical information systems (GIS) services	(Desktop) ArcView 9.0 (Network) ArcInfo ArcEditor ArcView 9.0
	-desktop publishing	QuarkXpress (complex documents) Microsoft Publisher 2003 (simple documents)

SERVICE AREA	SERVICE	Appropriate STANDARD (S)
	Business Processing	
	-Project management	MS Project 2003
	-Spreadsheet	MS Excel
	Management Support	
	-Statistical analysis	SAS
System Support	Software Engineering	
	-application development: web	MS .Net tools, including MS Terminal Server Client MS Visual Studio .Net Architect 2003 MS Visual C++ .Net Standard Edition 2003 MS Visual Basic .Net Standard Edition 2003 MS Visio Professional 2003
	User Interface Services - Graphical User Interface - Terminal Emulation	 Industry standards used in MS .Net, Visual C++, Visual Basic MS Windows 2003
	Data Management	
	-Database management system services	SQL 92, FIPS 127-2 Database language SQL June 2, 1993, Database language SQL
		MS SQL 2000 Server Client Components
		Oracle
	-Database: Personal	Access 2003
	-Database Dictionary	SQL Server
		Oracle DD
	-Database Modeling	MS Visio 2003

SERVICE AREA	SERVICE	Appropriate STANDARD (S)
	-Business Data	Data Universal Numbering System (DUNS), FAR parts 4 and PAR 52.212-1
	Data Interchange	
	-Document Interchange	XML 1.0, W3C Recommendation, 10 February 1998, Rec-xml-19980210 (Extensible Markup Language)
		HTML 4.0 Specification, W3C Recommendation revised 24-apr-1998, Rec-html40-19980424 (Hypertext Markup Language)
		ANSI ASC X12 (Electronic Data Interchange)
	Communications	
	-World Wide Web Services	IETF RFC-2616 Hypertext Transfer Protocol – HTTP/1.1, June 1999
	-Electronic Mail	IETF Standard 10/RFC-821/RFC-1869/RFC-1870 Simple Mail Transfer Protocol (SMTP) Service Extensions, November 1995
		IETF RFCs 2045-2049 Multipurpose Internet Mail Extensions (MIME), November 1996
	-Transport Services	IETF Standard 7/RFC-793 Transmission Control Protocol, September 1981
		IETF Standard 6/RFC-791/RFC-950/RFC-919/RFC-922/RFC-792/RFC-1112 Internet Protocol, September 1981
	-Wireless LAN	IEEE 802.11b
	Distributed Computing	
	-Object Services	.Net, Microsoft
	Security	
	-Authentication	(IETF RFC 2289, A One-Time Password System, February 1998, *Emerging standard*)
	-Security Algorithms	FIPS-PUB 186-2 Digital Signature Standard (DSS), January 27, 2000
	-Web Security	Secure Sockets Layer (SSL) Protocol Version 3.0, Netscape, 18 November 1996 *(Emerging)* IETF- RFC 2246 The Transport Layer Security (TLS) Protocol

SERVICE AREA	SERVICE	Appropriate STANDARD (S)
	-Anti-virus	Version1.0, January 1999 Virus Scan Enterprise (Network Associates, formerly McAfee), ver. 8.01
Operating System	Desktop Operating System	Windows XP
Physical Environment	Devices	See Appendix C

Technical Architecture Profile - Dictionary

The main DPW TRM services are in **bold** print.

Service Area	Service/Standard	Attributes
Standards Profile		*Name*: Department of Public Works Technical Architecture Profile *Description*: This is the standards profile for the DPW Technical Architecture. This profile outlines the standards necessary for connection to and interaction with DPW systems. *Applicable Date*: TBD
Reference Model		*Name*: Department of Defense Technical Reference Model, Version 2.0, April 9, 2001, (DoD TRM) *Description*: The Technical Architecture Profile is based on a tailored set of the service areas and services from the DoDAF TRM. *Source*: http://trm.disa.mil/trmv2.pdf
Standard Mission Applications		*Description:* The service area that includes implementations (i.e., software) of mission unique, specific end-user requirements or needs. These implementations may be commercial off-the-shelf (COTS) applications or government off-the-shelf (GOTS) applications including enterprise resource planning (ERP) systems, custom developed, or a combination of these.
	Other Applications	*Description:* The service includes applications that do not fit clearly in standard mission application services for Sanitation Services, Parking Services, Fleet Services, standard services for Service Requests and enterprise resource planning.
	Standard -Asset Management and Help Desk	*Name*: Remedy *Description:* Help desk management and Asset management system *Options & Parameters*: Version 5.5 *Reference:* http://www.remedy.com/ *Type*: DPW and OCTO Standard *Sourcing Options*: OCTO Data Center *Status*: Next Day
Support Applications		*Description*: Support applications are common applications that can be standardized across individual or multiple-mission areas. The services they provide can be used to develop mission-area specific applications or can be made available to the user. An implementation of a support application may actually merge several services from several different services. [Source: DoD

Service Area	Service/Standard	Attributes
		TRM]
	Communications	*Description*: Communication applications services used across multiple mission areas.
	-Web browser	*Description*: Includes COTS applications that support world wide web based e-mail (i.e., e-mail clients) and Internet search and retrieval of remote documents and multi-media.
	Standard	*Name*: Internet Explorer *Description*: COTS Web Browser (product standard); user needs only one of Internet Explorer or Netscape *Options & Parameters*: Version 6.X or better *Reference:* http://www.microsoft.com/ms.htm *Type*: COTS Product, OCTO Standard *Sourcing Options*: Download: microsoft.com *Status*: Current
	-Fax	*Description:* Communication applications services used in support of faxing
	Standard	*Name*: WinFax *Description*: COTS product *Reference:* http://www.symantec.com/winfax *Type*: DPW Standard *Status*: Current
	Database Utilities	*Description:* Database utilities services provide the capability to retrieve, organize, and manipulate data extracted from a database management system. These common services provide a consistent interface to the user while providing access to a variety of databases.
	Standard	*Name*: Crystal Reports *Description*: Report writing, query tool *Reference:* http://www.crystaldecisions.com/products/crystalreports *Type*: DPW Standard *Status*: Current
	Multimedia	*Description:* Multimedia services provide the capability to manipulate and manage information consisting of text, graphics, images, video, and audio.
	-Text and document processing	*Description:* Text-processing services, including the capability to create, edit, merge, and format text. Document-processing services, including the capability to create, edit, merge, and format documents.

Service Area	Service/Standard	Attributes
	Standard	*Name*: Office 2003 Professional Edition *Description*: COTS product includes Word, Excel, PowerPoint, Outlook, and Access *Reference:* http://www.microsoft.com/office/editions/prodinfo/default.mspx *Type*: COTS Product, OCTO Standard *Sourcing Options*: OCTO IT ServUs *Status*: Current
	Standard -Forms	*Name*: OmniForms *Description*: COTS product *Reference:* http://www.caere.com/omniform *Type*: COTS Product *Status*: Current
	-Geographical information system services (GIS)	*Description:* Geographic information system (GIS) services, including the capability to create, combine, manipulate, analyze, and present geospatial information. This includes the creation of entity symbology that overlays the map background display and access to standard symbol libraries. [*DoD TRM*]
	Standard - Desktop	*Name*: ArcView 9.0 *Description*: COTS product *Reference:* http://www.esri.com/software/index.html *Type*: COTS product, OCTO Standard *Sourcing Options*: OCTO GIS Services *Status*: Next Day
	Standard -Network	*Name*: ArcInfo, ArcEditor, ArcView 9.0 *Description*: COTS product *Reference:* http://www.esri.com/software/index.html *Type*: COTS Product, OCTO Standard *Sourcing Options*: OCTO GIS Services *Status*: Next Day
	-Desktop publishing	*Description:* Publishing services from the desktop in support of manipulating and managing information consisting of text, graphics, images, video, and audio.

Service Area	Service/Standard	Attributes
	Standard -Complete documents	*Name*: QuarkXpress *Description*: COTS product *Options & Parameters*: Version 6.0 *Reference:* http://www.quark.com *Type*: OCTO Standard *Sourcing Options*: OCTO IT ServUs *Status*: Current
	Standard -Simple documents	*Name*: Microsoft Publisher 2003 *Description*: COTS product *Reference:* http://www.microsoft.com/office/publisher/default.asp *Type*: COTS Product *Status*: Next Day
	Standard	*Name*: Adobe Acrobat *Description*: COTS product *Reference:* http://www.adobe.com/products/acrobat *Type*: COTS Product, DPW Standard *Status*: Current
	Business Processing	*Description:* Business support application services for common office functions used in day-to-day operations.
	-Project management services	*Description:* Services, including tools that support the planning, administration, and management of projects.
	Standard	*Name*: MS Project 2003 *Description*: COTS product *Reference:* http://www.microsoft.com/office/project *Type*: OCTO Standard *Sourcing Options*: OCTO IT ServUs *Status*: Current
	-Spreadsheet services	*Description:* Services that include the capability to create, manipulate, and present information in tables or charts.
	Standard	*Name*: Excel

Service Area	Service/Standard	Attributes
		Description: Microsoft spreadsheet and analysis program, part of Microsoft Office Professional. *Reference:* http://www.microsoft.com/office/excel/default.asp *Type*: OCTO Standard *Sourcing Options*: OCTO IT ServUs *Status*: Current
	Engineering/ Management Support	*Description:* Management/engineering support services include support for analysis, design, modeling, development, and simulation for a wide variety of users and environments.
	-Statistical analysis	*Description:* Management support services specific to statistical analysis services for users.
	Standard	*Name*: SPSS *Description*: COTS product *Reference:* http://www.spss.com/ *Type*: DPW Standard *Status*: Current
	Standard	*Name*: SAS *Description*: COTS product *Reference:* http://www.sas.com/products/index.html *Type*: DPW Standard *Status*: Current
System Support		*Description*: The service area that includes extended operating system services, other than the operating system, that supports common application needs. Examples include data management and data interchange services.
	Software Engineering	*Description:* Services for the development and maintenance of applications.
	Standard - application development	*Name*: MS .Net, including MS Terminal Server Client MS Visual Studio .Net Architect 2003 MS Visual C++ .Net Standard Edition 2003 MS Visual Basic .Net Standard Edition 2003

Service Area	Service/Standard	Attributes
		Description: The current Microsoft programming infrastructure, replacing ActiveX®, that includes: .Net Framework, a structure for compiling programming languages into Intermediate Language Code supporting Common Language Runtime and its portability; Web Services, a Internet platform for accessing services and software. *Reference:* http://www.microsoft.com/net *Type*: DPW Standard, OCTO Standard *Sourcing Options*: OCTO IT ServUS *Status*: Next Day
	User Interface Services	*Description:* Services that define how users may interact with an applications.
	- Graphical User Interface	*Description:* The Graphical User Interface (GUI) provide users with a user-friendly working computer environment, defines how the user interacts with the system, controls the screen appearance. It should allow a user to enter commands through the use of menus or by pointing to icons by the computer mouse, rather than typing command sequences on the keyboard
	Standard	*Name*: Industry standards used in MS .Net, Visual C++, Visual Basic *Description*: This standard supports the MS Common Types of Windows *Reference:* http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnwue/html/ch07b.asp *Type*: Industry Standard *Status*: Current
	- Terminal Emulation	*Description:* Terminal Emulation refers to thin client remote access to computers across local and wide area networks.
	Standard	*Name*: MS Windows 2000 *Description*: This standard includes terminal server services in Win 2000 *Reference:* http://msdn.microsoft.com/library/default.asp?url=/library/en-us/vsentpro/html/veconusingterminalemulation.asp *Type* DPW Standard *Status*: Current
	Data Management	*Description*: Includes application platform services that provide for the management of data independent of the processes that create or use it, maintained indefinitely, and shared among many processes. [*DoD TRM*]

Service Area	Service/Standard	Attributes
	- Database management system services	*Description:* Services that provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. [*DoD TRM*]
	Standard	*Name*: SQL-92, FIPS 127-2 Database language SQL June 2, 1993 *Description*: Standard for relational database management, defining the syntax for the creation, manipulation and deletion of data within a relational model. Most RDBMSs can send and receive data in SQL-92 format *Reference: :* http://www.itl.nist.gov/fipspubs/by-num.htm *Type*: Industry standard *Status*: Current
	Standard	*Name*: SQL Server 2000 *Description*: COTS product *Reference:* http://www.microsoft.com/sql/default.asp *Type*: DBMS Mid level, DPW Standard *Sourcing Options*: OCTO Data Center Services *Status*: Next Day
	Standard	*Name*: Oracle *Description*: COTS product *Reference:* http://www.oracle.com *Type*: OCTO Standard: DBMS Mid level (per Appendix D of OCTO's Professional Guide to Information Technology Standards for an intermediate platform). *Sourcing Options*: OCTO Data Center Services. *Status*: Current
	- Database: Personal	*Description:* Services for single user database use only, including minimal development work, not for use with any production systems.
	Standard	*Name*: Access 2003 *Description*: COTS product, part of Office 2003 Professional Edition *Reference:* http://www.microsoft.com/office/access *Type*: OCTO Standard: DBMS Personal, DPW Standard *Sourcing Options*: OCTO IT ServUS *Status*: Next Day

Service Area	Service/Standard	Attributes
	- Database modeling	Data management services in support of modeling databases.
	Standard	*Name:* MS Visio 2003 *Description*: COTS product *Reference:* http://office.microsoft.com/en-us/FX010857981033.aspx *Type*: OCTO Standard *Sourcing Options*: OCTO IT ServUS *Status*: Current
	Standard	*Name:* CA All Fusion Erwin *Description*: COTS product *Reference:* http://www3.ca.com/Solutions/Product.asp?ID=260 *Type*: DPW Development Desktop Standard *Status*: Current
	- Data dictionary /directory services	*Description:* Data dictionary/directory services allow data administrators and information engineers to access and modify data about data (i.e., metadata). Such data may include internal and external formats, integrity and security rules, and location within a distributed system. The services also allow end users/applications to define and obtain data that are available in the database. [*DoD TRM*]
	Standard	*Name*: SQL Server *Description*: COTS product *Reference:* http://www.microsoft.com/sql/default.asp *Type*: OCTO Standard *Sourcing Options*: OCTO Data Center Services *Status*: Current
		Name: Oracle DD *Description*: COTS product *Reference:* http://www.oracle.com *Type*: OCTO Standard: DBMS Mid level (per Appendix D of OCTO's Professional Guide to Information Technology Standards for an intermediate platform). *Sourcing Options*: OCTO Data Center Services *Status*: Current

Service Area	Service/Standard	Attributes
	-Business Data Standards	*Description*: Provides standard definitions for shared, common business data
	Data Element Standard	*Name*: Data Universal Numbering System (DUNS) *Description*: Unique number for identifying contractors (applicant/grantees) in the Federal Procurement Data System (FPDS). See FAR parts 4 and PAR 52.212-1, Instructions to Offerors Commercial Items. *Reference*: Provided by Dun and Bradstreet for offerors within the United States (1-800-33-0505; http://www.dnb.com) *Type*: Industry
	Data Interchange	*Description*: Data interchange services provide specialized support for the interchange of information between applications and to/from the external environment. These services are designed to handle data interchange between applications on the same platform and applications on different platforms. [*DoD TRM*]
	-Document Interchange/	*Description*: Document interchange services are supported by specifications for encoding the data (e.g., text, pictures, numbers, and special characters) and both the logical and visual structures of electronic documents. [*DoD TRM*]
	Standard	*Name*: eXtensible Markup Language (XML) [XML 2.0: World Wide Web Consortium (W3C) Recommendation, 6 October 2000, Rec-xml-19980210] *Description*: XML is based on the Standard Generalized Markup Language (SGML). XML allows domain specific markup languages and customized, application-specific markup languages to be defined through the use of application profiles using application-specific tagged data items. *Reference:* http://www.w3.org/TR/REC-xml *Type*: Industry consortium *Status*: Emerging
	Standard	*Name*: Extensible Hypertext Markup Language (XHTML) [HTML 4.0 Specification, W3C Recommendation revised 24-Apr-1998, Rec-html40-19980424] *Description*: This is the successor to HTML for interchange of these documents via the world wide web, and designed to work in conjunction with XML-based user agents.. *Reference:* http://www.w3.org/MarkUp/ *Type*: Industry consortium

Service Area	Service/Standard	Attributes
		Status: Current
	Standard	*Name*: Electronic Data Interchange (EDI) [American National Standards Institute (ANSI, a member of ISO)) Accredited Standards Committee (ASC) X12] *Description*: X12 provides standard syntax (i.e., data elements and structured business documents) for more than 250 types of business transactions. *Reference:* http://www.ansi.org *Type*: *De Jure* *Status*: Current
	Communicat-ions	*Description*: Platform communications services are provided to support distributed applications requiring data access and applications interoperability in a networked environment. [*DoD TRM*]
	-World Wide Web Services	*Description*: Platform communications services specific to the world wide web. [*DoD TRM*]
	Standard	*Name*: Hypertext Transfer Protocol (HTTP) [Internet Engineering Task Force (IETF) RFC-2616Hpertext Transfer Protocol – HTTP/1.1, June 1999] *Description*: This protocol supports search and retrieval with the world wide web. *Reference:* http://www.ietf.org/rfc.html *Type*: Industry consortium *Status*: Current
	-Electronic Mail	*Description*: The electronic mail services provide server-to-server communications capability for sending electronic messages. [*DoD TRM*]
	Standard	*Name*: Simple Mail Transfer Protocol (SMTP) [IETF Standard 10/RFC-821/RFC-1869/RFC-1870 Simple Mail Transfer Protocol (SMTP) Service Extensions, November 1995] *Description*: SMTP supports transmission of electronic messages between e-mail servers. *Reference:* http://www.ietf.org/rfc.html *Type*: Industry consortium *Status*: Current
	Standard	*Name*: Multipurpose Internet Mail Extensions (MIME) [IETF RFCs 2045-2049 Multipurpose Internet Mail Extensions (MIME), November 1996] *Description*: MIME supports attachments to electronic text messages. *Reference:* http://www.ietf.org/rfc.html *Type*: Industry consortium

Service Area	Service/Standard	Attributes
		Status: Current
	-Transport Services	*Description*: The transport services provide host-to-host communications capability for application support services. [*DoD TRM*]
	Standard	*Name*: Transmission Control Protocol (TCP) [IETF Standard 7/RFC-793 Transmission Control Protocol, September 1981] *Description*: TCP provides reliable connection-oriented transport services *Reference:* http://www.ietf.org/rfc.html *Type*: Industry consortium *Status*: Current
	Standard	*Name*: Internet Protocol (IP) [IETF Standard 6/RFC-791/RFC-950/RFC-919/RFC-922/RFC-792/RFC-1112 Internet Protocol, September 1981] *Description*: IP provides basic connectionless datagram service. IP includes Internet Control Message Protocol (ICMP) and Internet Group Management Protocol (IGMP). ICMP is used to provide error reporting, flow control, and route redirection. IGMP provides multicast extensions for hosts to report their group membership to multicast routers. *Reference:* http://www.ietf.org/rfc.html *Type*: Industry consortium *Status*: Current
	-Wireless LAN	*Description*: Wireless LAN services provide a common set of operational rules fo airwave interoperability of wireless Local Area Network products. [*DoD TRM*]
	Standard	*Name*: IEEE 802.11b *Description*: A supplement to 802.11: Information technology - Telecommunications and Information Exchange Between Systems - Local and metropolitan area networks - Specific requirements . Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications: Higher Speed Physical Layer (PHY) Extension in the 2.4 GHz band. *Reference:* http://standards.ieee.org/getieee802/802.11.html *Type*: Industry standards association *Status*: Current
	Distributed Computing	*Name*: Distributed Computing *Description*: Distributed computing services provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to

Service Area	Service/Standard	Attributes
		maintain a cooperative processing environment. . These are cross-cutting services. [*DoD TRM*]
	-Object Services	*Description*: Object services support definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [*DoD TRM*]
	Standard	*Name*: . Net, Microsoft *Description*: Currently, Microsoft-based COTS applications are implemented with Microsoft's Distributed Component Object Model (DCOM) supporting distributed computing, .NET is Microsoft's future open architecture, distributed computing framework. *Reference:* http://www.microsoft.com/net/ *Status*: DPW Standard, OCTO Standard
	Security	*Name*: Security *Description*: These services assist in protecting information and computer platform resources. These are cross-cutting services. [*DoD TRM*]
	-Security Algorithms	*Description*: These services provide standards for identified types of cryptographic algorithms that allow interoperability of transport protocols. [*DoD TRM*]
	Standard	*Name*: FIPS-PUB 186-2 Digital Signature Standard (DSS), January 27, 2000 *Description*: Specifies a way to generate and verify a digital signature. *Reference:* http://www.itl.nist.gov/fipspubs/by-num.htm *Type*: Government *Status*: Current
	Web Security/	*Description*: These services provide communications privacy over the Internet. They allow client/server applications to communicate in a way designed to prevent eavesdropping, tampering, or message forgery. [*DoD TRM*]
	Standard	*Name*: Secure Sockets Layer (SSL) Protocol Version 3.0, 18 November 1996 [Netscape] *Description*: Allows client/server applications to communicate in a way designed to prevent eavesdropping, tampering, or message forgery *Reference:* http://home.netscape.com/eng/ssl3/draft302.txt *Type*: *De facto* industry standard *Status*: Current
	Standard	*Name*: Transport Layer Security (TLS) [IETF- RFC 2246 The Transport Layer Security (TLS) Protocol Version1.0, January 1999]

Service Area	Service/Standard	Attributes
		Description: Allows client/server applications to communicate in a way designed to prevent eavesdropping, tampering, or message forgery. Not yet available in web browsers. May not be compatible with SSL. . *Reference:* http://www.ietf.org/rfc.html *Type*: Industry consortium *Status*: Emerging
	- Anti-virus	*Description*: These services provide assist in protecting information and computer platform resources against computer viruses
	Standard	*Name*: Virus Scan security kit (Network Associates, formerly McAfee), ver. 8.01 *Description*: Anti-virus software *Reference:* http://www.nai.com *Type*: DPW Standard, OCTO Standard *Sourcing Options*: OCTO IT Security *Status*: Current
Operating System Services		*Description:* Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. Application programmers will use operating system services to access operating system functions.
	Desktop operating system	*Description:* Operating system services specific to the desktop
	Standard	*Name*: Windows XP *Description*: COTS product *Reference:* http://www.microsoft.com/windowsxp/default.asp *Type*: OCTO Standard *Sourcing Options*: OCTO IT ServUs *Status*: Next Day

Appendix A: Technical Reference Model Terminology

TRM References

Service - A collection of components organized to accomplish a specific function or set of functions. [IEEE]

Interface - A shared boundary between two functional units, defined by specific attributes, such as functional characteristics, common physical interconnection characteristics, or signal characteristics. [IEEE]

Interoperability - Something (a program, a document) written according to specifications that should work identically across different applications and different computers. (W3C)
The ability of two or more systems or components to exchange data and use information. (IEEE STD 610.12)

Component - The elements of the model that contain the areas of services, and interface definitions, used to select and refine a set of standards. Components contain the major service areas.

Application Software Entity -The model entity that contains the mission unique application services and support application services that are common across multiple missions. Mission unique services are frequently implemented, as custom applications (DPW Serves) while common applications services may be COTS ERPs, (commercial off the shelf, enterprise resource planning applications).

Application Platform Entity – The model entity that contains system level services, such as database management system, operating system kernel, and device drivers.

External Environment Entity - The model entity that contains services with which the application platform exchanges information. These include user interface devices, continual storage media, and networks.

Application Program Interface (API) - The interface between the application software and the application platform. [IEEE]

External Environment Interface (EEI) – The interface between the application platform and the external environment across which information is exchanged. [IEEE]

Mission Area Applications – The component that includes implementations (i.e., software) of mission unique, specific end-user requirements or needs. These implementations may be commercial off-the-shelf (COTS) or government off-the-shelf (GOTS) including enterprise resource planning (ERP) systems, custom developed, or a combination of these.

Support Applications – The service area that includes common application services used across multiple mission areas. Examples include office automation and similar COTS packages. The services provided can be used to develop mission area specific applications or may be made directly available to the user.

System Support Services – The service area that includes system level software, other than the operating system, that supports common application needs. Examples include database management system services and directory services.

Operating System Services – The service area that includes the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. Examples include operating system kernel, shell, and utilities.

Physical Environment Services – The service area that includes low level resource drivers (software components) and physical resources (hardware components).

Cross-cutting - cross-category service

Open system - A system that implements sufficient open specifications for interfaces, services, and supporting formats to enable properly engineered components to be utilized across a wide range of systems with minimal changes, to interoperate with other components on local and remote systems, and to interact with users in a style that facilitates portability. An open system is characterized by the following:

- Well-defined, widely used, non-proprietary interfaces/protocols
- Use of standards which are developed/adopted by industrially recognized standards bodies
- Definition of all aspects of system interfaces to facilitate new or additional systems capabilities for a wide range of applications
- Explicit provision for expansion or upgrading through the incorporation of additional or higher-performance elements with minimal impact on the system.

(IEEE POSIX 1003.0/D15 as modified by the Tri-Service Open Systems Architecture Working Group)

POSIX: Portable Operating System Interface - The Standards for POSIX and C were designed to enable the portability of applications across platforms - http://www.knosof.co.uk/posix.html

Standard - A document that establishes uniform engineering or technical criteria, methods, processes, and practices. (DoD)

Standards bodies:

IEEE: Institute for Electrical and Electronics Engineers - An accredited standards body that has produced standards such as the network-oriented 802 protocols and POSIX. Members represent an international cross-section of users, vendors, and engineering professionals. - http://www.standards.ieee.org

ISO - International Organization for Standardization - ISO is a worldwide federation of national standards bodies from some 100 countries, one from each country. ISO is a non-governmental organization, established to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological, and economic activity. ISO™s work results in international agreements, which are published as International Standards. - http://www.ansi.org

IETF - Internet Engineering Task Force - IETF is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. The actual technical work of the IETF is done in its working groups, which are organized by topic into several areas (e.g., routing, transport, security). The IETF is a subdivision of the Internet Architecture Board (IAB) responsible for the development of protocols, their implementations, and standardization. - http://www.ietf.org

National Institute of Standards and Technology - (NIST) is a non-regulatory federal agency with a mission to develop and promote measurements, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life. Through its Information Technology Laboratory it conducts research and develops test methods and standards for emerging and rapidly-changing information technologies. ITL focuses on technologies to improve the usability, reliability and security of computers and computer networks for work and home.

W3C World Wide Web Consortium - The WC3 was created in October 1994 to lead the World Wide Web to its full potential by developing common protocols that promote its evolution and ensure its interoperability. W3C has more than 500 member organizations from around the world and has earned international recognition for its contributions to the growth of the Web. - http://www.w3.org/

Acronyms

API: Application Program Interface
CORBA: Common Object Request Broker
COTS: Commercial Off-the-Shelf
DBMS: Database Management System
DoD: Department of Defense
EA: Enterprise Architecture
EEI: External Environment Interface
GOTS: Government Off-the-Shelf
HTML: Hyper-Text Markup Language
HTTP: HTML Transport Protocol
IT: Information Technology

LAN: Local Area Network
ORB: Object Request Broker
SQL: Standard Query Language
TRM: Technical Reference Model

Appendix B: Broader Service Definitions

The following are detailed service areas, services and additional services relevant to DPW.

- **Standard Mission Applications** - The service area that includes implementations (i.e., software) of mission unique, specific end-user requirements or needs. These implementations may be commercial off-the-shelf (COTS) applications or government off-the-shelf (GOTS) applications including enterprise resource planning (ERP) systems, custom developed, or a combination of these.

    - Other Applications - applications that do not fit clearly in standard mission application services for Sanitation Services, Parking Services, Fleet Services, standard services for Service Requests and enterprise resource planning

- **Support Applications** - extensive services:

    - Communications - Communication applications services used across multiple mission areas and include personal-messaging services, organizational messaging services, enhanced telephony applications, including call-forwarding, call-waiting, programmed directories, teleconferencing, automatic call distribution (useful for busy customer service areas), call detail recording, and voice mail; shared-screen teleconferencing applications, videoconferencing services, broadcast services, computer conferencing services.

        - Web browsers - Includes COTS applications that support World Wide Web based e-mail (i.e., e-mail clients) and Internet search and retrieval of remote documents and multi-media.

        - Fax - Communication applications services used in support of faxing

    - Business processing - provide common office functions used in day-to-day operations, include: spreadsheet services, project management services, calculation services, calendar services,
        - Project management services - Services, including tools that support the planning, administration, and management of projects.
        - Spreadsheet services - Services that include the capability to create, manipulate, and present information in tables or charts.

    - Environment management – These services support client side management of a particular data processing or communications environment. Examples include: user profiling and information distribution services for message handling; and learning technology services such as computer-based training, computer assisted instruction, and distance learning.

- Database utility services - provide the capability to retrieve, organize, and manipulate data extracted from a database management system. These common services provide a consistent interface to the user while providing access to a variety of databases.
  - Query-processing services, which provide for interactive selection, extraction, and formatting of stored information from files and databases.
  - Screen-generation services, which provide the capability to define and generate screens that support the retrieval, presentation, and update of data.
  - Report-generation services, which provide the capability to define and generate hardcopy reports composed of data extracted from a database.
  - Networking/concurrent access services, which manage concurrent user access to database management system (DBMS) services.

- Multimedia services - provide the capability to manipulate and manage information consisting of text, graphics, images, video, and audio. These services can be used directly by user applications, but they can also be used by other support applications to satisfy a common requirement. These services can be used in combination or separately. Multimedia services include:
  - Text-processing services, including the capability to create, edit, merge, and format text.
  - Document-processing services, including the capability to create, edit, merge, and format documents.
  - Electronic-publishing services, including incorporation of photographic-quality images and color graphics, and advanced formatting and style features
  - Image-processing services, providing for the capture, scan, creation, and edit of images in accordance with recognized image-formatting standards.
  - Video-processing services, including the capability to capture, compose, and edit video information.
  - Audio-processing services, including the capability to capture, compose, and edit audio information.
  - Multimedia-processing services, including the capability to compress, store, retrieve, modify, sort, search, and print all or any combination of the above-mentioned media, and to perform these actions on two or more types of media simultaneously. This includes support for microform media, optical-storage technology that allows for storage of scanned or computer-produced documents using digital storage techniques, a scanning capability, and data compression. Additionally, multimedia processing includes hypermedia processing. Hypermedia provides the capability to create and browse documents that allow users to interactively navigate through the document using information embedded in the document.
  - Geographic information system (GIS) services, including the capability to create, combine, manipulate, analyze, and present geospatial information. This includes the creation of entity symbology that overlays the map background display and access to standard symbol libraries.
    - Desktop publishing - publishing services from the desktop in support of manipulating and managing information consisting of text, graphics, images, video, and audio.

- Engineering/Management Support – services include computer–aided design and engineering decision support such as simulation and modeling, and expert systems which provide artificial intelligence capabilities usually based on knowledge- or rules-based inference engines that recommend or take actions based on presented situations and prior "experiences".
    - Statistical analysis - Management support services specific to statistical analysis services for users.

- Groupware – These services support collaborative work environments.

- **System Support** - extensive services:

    - Software engineering - services for the development and maintenance of applications, including language services, shell and executive script language services enable the use of operating-system commands or utilities rather than a programming language, bindings and object code linking, which provide the ability for programs to access the underlying application and operating system platform through APIs that have been defined independently of the computer language, Computer-Aided Software Engineering (CASE) tools and environments, software life-cycle processes.

    - User interface services - define how users may interact with an application. They provide a consistent way for people who develop, administer, and use a system to gain access to applications programs, operating systems, and various system utilities. The user interface is a combination of menus, screen design, keyboard commands, command language, and help screens, which create the way a user interacts with a computer. User interface services describe the following areas:

        - Graphical User Interface
          The Graphical User Interface (GUI) provide users with a user-friendly working computer environment, defines how the user interacts with the system, controls the screen appearance. It should allow a user to enter commands through the use of menus or by pointing to icons by the computer mouse, rather than typing command sequences on the keyboard

        - Terminal Emulation refers to thin-client remote access to computers across local and wide area networks. Client software is used to connect to a host running terminal emulation services. All computing takes place on the host computer. Screen updates are transmitted from the host to the client. The client software may be embedded within a dedicated appliance (such as early mainframe terminals) or may be installed on a workstation or other multi-function device. In DPW, terminal emulation services includes Microsoft's Terminal Services for Windows

    - Graphics services– examples include raster graphics and vector graphics

- examples include graphical user interface (GUI) software, window managers, and character based interfaces
- Internationalization – These services focus on support for definition, selection, and change among different culturally related application environments. Examples include: character sets and data representations, including modifications of GUI screens to support character set conventions (e.g., right to left or top to bottom instead of left to right; future versions may incorporate Spanish, or other, language support.)

- Transaction processing – These services support the management and integrity of transaction queues and processing (i.e., no lost transactions due to system or software failures; guarantee of completion of the transaction or rollback to a prior consistent system state), and high performance transaction throughput, (i.e., services provided by the Transaction Processing Monitors (TP Monitors) of production DBMSs.

- Workflow – These services support the routing of information based on business process events. Examples include services provided by high-end workflow management systems. (These services are sometimes placed in the Support Applications area.)

- Data management - services that provide for the management of data independent of the processes that create or use it, maintained indefinitely, and shared among many processes. Services include data dictionary/directory services, data administration, database management system services, transaction processing services.
  - Database management system services - Services that provide data administration, managed objects functionality, and controlled access to, and modification of, structured data
  - Data dictionary/directory services - allow data administrators and information engineers to access and modify data about data (i.e., metadata). Such data may include internal and external formats, integrity and security rules, and location within a distributed system. The services also allow end users/applications to define and obtain data that are available in the database
  - Database modeling - data administration services in support of modeling databases.
  - Desktop data management - Services in support of interfacing different applications and databases.

- Data interchange - provide specialized support for the interchange of information between applications and to/from the external environment. These services are designed to handle data interchange between applications on the same platform and applications on different platforms, and include: document interchange services, characters and symbols services, optical digital technologies (ODTs), technical data interchange services, hardware applications services, which provide data interchange services between non-homogeneous hardware components.

    - Document interchange - is supported by specifications for encoding the data (e.g., text, pictures, numerics, special characters) and both the logical and visual structures of electronic documents. Services support document exchange between heterogeneous computer systems, electronic forms interchange.

- Distributed computing services - provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to maintain a cooperative processing environment. The classical definition of a computer becomes blurred as the processes that contribute to information processing become distributed across a facility or a network. As with other cross cutting services, the requisite components of distributed computing services typically exist within particular service areas. They are described below to offer a coherent view of this important service.
    - Client/server Services, which provide support for computing services partitioned into requesting processes (clients) and providing processes (servers), whether on the same platform or in a distributed environment.
    - Object Services, which support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence (e.g., real-time embedded middleware layer software).
    - Remote-Access Services, which provide location transparency functionality for distributed computing services, allowing users and client processes to access appropriate systems resources (files, data, processes) without regard to the location of either.
    - Middleware – These services can include a wide range of data transformation, mediation, and accessing mechanisms

- Communications - Platform communications services are provided to support distributed applications requiring data access and applications interoperability in a networked environment to support Software Applications. These services are the functions and interfaces that reside on the underlying network and communications system protocol software and are used by applications. Services include transport services, subnetwork technology services, which support access to local area networks (LANs) and other networks. This area includes LANs, point-to-point communications, packet-switching, circuit-switching, and military-unique data communications.
    - World Wide Web services - platform communications services specific to the World Wide Web.
    - Electronic mail - services that provide server-to-server communications capability for sending electronic messages
    - Transport services - perform a variety of functions concerned primarily with the end-to-end transmission of data across a network and end-to-end reliability. The services performed include end-to-end error detection and recovery, regulating flow control, and managing the quality of service
    - Wireless LAN – services to provide a common set of operational rules for airwave interoperability of wireless LAN products

- Systems management - may be divided according to the management elements that generically apply to all functional resources: state management, configuration control, performance management, fault management, user/group management, usage management and other management
    - State management services, which provide for mechanisms that monitor, maintain, and change the state of the system or components of the system (i.e., fault mode, recovery mode, standby, active.
    - Performance management services, which allow information technology resources to be managed efficiently. Performance aspects of hardware, software, and network components must be monitored and subsequently made available to the system manager. The manager must then have access to services and parameters with which to tune the system to meet performance targets. This is accomplished through batch scheduling, system resource management, print and storage device management, system startup and shutdown, subsystem management, and communication of management information.
    - Fault management services, which allow a system to react to the loss or incorrect operation of system components at various levels (hardware, software, etc.). Fault management involves event management and network error recovery.
    - User/group management services, which provide traditional system administration interfaces for administering users and groups. These services are mechanisms for system and network administrators to use when implementing a management policy across a system. Administrators can use the services to establish domains and policies for management throughout the system. They can provide the ability for applications to access group and user databases. Users can set up their own areas of management and policies or use system defaults that are included in management services.
    - Usage management and cost allocation services, which include the management of software licensing, system cost management, and system resource allocation. Software license management for a system provides license administration, management, and enforcement services that allow more detailed, firm, and equitable licensing terms for users, and better protection against illegal software usage for vendors. Cost allocation services provide the ability to cost services for charging and reimbursement and to measure and prioritize resource usage. System resource allocation allows system administrators to control the amount of system resources available to users.
    - Other management services include the following services, which do not fit cleanly into any other management area: database administration, object-oriented database management, floppy disk formatting and handling, POSIX tape labeling and tape volume processing, and print management. Database and object-oriented database administration provide facilities and interfaces to manage databases and object-oriented databases, respectively. Floppy disk-formatting and handling standards provide formats and interfaces for the exchange, backup, and restoration of data to or from floppy disks. POSIX tape labeling and tape volume processing provide standardized methods of handling and reading data stored on tape media and containing certain types of administrative information automatically readable

by tape-handling software. Print-management services are used by management and user applications to send a file to a printer, cancel a print job, and get printer status information.

- Security services - These services assist in protecting information and computer platform resources. These are cross-cutting services that cut across all aspects of the system and add an additional complexity to the hardware and software that interacts with the rest of the system. This could be a special feature of the hardware and software and can be multi-dimensional such as Application level, kernel level, device level, system level, and application platform level. Security services are necessary to protect sensitive information in the information system. The appropriate level of protection is determined based upon the classification to the mission-area end users and the perception of threats to it. Security Services include: access control services, integrity service, confidentiality service, Non-repudiation services, including electronic signature, that ensure that senders and recipients cannot deny the origin or delivery of data; availability service, security labeling, information system security management services.
  - Authentication - These services support verification of user identify and privileges and tracing of security relevant events to individual users.
  - Security algorithms services - provide standards for identified types of cryptographic algorithms that allow interoperability of transport protocols
  - Web security services - provide communications privacy over the Internet. They allow client/server applications to communicate in a way designed to prevent eavesdropping, tampering, or message forgery

- **Operating System Services** - The core services needed to operate and administer the application platform and provide an interface between the application software and the platform. Application programmers will use operating system services to access operating system functions. To separate sensitive data within an information system, the kernel must include mechanisms to control access to that information and to the underlying hardware. Operating system services include the following: kernel operations, real-time extensions, clock/calendar services, fault management, shell and utilities, operating system object services and media handling services.

  - Server Operating System - The server operating system defines the operating services responsible for the management of platform resource enabled services. The controlling software provides for the efficient delivery of computing capabilities with continuous availability and complete data integrity. Server operating system services are responsible for the management of platform resources, including the processor, memory, files, and input/output.

  - Kernel operations – These services are the low level, basic operating system services including: creation and management of processes and threads, execution of programs, definition and communication of signals, definition and processing of system clock operations, and controlling input/output processing to and from peripheral devices

- Real-time extensions – These services focus on event-driven processes supporting management and actuation of physical processes. Examples include interrupt handling and time-bound threads of control

- Clock/calendar – examples include clocks and timers, real-time timers, and distributed timing services

- Fault management – examples include fault detection, isolation, recovery, and avoidance

- Shell and utilities – These are the services typically associated with UNIX style commands and utilities available at the UNIX command line. Examples include operator level mechanisms such as comparing, printing, and displaying file contents, searching patterns, evaluating expressions, logging messages, moving files between directories, and executing command scripts.

- Media-handling services – examples include disk and tape formatting

- Desktop operating system services - Operating system services specific to the desktop

- **Physical Environment Services** - Hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. Some hardware devices have software (device drivers) embedded in them to enable the computer system with digital/analog timing sequences to operate in a correct manner. It should be noted that hardware-based services appear in two places in the TRM: as part of physical environment services and as part of the external environment. The TRM does not allocate any specific services to either one of these. The general notion is that services provided by the hardware that is part of a particular system are considered physical environment services, while the external environment provides the services of hardware outside that system. However, it is recognized that what constitutes a system is a matter of perspective. Even in the information systems context, components viewed by the end user as part of the system are frequently viewed by vendors of computers as external to it, even including components that may be physically housed inside the computer box. To some people, it may make a difference if a disk drive is internal or external, or even if the interface to it is part of the computer's motherboard or on a separate plug-in board. Others will not make such distinctions. For this reason, the following physical environment services contained in and supporting application platform services may also be found to exist in the external environment.

    - Devices - This highlights the general physical services required in an application platform including, but not limited to, the hardware interconnect services (e.g., backplanes), data storage services (e.g., tape and disk format standards), power supplies, temperature control, mechanisms and processing resources required to implement an application "platform." Since one intent of open system standards is to provide independence of systems from the details of processing resources (i.e., details

of CPU instruction sets), standards in this last area will generally not be specified. However, standards in the other areas are frequently required to support interoperability, portability, and technology upgrade goals of systems.

- Backplanes and Buses - are hardware interconnect services that facilitate data transfer between physically separated systems, subsystems, and modules. At this level, information is frequently represented as changes in either voltage levels, current flow, or other physical parameters. However, existing standards also frequently consider logical interactions among components.

- Storage - Hardware data storage services facilitate data retention. At this level, all information is represented as changes in either voltage levels, current flow, or other physical parameters. This area includes standards for the representation of data in physical storage media (e.g., disks, tapes, optical devices).

- Hardware Processing - Hardware processing is the hardware service that manages, controls, and manipulates data.

- **External Environment entity and component** - The External Environment model component represents the external services with which the application platform interfaces information

  - Networks and Communications Infrastructure
    - Networks cover the physical and logical structure of the LAN, from cabling and connectors, through the access method, to the transport protocols.
    - Communications Infrastructure includes specific types of media, including waveforms, and associated equipment (e.g., routers, hubs, switches,) necessary to connect the system to external entities. System requirements and the relationship between the system and the external entities determine the types of media that may be used. In some cases the communications infrastructure might also include backplanes and buses normally considered part of the Physical Environment Services.

  - Storage (External Environment) - Hardware data storage services facilitate data retention. At this level, all information is represented as changes in either voltage levels, current flow, or other physical parameters. This area includes standards for the representation of data in physical storage media (e.g., disks, tapes, optical devices).

  - Devices - include hardware interconnect services components and processing resources required to support application platforms. Devices support physical interaction between the user and the application platform.

  - User Interface Devices
    - User Interface Cognitive: The interface services that define the process by which the user obtains the required information from the system to accomplish the portion of the system mission assigned to the human element of the system. These

services may include one or more of the following: screen design, symbology, font size, color, contrast, speed and size of displays, LED size, control/display layout. This is the cognitive aspect of both the Human Computer Interface (HCI) and the Human Machine Interface (HMI).

- User Interface Physical: The interface services that define the physical methods and means the human element of the system can or must use to cause the system to provide the information required to accomplish the portion of the system mission assigned to the human element of the system. These services may include the use of one or more of the following: mouse, keyboard, voice interface, touch pad, joy stick, track ball, light pen, and other hardware devices. This is the physical aspect of both the HMI and HCI.

Appendix C: Hardware and Environment Standards

Since the intent of open system standards is to provide independence of systems from the details of processing resources (i.e., details of CPU instruction sets), standards for processing resources are generally not specified in a technical architecture. However, hardware standards and environment are provided here:

DPW Desktop Standard for PC and Printer

PC: Dell Optiplex GX280 Small Small Form Factor

Processor:	Pentium 4 520/2.8 GHz
Base Unit:	Int Broadcom Gigabit NIC
Memory:	512 MB Non-ECC 400MHhz DDR2
Keyboard:	Dell USB Keyboard, No hot keys
Monitor:	Dell UltraSharp 1704FPV Flat Panel with Height Adjustable Stand, 17.0-inch
Video:	Integrated Video – Intel DVMT
CD/RW:	24X Max Slimline DVD-CDRW Combo Drive with DVD playback
Hard Drive:	80GB SATA 7200 rpm with Data Burst Cache
Floppy:	No floppy drive
OS:	Windows XP Proffessional, Service Pack 2 with media.
Mouse:	Dell USB 2 Button Optical Mouse with Scroll
Speaker:	No speakers
Software:	MS Office – DPW site license
Documentation:	Optiplex Resource CD

Network Printer: Black and white HP LaserJet 2430n:

Speed:	Up to 35ppm
Quality:	1200 x 1200 dpi
Connectivity:	bi-directional parallel, fast infrared, Jet direct 610n for networking.
Trays:	2 standard, 3 maximum with 350 and 850 pages capacity.
Paper size:	Letter, legal, executive, and envelopes.
Memory:	64 MB expandable to 320 MB.
Duplex:	Manual, driver support provided.
Language:	HP ProRes 1200, Resolution Enhancement technology (REt)

Network Printer: Color Laserjet 3550n Printer - Regular:

Speed:	up to 16 ppm
Quality:	up to 600 x 600 dpi
Connectivity:	Hi-Speed USB 2.0 port, HP Jetdirect .
Trays:	3 with 350 and 850 pages capacity.
Paper size:	Letter, legal, executive, and envelopes.
Memory:	64 MB expandable to 72 MB.
Duplex:	Manual (driver support provided)
Language:	HP JetReady 4.1 enhanced host-based printing for Windows

New Desktop Installation Check List

Set up that without additional requirements:

- Adobe Acrobat reader
- MS Office 2K3
- McAfee Antivirus
- Winzip
- DPW Application folder.

Set up that requires configuration and/or associated hardware:

- Quick tutorial.
- Reclaim the old or replaced PC.
- Other software over and beyond in the above list might require procurement and licenses.

Other items to be included:

- OITS Mouse pad
- Service tag label

New DPW Employee

1. Must have a PC identified and assigned.
2. Must go through the helpdesk to have all the new accounts such as email, network, etc. created

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DPW *GIS*/High End Desktop Standard for PC and Printer

PC: **Dell Optiplex GX280 Small MiniTower:**

Processor:	Pentium 4 550J, 3.40 GHz
Memory:	2.0 GB Non-ECC 400 MHz DDR2
Keyboard:	Dell USB Keyboard, No hot keys
Monitor:	Dell UltraSharp 1905FP Flat Panel, woth Height Adjustable Stand (19.0 inch
Video card.:	128Mb Video Card
CD/ROM:	48X32 CDRW/DVD Combo, with DVD Playback
Hard Drive:	160GB SATA 7200 rpm with Data Burst Cache
Floppy:	1.44 MB 3.5 floppy drive
OS:	Windows XP Professional
Mouse:	Dell USB 2 Button Optical Mouse with Scroll
Speaker:	Internal chassis speaker

Documentation: Dell resource CD contains diagnostics & drivers for Optiplex

Network GIS Printer: **HP 8550 printer**

See “DPW Desktop Standard for PC and Printer” for **New Desktop Installation Check List**

DPW Laptop Computer Standard

Dell Latitude D610

Processor:	Pentium M 725 processor,1.6 GHz
Memory:	512 MB 1 DIMM DDR Total 640 MB
Hard Drive:	60 GB 5MM, 4200 rpm
CD/DVD Drive:	8/24/10/24X SWDVD/CDRW combo drive
Video:	14.1 XGA display
Modem:	Int. 56K modem
Operating System:	MS Windows^{R} XP Professional, SP2, with media
Batteries:	6 cell primary battery
Docking Solution	D/Port Advanced Port Replicator
Service:	Gold Technical Support, Latitude 3 years

VPN Instructions

Login to the PC.

Username: dpwlaptop1
Password: dpwoits

VPN Connection Instructions

a. Double click on the VPN Dialer icon on the desktop.
b. Click Connect.
c. A prompt for password will come up. The password is "dpwoits" followed by the current 6 digits number on the VPN token. This number changes all the time so the password will always be different. For example, if the current number on the token is 123456, then the password is "dpwoits123456".
d. On the next screen, click Continue.

You are connected to the DPW network. To use any of the DPW applications, double click on the DPW Applications folder on the desktop.

Installation Check List:

Set up without additional requirements:

- Adobe Acrobat reader
- MS Office 2K3
- McAfee Antivirus
- Winzip
- DPW Application folder

Set up that requires configuration and/or associated hardware:

- VPN configuration
  Requires VPN token and must go through telecomm. process for acquisition
- Internet access dial Up account if applicable and must go through telecomm. process
- Broadband wireless
  Requires broadband card and must go through telecomm. process for acquisition
- Internet access broadband account if applicable and must go through telecomm. process
- Upload user data from desktop to network and then download to laptop.
- Configure the docking station or port replicator for laptop.
- Set up the user's docking station or port replicator for laptop.
- Provide quick tutorial.
- Reclaim the old or replaced PC.
- Other desktop software, over and beyond in the above list, might require procurement and licenses.

Other items to be included:

- OITS Mouse pad
- Security Chain for laptop
- Service tag label

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Development Desktop Standard

Hardware Requirements

- 3.4 MHz CPU
- 160 gig or more hard disk space
- 1 gigabyte or more memory, it is best to have the memory match the CPU speed when dealing with application designing.
- CD/DVD RW drive
- Blackberry? (Anthony Coley)
- MicroTek scanner

WEB Tools

- Macromedia Dreamweaver MX + Fireworks + Homesite
- Microsoft FrontPage
- Adobe Acrobat for Windows
- Adobe Photoshop for Windows/Adobe Illustrator

Database & Application Tools

- Microsoft SQL Server Client Components (with SQL Enterprise Manager)
- Microsoft Terminal Server Client
- Microsoft Visual Studio .Net Enterprise Architect 2003
- Microsoft Visual C++ .Net Standard Edition 2003
- Microsoft Visual Basic .Net Standard Edition 2003
- Microsoft Visio PRO
- AppForge Mobile VB
- Psion OLE
- Palm
- B-Coder
- MS Office Suite v2000 (installed as “custom” – all options)
- Erwin Logic Works
- SQL Enterprise Manager
- Streets & Trips 2002
- CA All Fusion Erwin
- Crystal Reports
- WinZip
- WS FTP
- ThumbsPlus
- Clipper 5
- Blitzen Linker for Clipper
- ULead WebRazor

Resources

- Subscription to Microsoft MSDN for online information, support, development tools, and library of resources.

OCTO Standards

Table of Software Standards

Software Category	*Mfg*	**Standard Product**	*Standard*	*Sourcing Options*
Software Standards – Desktop Applications				
Desktop Virus Protection	McAfee	VirusScan Enterprise	8.01	OCTO IT Security
Office Automation	Microsoft	Office Professional	2003	ServUs
Desktop Operating System[1]	Microsoft Microsoft	Windows Windows	2000 XP	ServUs ServUs
Email/Calendar Client	Microsoft	Outlook	2003	ServUs
Wireless Email Messaging	Cingular	GoodLink	2003	Citywide Messaging
Web Browser	Microsoft	Internet Explorer	6.0 (128 bit)	Download: microsoft.com
Media Player – Desktop	Microsoft	Windows Media Player	9.0	Download: microsoft.com
Desktop Publishing	Adobe Quark	Acrobat QuarkXPress	6.0 6.0	ServUs Purchase
Project Management	Microsoft	Project	2003	ServUs
Technical Diagramming	Microsoft	Visio	2003	ServUs
Software Standards – Server Applications				
Server Operating System – File and Print	Microsoft	Windows Server	2003	Purchase with System Purchase with System
Server Operating System – Application and Database	IBM IBM Sun Microsoft Microsoft	AIX OS 390 Solaris 8 Windows Server Windows Server Enterprise	5.2 2.10 8 2003 2003	Purchase with System Data Center Purchase with System Purchase with System Purchase with System
Server Antivirus	McAfee	VirusScan Enterprise	7.1	OCTO IT Security
Enterprise Application Integration (EAI)	SeeBeyond	eGate EAI eWay Adapters	5.0 5.0	Software Licensing Desk Software Licensing Desk
Enterprise Service Business (ESB)	SeeBeyond	eXchange Integrator	5.0	Software Licensing Desk
Business Process	SeeBeyond	eInsight	5.0	Software Licensing Desk

[1] Windows 2000 Workstation is for high-end performance PCs, and XP is for ordinary administrative systems.

Software Category	*Mfg*	**Standard Product**	*Standard*	*Sourcing Options*
Management (BPM)				
Java Application Server	IBM	Websphere Enterprise	5.1	Purchase
Java Servlet Container	Apache	Tomcat	5.0	Download: apache.org
Internet Content Management	Cimbrian	Dynamic Site Framework	3.2	OCTO E-government
Directory Services[2]	Microsoft Microsoft Microsoft	Active Directory ADAM Metadirectory Services	2003 2003 2003	Citywide Messaging Citywide Messaging Citywide Messaging
Email Server	Microsoft	Exchange	2003	Citywide Messaging
Web Server	Microsoft	IIS	6.0	Bundled with System
Intranet/Extranet Portal	PlumTree	Portal Platform	5.0	DC Intranet/Extranet Portal Group
Software Standards – Database Applications				
Relational Database Management	IBM Microsoft Oracle	DB2/MVS SQL Server[3] Oracle Enterprise	V7 2000 10g	Data Center Services Purchase Purchase
Database Modeling	Microsoft	Visio	2003	ServUs
Software Standards – Utility Applications				
Web Development - Internet[4]	Cimbrian	DSF	3.2	OCTO E-government
Web Development – DC Intranet/Extranet	PlumTree	Portal Platform	5.0	DC Intranet/Extranet Portal Group
Web Development - .NET Application	Microsoft	Visual Studio .NET (InterDev, VB, C++)	2003	Purchase
Web Development – Java Application	IBM	Websphere Studio/XDE Application Developer	5.1	Purchase

[2] Active Directory is the operational directory for out-of-the-box Microsoft and 3rd party applications. ADAM is a generic LDAP implementation available for integration and customization with SMPs and District applications (e.g. adding new custom attributes). Metadirectory Services provides specialized directory interchange tools and runtime mechanisms, to facilitate synchronization of application security with ADAM.
[3] For internet/extranet applications, the E-government group has some shared server capacity in the OCTO DMZ network environment. Internal applications projects should contact the OCTO SLD.
[4] Cimbrian DSF is the standard for DC.Gov HTML development and content management.

Software Category	*Mfg*	Standard Product	*Standard*	*Sourcing Options*
Integrated Development Environment	IBM Rational	XDE[5] Team Unifying Platform[6]	2003 2003	OCTO Common Services
Configuration Management (CM)	Merant	Dimensions	8.5	Data Center
Web Reporting	WebTrends	Analysis Suite	7	OCTO E-government
PC File Compression	WinZip	WinZip	8.0	ServUs
Remote Host Application	LANDesk	Patch Manager	8.8.1	ServUs
Software Standards – Business Tier Applications				
Correspondence Tracking	ACS Desktop Solution	Intranet Quorum	2.6	OCTO IQ Group
Help Desk	Remedy	IT Service Management[7]	5.5	Data Center
Geographic Information Systems	ESRI	ArcIMS ArcSDE ArcVIEW	9.0 9.0 9.0	OCTO GIS Services
Business Intelligence	Business Objects	Business Objects	6.5	OCTO Common Services
Software Standards – Network and System Management				
Node Manager - Windows	Hewlett Packard	HP Open View Network Node Manager	6.2	DC-WAN/NET Services
Node Manager - Unix	Hewlett Packard	HP Open View Operations - Unix	7.0	DC-WAN/NET Services
IP Services Monitoring	Hewlett Packard	HP Open View Internet Services (Win2K)	7.2	DC-WAN/NET Services
Network Management Reporting	Hewlett Packard	HP Reporter	3.5	DC-WAN/NET Services
Performance Monitoring	Hewlett Packard	HP Glance Plus Pack Tier2		DC-WAN/NET Services
Network Component Management	Cisco	Cisco Works 2000	LMS 2.0	DC-WAN/NET Services
Network Diagnostic Reporting	Concord	Ehealth	5.0	DC-WAN/NET Services
Network Resource	InfoVista	Infovista Server	2.2	DC-WAN/NET Services

[5] Rational XDE is a tool for UML modeling, software design, and is integrated with other tools in Rational Team Unifying Platform.
[6] Team Unifying Platform includes: Requisite Pro, Project Console, Clearcase LT, ClearQuest, Test Manager, SoDA, and RUP.
[7] Available OCTO-hosted Remedy modules include: Help Desk, Change Management, Asset Management, and Administrator (supports custom extensions).

Software Category	*Mfg*	**Standard Product**	*Standard*	*Sourcing Options*
Management				
Security Event Management	MicroMuse	Netcool Object Server Netcool Firewall Probe, Netcool Omnibus Probe	3.4.1 2.2.1 3.4.1	DC-WAN/NET Services
Network Event Notification	Vytek	Telalert Messaging	5.4	DC-WAN/NET Services

HARDWARE STANDARDS - END-USER CLIENTS

The computer hardware standards are defined in terms of five (5) basic and advanced configurations. These configurations are available directly from ServUs. There are 3 basic models offered by ServUs. Group 1 is the basic desktop. Group 3 is the high-end desktop. Group 4 is basic laptop. Group 5 is high-end laptop. Group 2 offers smaller form factor systems. Please refer to the latest versions of these standards, posted on the DC Intranet at www.octo.in.dc.gov.

Group 1: Standard Desktop	
System Attribute	**Attribute Specification**
Base Unit:	**Intel , 2.80GHz, Pentium4,1M Cache, Gigabit NIC, SmallMinitower, 800 Front Side Bus**
Memory:	**512MB, Non-ECC, 400MHz DDR, 2x128**
Keyboard:	**PS/2 Keyboard in Gray, No Hot Keys**
Monitor:	**Flat Panel,17 Inch Viewable Image Size, Gray**
Video Card:	**Integrated Video - Intel DVMT,**
Hard Drive:	**40GB SATA, 7200 RPM, Hard Drive**
Floppy Disk Drive:	**3.5 inch, 1.44MB, Floppy Drive**
Operating System:	**Windows XP Professional with SP1, License, English**
Operating System:	**Media for Windows XP Professional Service Pack 1,Factory Install**
Operating System:	**NTFS File System**
Mouse:	**USB 2-Button Optical Mouse with Scroll**
NIC:	**Integrated Intel Gigabit NIC, 10/100/1000, with Alert Standards Format**
CD-ROM or DVD-ROM Drive:	**16X DVD with DVD playback**
Sound Card:	**Integrated Sound Blaster Compatible AC97 Sound,**
Speakers:	**Two Piece Stereo Speaker System**
Documentation Diskette:	**Resource CD**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, Initial Year**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, 2YR Extended**

Group 2 offers a smaller form factor basic desktop system.

Group 2: Basic Desktop – Reduced Form Factor	
System Attribute	**Attribute Specification**
Base Unit:	**Intel Pentium4, 2.80GHZ 1M Cache, Gigabit NIC, Small Form Factor, 800 Front Side Bus**
Memory:	**512MB, Non-ECC, 400MHz 1 DIMM**
Keyboard:	**PS/2 Keyboard in Gray, NoHot Keys**
Monitor:	**17 inch Flat Panel with Height Adjustable Stand,17.0 Inch VIS**
Video Card:	**Integrated Video - Intel DVMT**
Hard Drive:	**40GB SATA, 7200 RPM, Hard Drive**
Floppy Disk Drive:	**No Floppy Drive, External Floppy available**
Operating System:	**Windows XP Professional with SP1, License,English**
Operating System:	**Media for Windows XP Professional Service Pack1, ,English, Factory Install**
Operating System:	**NTFS File System for Install**
Mouse:	**USB 2-Button Optical Mouse with Scroll**
NIC:	**Integrated Intel Gigabit NIC, 10/100/1000, with Alert Standards Format,**
CD-ROM or DVD-ROM Drive:	**8X DVD, Slimline, with DVD playback**

Sound Card:	**Integrated Sound Blaster Compatible AC97 Sound,**
Speakers:	**No Speakers**
Documentation Diskette:	**Resource CD**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, Initial Year**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, 2YR Extended**
Misc:	**Mouse Pad**

Group 3 is the high-end desktop system, intended for power users.

Group 3: High-End Desktop	
System Attribute	**Attribute Specification**
Base Unit:	**Intel, 3.20GHz,Pentium4 Processor, 540 ,1M Cache, Gigabit NIC, SmallMinitower, 800 Front Side Bus**
Memory:	**1 GB, Non-ECC, 400MHz DDR, 2 DIMM**
Keyboard:	**PS/2 Keyboard in Gray, No Hot Keys**
Monitor:	**UltraSharp 1901FP Flat Panel with Height Adjustable Stand,19.0 Inch VIS**
Video Card:	**Digital Video Adapter Card, Full Height Small Minitower**
Hard Drive:	**160GB SATA, 7200 RPM with Data Burst Cache**
Floppy Disk Drive:	**3.5 inch, 1.44MB, Floppy Drive**
Operating System:	**Windows XP Professional Service Pack 1,English,Factory Install**
Operating System:	**Media for Windows XP Professional Service Pack 1,English,Factory Install**
Operating System:	**NTFS File System,Factory Install**
Mouse:	**USB 2-Button Optical Mouse with Scroll**
NIC:	**Integrated Intel Gigabit NIC, 10/100/1000, with Alert Standards Format**
CD-ROM or DVD-ROM Drive:	**48X32 CDRW/DVD Combo, with DVD Playback Combo**
Sound Card:	**Integrated Sound Blaster Compatible AC97 Sound**
Documentation Diskette:	**Resource CD**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, Initial Year**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, 2YR Extended**
Installation:	**Standard On-Site Installation Declined**
Misc:	**Mouse Pad**

Group 4 is the standard laptop, intended for most administrative or operational users with more than one work location.

Group 4: Standard Laptop	
System Attribute	**Attribute Specification**
Base Unit:	**Intel Centrino, 1.50GHz, Pentium M, 14.1 XGA, English**
Memory:	**512MB, 1 Dimm, DDR SDRAM**
Hard Drive:	**80GB Hard Drive 9.5MM 4200 RPM**
Floppy Disk Drive:	**No Floppy Drive**
Operating System:	**Windows XP Pro Service Pack 1, English, Factory Install**
Operating System:	**Media for Windows XP Pro Service Pack 1, English, Factory Install**
Modem:	**Internal 56K Modem for Notebooks, Factory Install**
TBU:	**65W AC Adapter**
CD-ROM or DVD-ROM Drive:	**8X DVD with Software**
Wireless Option:	**Intel PRO/Wireless 2100 WLAN (802.11b, 11Mbps) miniPCI CardFact**

Feature	**6-Cell/53 WHr Primary Factory Install**
Feature	**Classic Nylon Carrying Case ,Tied**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, Initial Year**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, 2YR Extended**
Service:	**CompleteCare Accidental DamageSvc, Lat, 3Yr**

Group 5 is the high-end laptop, intended for mobile or multiple work-location power users.

Group 5: High-End Laptop	
System Attribute	**Attribute Specification**
Base Unit:	**Intel® Pentium® M Processor 755 (2.0GHz) w/ 15.4 WXGA Display D820X**
Memory:	**1024MB,DDR SDRAM 2 DIMMS**
Video Card:	**NVIDIA® GeForce™ FX Go5200 4XAGP w/ 32MB DDR Video Memory 32MB**
Hard Drive:	**40GB,HD,9.5MM,5400RPM 40D**
Floppy Disk Drive:	**Floppy Drive, Internal Factory Tied**
Operating System:	**Media for Windows XP Pro Service Pack 1, English, Factory Installed**
Operating System:	**Media for Windows XP Pro Service Pack 1, English, Factory Install**
Modem:	**Internal 56K Modem, Factory Install**
TBU:	**9 CELL Primary Battery to include spare battery of same type**
CD-ROM or DVD-ROM Drive:	**8-24-24-24X SWDVD/CDRW Combo Drive, Factory Install**
Wireless Option :	**Intel PRO/Wireless 2100 WLAN (802.11b, 11Mbps) miniPCI, Factory Install**
Feature	**9-Cell, 80-WHr Primary Factory Install**
Feature	**Deluxe Nylon Carrying Case**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, Initial Year**
Service:	**Type 3 Contract - Next Business Day Parts and Labor On-Site Response, 2YR Extended**
Service:	**CompleteCare Accidental DamageSvc, Lat, 3Yr ,**
Feature:	**Travel Module for C810/C610/C510/C840/ C640 Notebooks,Packaged with System**

All of the above end-user client configurations are available, fully configured from ServUs (see the ServUs: Desktop Management Services section). For the most up-to-date configurations, please refer to the ServUs configurations posted on octo.in.dc.gov.

HARDWARE STANDARDS – PRINTERS AND SCANNERS

The following tables identify standard recommended attributes for printer and scanner peripherals at the personal, workgroup, and departmental workload levels.[8]

Hardware Category	Workload	Recommended Hardware Attributes
Printer - Personal *Example Solution: Hewlett Packard LaserJet 2000 Series 16 MB Memory*	Personal Non-Networked	4-20 pages per minute, 1-2 input trays - 100 pages, monthly volume of 5,000 pages. Support legal and letter prints. Remote management and configuration, built in network card, support laser or ink-jet technology
Printer - Workgroup *Example Solution: Hewlett Packard LaserJet 3000 Series 64 MB Memory*	Workgroup Networked	15-25 pages per minute, 2-3 input trays - 500 pages, monthly volume of 50,000 pages. Support legal, A4, and letter prints. Remote management and configuration, built in network card, support laser technology
Printer -Departmental *Example Solution: Hewlett Packard LaserJet 4000 Series 160 MB Memory*	High Volume Networked	20-30 pages per minute, 2-3 input trays -1,000 pages, monthly volume of 100,000 pages. Must support legal, A4, letter, and 11x17 prints. Remote management and configuration, built in network card, support laser technology
Scanner - Personal	Personal Non Networked	Personal - Must be single pass, USB and parallel port capable, 600 dpi to 2400 dpi optical resolution. Capacity at least 100 sheets. Support letter 8 ½" x 11", legal and 11"x17" paper
Scanner - Departmental	High Volume Networked	Must be single pass, USB and parallel port capable, 720 dpi to 2400 dpi optical resolution. Must support VRS (video versions only). Capacity at least 500 sheets Support letter, legal and 11"x17" paper
Fax - Workgroup	High Volume Networked	Plain paper. Hold at least 250 – 500 sheets of paper. Memory buffer for minimum 100 pages. Provides confirmation page, 14.4 - 33.6 Data/Fax mode, Print/copy in multi-mode i.e. fine, super-fine

[8] Please refer to the most recent version of these standards at octo.in.dc.gov.