

NATIONAL ENTERPRISE ARCHITECTURE FRAMEWORK KINGDOM OF BAHRAIN

Technology Standards and Guidelines

Application Domain



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1. INTRODUCTION

This document covers tools, technologies and standards used in the Application domain. The process of arriving at these standards has been outlined in the NEAF - Technology Standards Methodology & Process document in Section 3 - Methodology and Approach. Some of the tools, technologies and standards have been identified as potential requirements and hence been incorporated in this document. These may be considered as recommendations for current and future use.

This document shall be considered for revision in conjunction with the NEAF - Technology Standards Methodology & Process document at appropriate intervals of time as decided by the ICT Governance Committee. Any addition or upgrade to these tools and standards may be incorporated by following the process described in the NEAF - Technology Standards Methodology & Process document in Section 6 - Review and Maintenance of Technology Standards and Guidelines.

2. SUMMARY OF TECHNOLOGY STANDARDS/SPECIFICATIONS AND TOOLS

This section contains a summary of standards and tools applicable to the Application domain. These have been grouped into sub-sections (categories), with each category addressing one aspect of the related standards and tools. Further details and links to these standards and tools have been provided in the following sections of this document.

The rationale for selection of these standards and tools are:

- Based on the usage across ministries as captured in the internal survey.
- Technology best practices.
- References from international standards bodies.

2.1. MODELLING, DESIGN AND DEVELOPMENT

Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ Modeling, design and development products are software applications that provide comprehensive facilities to computer programmers for software development, designing and data modeling. Sometimes a version control system and various tools are integrated to simplify the construction of a GUI. Many modern tools also have a class browser, an object inspector, and a class hierarchy diagram, for use with software development.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ Modelling <ul style="list-style-type: none"> ○ UML – (Details) ▪ Design <ul style="list-style-type: none"> ○ IBM Rational Software Modeler (Version 7.5) – (Details) ○ IBM Rational Software Architect for WebSphere Software (Version 7.5.0) – (Details) ○ Microsoft Visio Version 2003 or higher (Current version 2010) – (Details) ▪ Development <ul style="list-style-type: none"> ○ IBM Rational Software Architect for WebSphere Software (Version 7.5.0) – (Details) ○ IBM Rational Application Developer for WebSphere Software (Version 7.5) – (Details) ○ Eclipse and Eclipse Plugins – (Details) ○ Oracle Developer Suite – JDeveloper (Version 10g,11g or higher) – (Details) ○ Microsoft Visual Studio (Version 2008) – (Details)
Remarks	
Exceptions	

2.2. PROGRAMMING LANGUAGES FOR APPLICATION DEVELOPMENT

Introduction to Sub-Category	
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	<ul style="list-style-type: none"> A programming language is an artificial language designed to express computations that can be performed by a machine, particularly a computer. Programming languages can be used to create programs that control the behavior of a machine, to express algorithms precisely, or as a mode of human communication. Various programming languages exist for application development.
Applicable Standard(s)	<ul style="list-style-type: none"> Java – (Details) C# – (Details) Visual Basic – (Details)
Remarks	
Exceptions	

2.3. TECHNOLOGIES FOR APPLICATION DEVELOPMENT

Introduction to Sub-Category	<ul style="list-style-type: none"> Application software is a computer program that functions and is operated by means of a computer, with the purpose of supporting or improving the software user's work. Various technologies exist to support the basic frameworks and programming languages used for application development.
Applicable Standard(s)	<ul style="list-style-type: none"> XML – (Details) SGML – (Details) CSS – (Details) XSLT – (Details) VBScript – (Details) Java Server Pages – (Details) ASP.NET – (Details) Voice XML – (Details) ECMA-262 3rd Edition – (Details) IMPP / XMPP - (Details) HTML v4.01 – (Details) XHTML v1.0 – (Details) JSON – (Details) PHP – (Details)
Remarks	<ul style="list-style-type: none"> ECMAScript is the scripting language, standardized in the ECMA-262 specification. JavaScript, ActionScript, and JScript are popular dialects of dialects of ECMAScript.
Exceptions	

2.4. APPLICATION DEVELOPMENT FRAMEWORKS

Introduction to Sub-Category	<ul style="list-style-type: none"> The complexity, size, lifespan, and performance requirements of
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	applications/solutions developed for ministries/agencies vary greatly. Application development frameworks provide the agencies with distinct approaches to address different application needs/ requirements.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ Microsoft .NET Framework – (Details) ▪ Java Platform, Enterprise Edition – (Details) ▪ Spring Framework – (Details) ▪ JavaServer Faces – (Details) ▪ Apache Struts – (Details) ▪ Apache Wicket – (Details) ▪ Oracle Application Development Framework – (Details) ▪ Javascript – (Details) ▪ AJAX – (Details) ▪ REST – (Details)
Remarks	
Exceptions	

2.5. PORTLET STANDARDS	
Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ Portlets are pluggable user interface software components that are managed and displayed in a web portal. Portlets produce fragments of mark-up code that are aggregated into a portal page. Typically, following the desktop metaphor, a portal page is displayed as a collection of non-overlapping portlet windows, where each portlet window displays a portlet. ▪ Hence a portlet (or collection of portlets) resembles a web-based application that is hosted in a portal. Some examples of portlet applications are email, weather reports, discussion forums, and news. Portlet standards are intended to enable software developers to create portlets that can be plugged in to any portal supporting the standards.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ WSRP - (Details) ▪ Java Portlet Specifications - JSR 168 and JSR 286 – (Details)
Remarks	
Exceptions	

2.6. WEB SERVICE DELIVERY	
Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ The Web Service Delivery, which defines the protocol for remotely requesting application functionality exposed through an interface, will be used by an application to request execution of a service provided by

	another application. The participating applications are autonomous – the implementation of the service is independent of the exposed interface.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ SOAP v1.2 – (Details)
Remarks	
Exceptions	

2.7. WEB SERVICE DESCRIPTION	
Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ The Web Service Description is required to standardise the way that application services are described to enable a standardised approach to requesting remote services, in accordance with the intra-government remote service delivery protocol standard. The standard will be used to describe the interface in terms of characteristics such as its name, a description of its purpose, input parameters and results.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ WSDL v1.1 – (Details)
Remarks	<ul style="list-style-type: none"> ▪ Though WSDL v2.0 is the latest version of the standard, but given the limited support for WSDL 2.0 and the considerably untested interoperability situation, WSDL v1.1 is the recommended standard
Exceptions	

2.8. WEB SERVICE REQUEST REGISTRY	
Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ Standard on Web Service Request Registry is required to define the format, schemas and request protocols to publish and locate descriptions of services described using the web service description standard. ▪ Web Service Request Registry would enable applications to locate services dynamically. An application which requires access to a service can “interrogate” the registry to identify the appropriate service, determine the location of the interface description and then request the service remotely using the web service delivery protocol.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ UDDI v3.0 – (Details)
Remarks	

	<ul style="list-style-type: none"> UDDI is applicable in situations where dynamic discovery of services is required. In situation where Web Service Description Files are required statically, a file system or database repository accessible via a web page can be utilized for publishing the files.
Exceptions	

2.9. WEB SERVICE INTEROPERABILITY

Introduction to Sub-Category	<ul style="list-style-type: none"> Interoperability guidance is required for core Web Services specifications such as Web Service Delivery, Web Service Description and Web Service Request Registry Web Service Interoperability provides a set of named web services specifications together with a set of implementation and interoperability guidelines recommending how the specifications may be used to develop interoperable web services.
Applicable Standard(s)	<ul style="list-style-type: none"> WS-I Basic Profile v1.1 – (Details) WS-I Simple SOAP Binding Profile v1.0 – (Details) WS-I Attachments Profile v1.0 – (Details)
Remarks	
Exceptions	

2.10. WEB SERVICE BUSINESS REPOSITORY

Introduction to Sub-Category	<ul style="list-style-type: none"> Web Service Business Repository standard is required provide an open, XML-based infrastructure that enables the global use of electronic business information in an interoperable, secure, and consistent manner by all trading partners.
Applicable Standard(s)	<ul style="list-style-type: none"> ebXML Registry Services Specification v2.1 – (Details) ebXML Registry Information Model v2.1 – (Details)
Remarks	
Exceptions	

2.11. BUSINESS RULES ENGINES

Introduction to Sub-Category	<ul style="list-style-type: none"> The business rule engines will provide the ability to develop a flexible
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	<p>way to separate the business rules that have a higher probability of change from the business logic.</p> <ul style="list-style-type: none"> ▪ A business rules engine is a software system that executes one or more business rules in a runtime production environment. ▪ A business rule system enables these company policies and other operational decisions to be defined, tested, executed and maintained separately from application code.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ Oracle Business Rules/CEP Engine – (Details) ▪ Pega Business Rules Engine – (Details) ▪ IBM iLog BRMS – (Details)
Remarks	
Exceptions	

2.12. APPLICATION INTEGRATION	
Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ Application integration provides technologies for integration of a wide variety of applications. Application integration might use a service that enables running a legacy system through a thin-client browser or a service that enables the execution of multiple application functions from an integrated user interface. The methods used to achieve this integration include web services, message oriented middleware, remote procedure calls and object request brokers.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ Web Services – (Details) ▪ Message Oriented Middleware <ul style="list-style-type: none"> ○ Oracle Enterprise Service Bus (ESB) – (Details) ○ TIBCO Rendezvous – (Details) ○ IBM WebSphere MQ – (Details) ○ Microsoft Message Queuing – (Details) ○ Microsoft BizTalk Server – (Details)
Remarks	
Exceptions	

2.13. REPORTING TOOLS	
Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ Reporting tools are necessary to write reports to a screen or to a printer or into files such as PDF, HTML, Microsoft Excel, RTF, ODT, Comma-separated values and XML files.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ Crystal Reports – (Details) ▪ Jasper Reports – (Details) ▪ Oracle Reports – (Details) ▪ Oracle OBIEE – (Details)

	<ul style="list-style-type: none"> ▪ Cognos ReportNet – (Details)
Remarks	
Exceptions	

2.14. BUSINESS INTELLIGENCE	
Introduction to Sub - Category	<ul style="list-style-type: none"> ▪ Business intelligence (BI) refers to skills, technologies, applications and practices used to help a business acquire a better understanding of its commercial context. Business intelligence may also refer to the collected information itself. BI technologies provide historical, current, and predictive views of business operations. Business intelligence often aims to support better business decision-making. Thus a BI system can be called a decision support system (DSS).
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ IBM Cognos 8 Business Intelligence (current version is 10) – (Details) ▪ Microsoft BI Products - SQL Server 2008, Sharepoint Server 2007 and Microsoft Office Utilities – (Details) ▪ SAP BusinessObjects Crystal Reports 2008 – (Details) ▪ Oracle Business Intelligence Products – (Details) ▪ Oracle Discoverer 10g (Current version 11g) – (Details)
Remarks	
Exceptions	

2.15. GEOGRAPHIC INFORMATION SYSTEM (GIS)	
Introduction to Sub-Category	<ul style="list-style-type: none"> ▪ A geographic information system (GIS), or geographical information system captures, stores, analyzes, manages, and presents data that is linked to location. Technically, GIS is geographic information systems which includes mapping software and its application with remote sensing, land surveying, aerial photography, mathematics, photogrammetry, geography, and tools that can be implemented with GIS software. Still, many refer to "geographic information system" as GIS even though it doesn't cover all tools connected to topology. In the strictest sense, the term describes any information system that integrates, stores, edits, analyzes, shares, and displays geographic information.
Applicable Standard(s)	<ul style="list-style-type: none"> ▪ ESRI ArcGIS – (Details)
Remarks	
Exceptions	

3. DETAILS OF STANDARDS / SPECIFICATIONS AND ASSOCIATED GUIDELINES

This section provides a brief description of the relevant standards listed in section 2 along with links for references to these standards.

3.1. SOAP v1.2	
Description	<ul style="list-style-type: none">▪ SOAP Version 1.2 (SOAP) is a lightweight protocol intended for exchanging structured information in a decentralized, distributed environment. It uses XML technologies to define an extensible messaging framework providing a message construct that can be exchanged over a variety of underlying protocols.▪ The framework has been designed to be independent of any particular programming model and other implementation specific semantics.
Applicable to	<ul style="list-style-type: none">▪ Web Service Delivery
Reference(s)	<ul style="list-style-type: none">▪ http://www.w3.org/TR/soap12-part1/#intro
Remarks	<ul style="list-style-type: none">▪ Two major design goals for SOAP are simplicity and extensibility (see XMLP Requirements [XMLP Requirements]). SOAP attempts to meet these goals by omitting, from the messaging framework, features that are often found in distributed systems.▪ Such features include but are not limited to "reliability", "security", "correlation", "routing", and "Message Exchange Patterns" (MEPs). While it is anticipated that many features will be defined, this specification provides specifics only for two MEPs. Other features are left to be defined as extensions by other specifications.

3.2. WSDL v1.1	
Description	<ul style="list-style-type: none">▪ WSDL is an XML format for describing network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented information. The operations and messages are described abstractly, and then bound to a concrete network protocol and message format to define an endpoint. Related concrete endpoints are combined into abstract endpoints (services).▪ WSDL is extensible to allow description of endpoints and their messages regardless of what message formats or network protocols are used to communicate, however, the only bindings described in this document describe how to use WSDL in conjunction with SOAP

	1.1, HTTP GET/POST, and MIME.
Applicable to	<ul style="list-style-type: none"> ▪ Web Service Description
Reference(s)	<ul style="list-style-type: none"> ▪ http://www.w3.org/TR/wsdl
Remarks	<ul style="list-style-type: none"> ▪ WSDL is written in XML ▪ WSDL is an XML document ▪ WSDL is used to describe Web services ▪ WSDL is also used to locate Web services

3.3. UDDI v3.0	
Description	<ul style="list-style-type: none"> ▪ UDDI Version 3.0, an OASIS Standard, builds on the vision of UDDI: a "meta service" for locating web services by enabling robust queries against rich metadata. ▪ Expanding on the foundation of versions 1 and 2, version 3 offers the industry a specification for building flexible, interoperable XML Web services registries useful in private as well as public deployments.
Applicable to	<ul style="list-style-type: none"> ▪ Web Service Request Registry
Reference(s)	<ul style="list-style-type: none"> ▪ http://www.oasis-open.org/committees/uddi-spec/doc/tcspecs.htm#uddiv3
Remarks	<ul style="list-style-type: none"> ▪ Within the government environment there is a need for the development of a virtual marketplace of data and services that will allow the evolution into a distributed environment for integrated planning and control. No single organization or contractor will be able to envision or accomplish this integrated vision. ▪ The UDDI standards and tools being developed by the commercial world can provide a non-proprietary market place where agencies and contractors can describe their mission related roles and the types of services and data that they provide.

3.4. WS-I BASIC PROFILE v1.1	
Description	

	<ul style="list-style-type: none"> ▪ WS-I Basic Profile v1.1 Profile is derived from the Basic Profile 1.0 by incorporating any errata to date and separating out those requirements related to the serialization of envelopes and their representation in messages. Such requirements are now part of the Simple SOAP Binding Profile 1.0, identified with a separate conformance claim. ▪ This separation is made to facilitate composability of Basic Profile 1.1 with any profile that specifies envelope serialization, including the Simple SOAP Binding Profile 1.0 and the Attachments Profile 1.0. A combined claim of conformance to both the Basic Profile 1.1 and the Simple SOAP Binding Profile 1.0 is roughly equivalent to a claim of conformance to the Basic Profile 1.0 plus published errata.
Applicable to	<ul style="list-style-type: none"> ▪ Web Service Interoperability
Reference(s)	<ul style="list-style-type: none"> ▪ http://www.ws-i.org/Profiles/BasicProfile-1.1.html
Remarks	<ul style="list-style-type: none"> ▪ IT is an open industry organization chartered to establish Best Practices for Web services interoperability, for selected groups of Web services standards, across platforms, operating systems and programming languages. ▪ WS-I's deliverables provide resources for Web services developers to create interoperable Web services and verify that their results are compliant with WS-I guidelines. ▪ Key WS-I deliverables include Profiles, Sample Applications and Testing Tools.

3.5. WS-I SIMPLE SOAP BINDING PROFILE V1.0

Description	<ul style="list-style-type: none"> ▪ WS-I Simple SOAP Binding Profile Version 1.0 (SSBP 1.0) is a set of non-proprietary Web services specifications, along with clarifications and amendments to those specifications which promote interoperability. ▪ The SSBP 1.0 is derived from the WS-I Basic Profile 1.0 requirements that relate to the serialization of the envelope and its representation in the message. ▪ WS-I Basic Profile 1.0 is split into two separately published profiles. These profiles are: <ul style="list-style-type: none"> • WS-I Basic Profile Version 1.1 • WS-I Simple SOAP Binding Profile Version 1.0 ▪ Together these two profiles supersede the WS-I Basic Profile Version 1.0.
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Applicable to	<ul style="list-style-type: none"> Web Service Interoperability
Reference(s)	<ul style="list-style-type: none"> http://www.ws-i.org/Profiles/SimpleSoapBindingProfile-1.0.html
Remarks	<ul style="list-style-type: none"> IT is an open industry organization chartered to establish Best Practices for Web services interoperability, for selected groups of Web services standards, across platforms, operating systems and programming languages.

3.6. WS-I ATTACHMENTS PROFILE V1.0

Description	<ul style="list-style-type: none"> WS-I Attachments Profile 1.0, consists of a set of non-proprietary Web services specifications, along with clarifications and amendments to those specifications that are intended to promote interoperability.
Applicable to	<ul style="list-style-type: none"> Web Service Interoperability
Reference(s)	<ul style="list-style-type: none"> http://www.ws-i.org/Profiles/AttachmentsProfile-1.0.html
Remarks	<ul style="list-style-type: none"> This profile complements the WS-I Basic Profile 1.1 to add support for interoperable SOAP Messages with Attachments-based Web services.

3.7. EBXML REGISTRY SERVICES SPECIFICATION V2.1

Description	<ul style="list-style-type: none"> The ebXML Registry provides a set of services that enable sharing of information between interested parties for the purpose of enabling business process integration between such parties based on the ebXML specifications. The shared information is maintained as objects in a repository and managed by the ebXML Registry Services defined in this document.
Applicable to	<ul style="list-style-type: none"> Web Service Business Repository
Reference(s)	<ul style="list-style-type: none"> http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=regrep

Remarks	<ul style="list-style-type: none"> ▪ The Registry provides a stable store where information submitted by a Submitting Organization is made persistent. Such information is used to facilitate ebXML-based Business to Business (B2B) partnerships and transactions. Submitted content may be XML schema and documents, process descriptions, ebXML Core Components, context descriptions, UML models, information about parties and even software components. ▪ The ebXML Registry architecture consists of an ebXML Registry Service and ebXML Registry Clients. The ebXML Registry Service provides the methods for managing a repository. An ebXML Registry Client is an application used to access the Registry.
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3.8. EBXML REGISTRY INFORMATION MODEL V2.1

Description	<ul style="list-style-type: none"> ▪ The Registry Information Model provides a blueprint or high-level schema for the ebXML Registry. Its primary value is for implementers of ebXML Registries. It provides these implementers with information on the type of metadata that is stored in the Registry as well as the relationships among metadata Classes. ▪ The Registry information model: <ul style="list-style-type: none"> • Defines what types of objects are stored in the Registry. • Defines how stored objects are organized in the Registry.
Applicable to	<ul style="list-style-type: none"> ▪ Web Service Business Repository
Reference(s)	<ul style="list-style-type: none"> ▪ http://www.ebxml.eu.org/registry.htm
Remarks	<ul style="list-style-type: none"> ▪ The Registry Information Model may be implemented within an ebXML Registry in the form of a relational database schema, object database schema or some other physical schema. It may also be implemented as interfaces and classes within a Registry Implementation.

3.9. PHP

Description	<ul style="list-style-type: none"> ▪ PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. ▪ PHP code is interpreted by a web server with a PHP processor module, which generates
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	the resulting web page: PHP commands can be embedded directly into an HTML source document rather than calling an external file to process data. It has also evolved to include a command-line interface capability and can be used in standalone graphical applications.
Applicable to	<ul style="list-style-type: none"> ▪ Technologies for Application Development ▪ Client Side Scripting
Reference(s)	<ul style="list-style-type: none"> ▪ http://www.php.net
Remarks	

3.10. JSON

Description	<ul style="list-style-type: none"> ▪ JSON (JavaScript Object Notation) is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate. It is based on a subset of the JavaScript Programming Language, Standard ECMA-262 3rd Edition - December 1999. JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. These properties make JSON an ideal data-interchange language.
Applicable to	<ul style="list-style-type: none"> ▪ Technologies for Application Development ▪ Data-interchange Formats
Reference(s)	<ul style="list-style-type: none"> ▪ http://www.json.org/
Remarks	<ul style="list-style-type: none"> ▪ JSON is an implementation of the ECMA-262 specification mentioned in the section below.

3.11. ECMA-262 3RD EDITION

Description	<ul style="list-style-type: none"> ▪ ECMAScript is an object-oriented programming language for performing computations and manipulating computational objects within a host environment. ▪ ECMAScript program will provide not only the objects and other facilities described in this specification but also certain environment-specific host objects, whose description and behaviour are beyond the scope of this specification except to indicate that they may provide certain properties that can be accessed and certain functions that can be called
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	from an ECMAScript program.
Applicable to	<ul style="list-style-type: none"> Client Side Scripting
Reference(s)	<ul style="list-style-type: none"> http://www.ecma-international.org/publications/standards/Ecma-262.htm
Remarks	<ul style="list-style-type: none"> Ecma Standard is based on several originating technologies, the most well-known being JavaScript (Netscape) and JScript (Microsoft). The language was invented by Brendan Eich at Netscape and first appeared in that company's Navigator 2.0 browser. It has appeared in all subsequent browsers from Netscape and in all browsers from Microsoft starting with Internet Explorer 3.0.

3.12. HTML

Description	<ul style="list-style-type: none"> HTML defines the HyperText Markup Language (HTML), the publishing language of the World Wide Web. HTML 5 is the newest version of HTML and is currently being widely used. It will be considered for both application and mobile domains when it has been published. HTML5 is intended to subsume not only HTML 4, but also XHTML 1 and DOM Level 2 HTML.
Applicable to	<ul style="list-style-type: none"> HyperText Interchange
Reference(s)	<ul style="list-style-type: none"> http://www.w3.org/TR/html5/ http://www.w3.org/TR/REC-html40/ Hypertext Markup Language (HTML) http://www.w3.org/TR/html401
Remarks	<ul style="list-style-type: none"> HTML supports multimedia options, scripting languages, style sheets, better printing facilities, and documents that are more accessible to users with disabilities. HTML has also taken great strides towards the internationalization of documents, with the goal of making the Web truly World Wide.

3.13. XHTML v1.0

Description	<ul style="list-style-type: none"> XHTML is a family of current and future document types and modules that reproduce, subset, and extend HTML 4 [HTML4].
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	<ul style="list-style-type: none"> ▪ XHTML family document types are XML based, and ultimately are designed to work in conjunction with XML-based user agents.
Applicable to	<ul style="list-style-type: none"> ▪ HyperText Interchange
Reference(s)	<ul style="list-style-type: none"> ▪ http://www.w3.org/TR/xhtml1/
Remarks	<ul style="list-style-type: none"> ▪ XHTML 1.0 is the first document type in the XHTML family. It is a reformulation of the three HTML 4 document types as applications of XML 1.0 [XML]. It is intended to be used as a language for content that is both XML-conforming and, if some simple guidelines are followed, operates in HTML 4 conforming user agents. Developers who migrate their content to XHTML 1.0 will realize the following benefits: <ul style="list-style-type: none"> • XHTML documents are XML conforming. As such, they are readily viewed, edited, and validated with standard XML tools. • XHTML documents can be written to operate as well or better than they did before in existing HTML 4-conforming user agents as well as in new, XHTML 1.0 conforming user agents. • XHTML documents can utilize applications (e.g. scripts and applets) that rely upon either the HTML Document Object Model or the XML Document Object Model [DOM]. • As the XHTML family evolves, documents conforming to XHTML 1.0 will be more likely to interoperate within and among various XHTML environments. ▪ The XHTML family is the next step in the evolution of the Internet. By migrating to XHTML today, content developers can enter the XML world with all of its attendant benefits, while still remaining confident in their content's backward and future compatibility.

3.14. WSRP	
Description	<ul style="list-style-type: none"> ▪ Web Services for Remote Portlets (WSRP) is an XML and Web Services specification that will allow for the plug-n-play of: portals, other intermediary web applications that aggregate content, and applications from disparate sources.
Applicable to	<ul style="list-style-type: none"> ▪ Portlet Standards
Reference(s)	<ul style="list-style-type: none"> ▪ http://www.service-architecture.com/web-services/articles/web_services_for_remote_portals_wsrp.html

Remarks	<ul style="list-style-type: none"> Web Services for Remote Portlets will be designed to enable businesses to provide content or applications in a form that does not require any manual content or application-specific adaptation by consuming applications.
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3.15. XMPP	
Description	<ul style="list-style-type: none"> Extensible Messaging and Presence Protocol (XMPP) (formerly named Jabber) is an open, XML-based protocol originally aimed at near-real-time, extensible instant messaging (IM) and presence information (e.g., buddy lists), but now expanded into the broader realm of message-oriented middleware. It was developed by the Jabber open-source community in 1999. Built to be extensible, the protocol has been extended with features such as Voice over Internet Protocol and file transfer signaling.
Applicable to	<ul style="list-style-type: none"> Real-time messaging services
Reference(s)	<ul style="list-style-type: none"> http://xmpp.org/xsf/press/2004-10-04.shtml
Remarks	<ul style="list-style-type: none"> The Extensible Messaging and Presence Protocol (XMPP) is an open technology for real-time communication, which powers a wide range of applications including instant messaging, presence, multi-party chat, voice and video calls, collaboration, lightweight middleware, content syndication, and generalized routing of XML data.

3.16. MICROSOFT .NET FRAMEWORK	
Description	<ul style="list-style-type: none"> The Microsoft .NET Framework is a software framework that can be installed on computers running Microsoft Windows operating systems. It includes a large library of coded solutions to common programming problems and a virtual machine that manages the execution of programs written specifically for the framework. The .NET Framework is a key Microsoft offering and is intended to be used by most new applications created for the Windows platform.
Applicable to	<ul style="list-style-type: none"> Application Development Frameworks
Reference(s)	<ul style="list-style-type: none"> Microsoft .NET Framework http://www.microsoft.com/.NET
Remarks	

3.17. JAVA PLATFORM ENTERPRISE EDITION

Description	<ul style="list-style-type: none">Java Platform, Enterprise Edition or Java EE is a widely used platform for server programming in the Java programming language. The Java platform, Enterprise Edition provides functionality to deploy fault-tolerant, distributed, multi-tier Java software, based largely on modular components running on an application server.
Applicable to	<ul style="list-style-type: none">Application Development Frameworks
Reference(s)	<ul style="list-style-type: none">Java Platform, Enterprise Edition http://java.sun.com/javaeehttp://www.oracle.com/technetwork/java/javaee/overview/index.html
Remarks	

3.18. SPRING FRAMEWORK

Description	<ul style="list-style-type: none">The Spring Framework is an open source application framework for the Java platform and .NET Framework
Applicable to	<ul style="list-style-type: none">Application Development Frameworks
Reference(s)	<ul style="list-style-type: none">Spring Framework http://www.springsource.org
Remarks	

3.19. APACHE STRUTS

Description	<ul style="list-style-type: none">Apache Struts is an open-source web application framework for developing Java EE web applications. It uses and extends the Java Servlet API to encourage developers to adopt a model-view-controller (MVC) architecture.
Applicable to	<ul style="list-style-type: none">Application Development Frameworks
Reference(s)	<ul style="list-style-type: none">Apache Struts http://struts.apache.org
Remarks	

3.20. APACHE WICKET

Description	<ul style="list-style-type: none">Apache Wicket is a lightweight component-based web application framework for the Java programming language conceptually similar to JavaServer Faces.
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Applicable to	<ul style="list-style-type: none"> Application Development Frameworks
Reference(s)	<ul style="list-style-type: none"> Apache Wicket http://wicket.apache.org
Remarks	

3.21. ORACLE APPLICATION DEVELOPMENT FRAMEWORK (ADF)

Description	<ul style="list-style-type: none"> Oracle ADF is an end-to-end Java EE framework that simplifies development by providing out of the box infrastructure services and a visual and declarative development experience.
Applicable to	<ul style="list-style-type: none"> Application Development Frameworks
Reference(s)	<ul style="list-style-type: none"> Oracle Application Development Framework http://www.oracle.com/technology/products/adf/index.html
Remarks	

3.22. JAVASCRIPT

Description	<ul style="list-style-type: none"> JavaScript (sometimes abbreviated JS) is a prototype-based scripting language that is dynamic, weakly typed and has first-class functions. It is a multi-paradigm language, supporting object-oriented, imperative, and functional programming styles. JavaScript was formalized in the ECMAScript language standard and is primarily used in the form of client-side JavaScript, implemented as part of a Web browser in order to provide enhanced user interfaces and dynamic websites. This enables programmatic access to computational objects within a host environment.
Applicable to	<ul style="list-style-type: none"> Application Development Frameworks
Reference(s)	<ul style="list-style-type: none"> JavaScript (ECMAScript) - http://www.ecma-international.org/publications/standards/Ecma-262.htm
Remarks	

3.23. AJAX

Description	<ul style="list-style-type: none"> AJAX is an acronym for Asynchronous JavaScript and XML. The term Ajax has come to represent a broad group of web technologies that can be used to implement a web application that communicates with a server in the background, without interfering with the current state of the page. In the article that coined the term
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	<p>Ajax, Jesse James Garrett explained that the following technologies are incorporated:</p> <ul style="list-style-type: none"> ○ HTML (or XHTML) and CSS for presentation ○ The Document Object Model (DOM) for dynamic display of and interaction with data ○ XML for the interchange of data, and XSLT for its manipulation ○ The XMLHttpRequest object for asynchronous communication ○ JavaScript to bring these technologies together <ul style="list-style-type: none"> ▪ XML is not required for data interchange and therefore XSLT is not required for the manipulation of data. JavaScript Object Notation (JSON) is often used as an alternative format for data interchange, although other formats such as preformatted HTML or plain text can also be used.
Applicable to	<ul style="list-style-type: none"> ▪ Application Development Frameworks
Reference(s)	<ul style="list-style-type: none"> ▪ AJAX – ▪ http://www.adaptivepath.com/ideas/ajax-new-approach-web-applications ▪ http://www.w3schools.com/ajax/default.asp
Remarks	

3.24. REPRESENTATIONAL STATE TRANSFER (REST)

Description	<ul style="list-style-type: none"> ▪ Representational State Transfer (REST) is a style of software architecture for distributed systems such as the World Wide Web. REST has emerged over the past few years as a predominant Web service design model. REST has increasingly displaced other design models such as SOAP and WSDL due to its simpler style.
Applicable to	<ul style="list-style-type: none"> ▪ Application Development Frameworks
Reference(s)	<ul style="list-style-type: none"> ▪ REST – ▪ http://www.ics.uci.edu/~fielding/pubs/dissertation/rest_arch_style.htm ▪ http://tools.ietf.org/html/rfc2616
Remarks	

3.25. WEB SERVICES

Description	<ul style="list-style-type: none"> ▪ Web Service is defined as a software system designed to support interoperable machine-to-machine interaction over a network. Web services standards such as SOAP and WSDL have been defined under “Web Services” standards document.
Applicable to	<ul style="list-style-type: none"> ▪ Application Integration
Reference(s)	<ul style="list-style-type: none"> ▪ Web Services - http://www.w3.org/standards/webofservices/

Remarks	
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3.26. JAVA PORTLET SPECIFICATION

Description	<ul style="list-style-type: none"> The Java Portlet Specification defines a contract between the portlet container and portlets and provides a convenient programming model for Java portlet developers.
Applicable to	<ul style="list-style-type: none"> Portlet Standards
Reference(s)	<ul style="list-style-type: none"> Java Specification Request (JSR 286) http://www.jcp.org/en/jsr/detail?id=286 Java Specification Request (JSR 168) - http://jcp.org/aboutJava/communityprocess/final/jsr168/
Remarks	

3.27. JAVA

Description	<ul style="list-style-type: none"> Java is a programming language originally developed by James Gosling at Sun Microsystems and released in 1995 as a core component of Sun Microsystems' Java platform. The language derives much of its syntax from C and C++ but has a simpler object model and fewer low-level facilities. Java applications are typically compiled to bytecode (class file) that can run on any Java virtual machine (JVM) regardless of computer architecture.
Applicable to	<ul style="list-style-type: none"> Programming Languages for Application Development
Reference(s)	<ul style="list-style-type: none"> Java - http://www.oracle.com/technetwork/java/index.html
Remarks	

3.28. C#

Description	<ul style="list-style-type: none"> C# (pronounced "C Sharp") is a multi-paradigm programming language encompassing imperative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines. It was developed by Microsoft within the .NET initiative and later approved as a standard by Ecma (ECMA-334) and ISO (ISO/IEC 23270). C# is one of the programming languages designed for the Common Language Infrastructure.
Applicable to	<ul style="list-style-type: none"> Programming Languages for Application Development

Reference(s)	<ul style="list-style-type: none"> ▪ C# Programming Language standardized by International Organization for Standardization under ISO/IEC 23270 http://www.iso.org/iso/catalogue_detail.htm?csnumber=36768
Remarks	

3.29. VISUAL BASIC	
Description	<ul style="list-style-type: none"> ▪ Visual Basic, formerly called Visual Basic .NET (VB.NET), is an object-oriented computer programming language that can be viewed as an evolution of Microsoft's Visual Basic (VB) implemented on the Microsoft .NET Framework. Visual Basic 7.0 was known as Visual Basic.NET, whereas version 8.0 was renamed as Visual Basic. Visual Basic 6.0 is no longer support by Microsoft and the Mainstream Support for Visual Basic 7.X has also ended. ▪ Visual Basic 2010 Express is part of the Visual Studio 2010 Express family, a free set of tools that Windows developers at any level can use to create custom applications using basic and expert settings. Visual Basic provides a fast and easy way to create .NET Framework-based Windows applications. As with all programs that target the .NET Framework, programs written in Visual Basic benefit from security and language interoperability.
Applicable to	<ul style="list-style-type: none"> ▪ Programming Languages for Application Development
Reference(s)	<ul style="list-style-type: none"> ▪ Visual Basic - http://www.microsoft.com/visualstudio/en-us/products/2010-editions/visual-basic-express
Remarks	

3.30. XML	
Description	<ul style="list-style-type: none"> ▪ XML (Extensible Markup Language) is a set of rules for encoding documents electronically. It is defined in the XML 1.0 Specification produced by the W3C. XML's design goals emphasize simplicity, generality, and usability over the Internet. It is a textual data format, with strong support via Unicode for the languages of the world. Although XML's design focuses on documents, it is widely used for the representation of arbitrary data structures.
Applicable to	<ul style="list-style-type: none"> ▪ Technologies For Application Development
Reference(s)	<ul style="list-style-type: none"> ▪ Extensible Markup Language (XML) http://www.w3.org/TR/REC-xml
Remarks	

3.31. SGML

Description	<ul style="list-style-type: none">▪ The Standard Generalized Markup Language (ISO 8879:1986 SGML) is an ISO-standard technology, per ISO Annex A.2, for defining generalized markup languages for documents.
Applicable to	<ul style="list-style-type: none">▪ Technologies For Application Development
Reference(s)	<ul style="list-style-type: none">▪ Standard Generalized Markup Language (SGML) standardized by International Organization for Standardization under ISO 8879:1986 http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=16387
Remarks	

3.32. CSS

Description	<ul style="list-style-type: none">▪ Cascading Style Sheets (CSS) is a style sheet language used to describe the presentation (that is, the look and formatting) of a document written in a markup language. Its most common application is to style web pages written in HTML and XHTML, but the language can be applied to any kind of XML document.
Applicable to	<ul style="list-style-type: none">▪ Technologies For Application Development
Reference(s)	<ul style="list-style-type: none">▪ Cascading Style Sheets (CSS) http://www.w3.org/TR/CSS2
Remarks	

3.33. XSL TRANSFORMATION

Description	<ul style="list-style-type: none">▪ XSL Transformations (XSLT) is a declarative XML-based language used for the transformation of XML documents into other XML documents. The original document is not changed; rather, a new document is created based on the content of an existing one. The new document may be serialized (output) by the processor in standard XML syntax or in another format, such as HTML or plain text.
Applicable to	<ul style="list-style-type: none">▪ Technologies For Application Development
Reference(s)	<ul style="list-style-type: none">▪ XSL Transformations (XSLT) http://www.w3.org/TR/xslt20▪ http://www.w3.org/standards/techs/xslt#w3c_all
Remarks	

3.34. VBSCRIPT

Description	<ul style="list-style-type: none">▪ VBScript (short for Visual Basic Scripting Edition) is an Active Scripting language, developed by Microsoft, which uses the Component Object Model to access elements of the environment within which it is running (e.g. FileSystemObject or FSO used to create, read, update and delete files). The language's syntax reflects its origins as a limited variation of Microsoft's Visual Basic programming language. VBScript was used with Active Server Pages.▪ With the advent of the .NET framework, the scripting team took the decision to implement future support for VBScript within ASP.NET for web development,
Applicable to	<ul style="list-style-type: none">▪ Technologies For Application Development
Reference(s)	<ul style="list-style-type: none">▪ VBScript - http://msdn.microsoft.com/en-us/library/t0aew7h6(VS.85).aspx
Remarks	

3.35. ASP .NET

Description	<ul style="list-style-type: none">▪ Active Server Pages (ASP), also known as Classic ASP or ASP Classic, was Microsoft's first server-side script engine for dynamically-generated web pages. Initially released as an add-on to Internet Information Services (IIS) via the Windows NT 4.0 Option Pack, it was subsequently included as a free component of Windows Server (since the initial release of Windows 2000 Server). It has now been superseded by ASP.NET.▪ ASP.NET is a Web application framework developed and marketed by Microsoft to allow programmers to build dynamic Web sites, Web applications and Web services. It was first released in January 2002 with version 1.0 of the .NET Framework, and is the successor to Microsoft's Active Server Pages (ASP) technology. ASP.NET is built on the Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language. The ASP.NET SOAP extension framework allows ASP.NET components to process SOAP messages.
Applicable to	<ul style="list-style-type: none">▪ Technologies For Application Development
Reference(s)	<ul style="list-style-type: none">▪ http://www.asp.net/
Remarks	

3.36. JAVA SERVER PAGES

Description	<ul style="list-style-type: none">▪ JavaServer Pages (JSP) technology provides a simplified, fast way to create dynamic web content. JSP technology enables rapid development of web-based applications that are
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	<p>server- and platform-independent.</p> <ul style="list-style-type: none"> ▪ To deploy and run JavaServer Pages, a compatible web server with a servlet container is required.
Applicable to	<ul style="list-style-type: none"> ▪ Technologies For Application Development
Reference(s)	<ul style="list-style-type: none"> ▪ Java Server Pages - http://www.oracle.com/us/products/tools/jsp-138432.html
Remarks	

3.37. VOICE XML (VXML)

Description	<ul style="list-style-type: none"> ▪ VoiceXML is designed for creating audio dialogs that feature synthesized speech, digitized audio, recognition of spoken and DTMF key input, recording of spoken input, telephony, and mixed initiative conversations. Its major goal is to bring the advantages of Web-based development and content delivery to interactive voice response applications.
Applicable to	<ul style="list-style-type: none"> ▪ Technologies For Application Development
Reference(s)	<ul style="list-style-type: none"> ▪ Voice XML - http://www.w3.org/TR/voicexml20/
Remarks	

3.38. UML

Description	<ul style="list-style-type: none"> ▪ The Unified Modeling Language™ - UML - is OMG's most-used specification, and the way the world models not only application structure, behavior, and architecture, but also business process and data structure.
Applicable to	<ul style="list-style-type: none"> ▪ Modelling, Design and Development
Reference(s)	<ul style="list-style-type: none"> ▪ http://uml.org/
Remarks	

4. DETAILS OF TOOLS SUPPORTING RECOMMENDED STANDARDS

This section provides a brief description of the relevant tools listed in section 2 along with links for references to these tools.

4.1. ORACLE BUSINESS RULES	
Description	<ul style="list-style-type: none"> Oracle Business Rules makes processes and applications more flexible by enabling business analysts and non-developers to easily define and modify business logic without programming. Oracle Business Rules consist of a rule authoring tool, a rules engine, and software developer kit (SDK). The authoring tool presents an English-like paradigm for declaring rules that can be used by both programmers and business analysts. The rules engine is a fast and efficient JSR-94 compliant RETE based engine written in Java. The SDK enables rules generation by custom rules editing applications.
Applicable to	<ul style="list-style-type: none"> Business Rules Engines
Reference(s)	<ul style="list-style-type: none"> Oracle Business Rules - http://www.oracle.com/us/solutions/ent-performance-bi/business-intelligence/rules-066590.html
Remarks	<ul style="list-style-type: none"> Business Rules makes processes and applications more flexible. By defining and maintaining business rules outside of the related process or application, Business Rules provides faster, easier rule modifications and reduces subsequent redeployment costs

4.2. PEGA BUSINESS RULES	
Description	<ul style="list-style-type: none"> Pega's unified environment and engine handling business processes, rules, and analytics-based-decisioning. You can organize and manage rules by time, versioning, classification (inheritance), circumstance and security (role and access), enabling you to maintain many rule variations to account for specific situations or exceptions that may affect a process.
Applicable to	<ul style="list-style-type: none"> Business Rules Engines
Reference(s)	<ul style="list-style-type: none"> Pega - http://www.pega.com/products/decision-management/business-rules
Remarks	<ul style="list-style-type: none"> Business Rules makes processes and applications more flexible. By defining and maintaining business rules outside of the related process or application, Business Rules provides faster, easier rule modifications and reduces subsequent redeployment costs

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4.3. IBM WEBSHERE (ILOG) BUSINESS RULES	
Description	<ul style="list-style-type: none"> ▪ A business rules management system (BRMS) is an essential technology within Operational Decision Management, enabling organizational policies – and the repeatable decisions associated with those policies, such as claim approvals, cross-sell offer selection, pricing calculations and eligibility determinations – to be defined, deployed, monitored and maintained separately from application code. ▪ WebSphere Operational Decision Management provides the ability for non-technical business users to be directly involved in business rules management, enabling flexible decision automation for applications and processes that are subject to complex, variable and evolving business rules.
Applicable to	<ul style="list-style-type: none"> ▪ Business Rules Engines
Reference(s)	<ul style="list-style-type: none"> ▪ IBM iLog - http://www-01.ibm.com/software/websphere/ilog/ ▪ http://www-01.ibm.com/software/websphere/products/business-rule-management/
Remarks	<ul style="list-style-type: none"> ▪ Business Rules makes processes and applications more flexible. By defining and maintaining business rules outside of the related process or application, Business Rules provides faster, easier rule modifications and reduces subsequent redeployment costs

4.4. ORACLE ENTERPRISE SERVICE BUS	
Description	<ul style="list-style-type: none"> ▪ Oracle Service Bus is a proven, lightweight and scalable SOA integration platform that delivers low-cost, standards-based integration for high-volume, mission critical SOA environments. It is designed to connect, mediate, and manage interactions between heterogeneous services, legacy applications, packaged applications and multiple enterprise service bus (ESB) instances across an enterprise-wide service network. Oracle Service Bus provides built-in management and monitoring capabilities and supports out-of-the-box integration with SOA Governance products.
Applicable to	<ul style="list-style-type: none"> ▪ Application Integration
Reference(s)	<ul style="list-style-type: none"> ▪ Oracle ESB - http://www.oracle.com/us/technologies/soa/service-bus/index.html
Remarks	

4.5. IBM WEBSHERE MQ

Description	<ul style="list-style-type: none">▪ IBM WebSphere MQ accelerates that flow without complexity, cutting costs and reducing maintenance, improving business responsiveness and connecting to new solutions and technologies from the mainframe to the mobile enterprise.▪ It enables devices (e.g. Smartphones, Remote Sensors, Smart Meters, RFID tags) to be rapidly and easily connected with existing applications and services.
Applicable to	<ul style="list-style-type: none">▪ Application Integration
Reference(s)	<ul style="list-style-type: none">▪ IBM WebSphere MQ http://www-01.ibm.com/software/integration/wmq/
Remarks	

4.6. MICROSOFT MESSAGE QUEUE (MSMQ)

Description	<ul style="list-style-type: none">▪ Message Queuing (MSMQ) technology enables applications running at different times to communicate across heterogeneous networks and systems that may be temporarily offline.▪ Message Queuing provides guaranteed message delivery, efficient routing, security, and priority-based messaging. It can be used to implement solutions to both asynchronous and synchronous scenarios requiring high performance. The several places where Message Queuing can be used are - Mission-critical financial services, Embedded and hand-held applications and Workflow.
Applicable to	<ul style="list-style-type: none">▪ Application Integration
Reference(s)	<ul style="list-style-type: none">▪ Microsoft MQ http://msdn.microsoft.com/en-us/library/ms711472%28VS.85%29.aspx
Remarks	

4.7. MICROSOFT BIZTALK SERVER

Description	<ul style="list-style-type: none">▪ BizTalk Server is Microsoft's Integration and connectivity server solution. A mature product on its seventh release, BizTalk Server 2010 provides a solution that allows organizations to more easily connect disparate systems. Including over 25 multi-platform adapters and a robust messaging infrastructure, BizTalk Server provides connectivity between core systems both inside and outside your organization. In addition to integration functionality, BizTalk also provides strong durable messaging, a rules engine, EDI connectivity, Business Activity Monitoring (BAM), RFID capabilities and IBM Host/Mainframe connectivity.
Applicable to	<ul style="list-style-type: none">▪ Application Integration

Reference(s)	<ul style="list-style-type: none"> Microsoft BizTalk Server http://www.microsoft.com/biztalk/en/us/default.aspx
Remarks	

4.8. TIBCO RENDEZVOUS

Description	<ul style="list-style-type: none"> TIBCO Rendezvous® is the leading low latency messaging product for real-time high throughput data distribution applications. It is the most widely deployed, most widely supported, and most widely proven low latency messaging solution on the market today. It is used for applications ranging from market data distribution and trading applications; to real-time control systems for manufacturing plants, supply chains, and transportation networks, to public sector and military applications.
Applicable to	<ul style="list-style-type: none"> Application Integration
Reference(s)	<ul style="list-style-type: none"> TIBCO Rendezvous http://www.tibco.com/software/messaging/rendezvous/default.jsp
Remarks	

4.9. ESRI ARCGIS

Description	<ul style="list-style-type: none"> ESRI ArcGIS is an integrated collection of GIS software products that provides a standards-based platform for spatial analysis, data management, and mapping. ArcGIS is scalable and can be integrated with other enterprise systems such as work order management, business intelligence, and executive dashboards. Version 9.1 is into mature support and will be moved to retired phase after release of next version
Applicable to	<ul style="list-style-type: none"> Geographic Information Systems
Reference(s)	<ul style="list-style-type: none"> ESRI ArcGIS http://www.esri.com/software/arcgis/
Remarks	

4.10. ORACLE REPORTS

Description	<ul style="list-style-type: none"> Oracle Reports is a tool for developing reports against data stored in an Oracle database. Oracle Reports consists of Oracle Reports Developer (a component of the Oracle Developer Suite) and Oracle Application Server Reports Services. The reports can be delivered directly to a printer or saved in HTML, RTF, PDF, XML, Microsoft Excel and RDF formats
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Applicable to	<ul style="list-style-type: none"> Reporting Tools
Reference(s)	<ul style="list-style-type: none"> Oracle Reports http://www.oracle.com/technology/products/reports/index.html
Remarks	

4.11. ORACLE BUSINESS INTELLIGENCE ENTERPRISE EDITION

Description	<ul style="list-style-type: none"> Oracle Business Intelligence Enterprise Edition 11g (OBIEE) is a comprehensive business intelligence platform that delivers a full range of analytic and reporting capabilities. Designed for scalability, reliability, and performance, Oracle Business Intelligence Enterprise Edition 11g can deliver contextual, relevant and actionable insight to everyone in an organization, resulting in improved decision-making, better-informed actions, and more efficient business processes. Oracle also provides the industry's only multi-sourced BI applications, as well as market-leading performance management applications that are powered by this BI platform.
Applicable to	<ul style="list-style-type: none"> Reporting Tools
Reference(s)	<ul style="list-style-type: none"> Oracle BI EE 11g - http://www.oracle.com/us/solutions/ent-performance-bi/enterprise-edition-066546.html
Remarks	

4.12. JASPER REPORTS

Description	<ul style="list-style-type: none"> JasperReports is an open source Java reporting tool that can write to screen, to a printer or into PDF, HTML, Microsoft Excel, RTF, ODT, Comma-separated values and XML files. It can be used in Java-enabled applications, including Java EE or Web applications, to generate dynamic content. It reads its instructions from an XML or .jasper file.
Applicable to	<ul style="list-style-type: none"> Reporting Tools
Reference(s)	<ul style="list-style-type: none"> Jasper Reports http://www.jasperforge.org/jasperreports
Remarks	

4.13. CRYSTAL REPORTS

Description	<ul style="list-style-type: none">Crystal Reports is a business intelligence application used to design and generate reports from a wide range of data sources. Several other applications, such as Microsoft Visual Studio, bundle an OEM version of Crystal Reports as a general purpose reporting tool.
Applicable to	<ul style="list-style-type: none">Reporting Tools
Reference(s)	<ul style="list-style-type: none">Crystal Reports http://www.businessobjects.com/product/catalog/crystalreports
Remarks	

4.14. COGNOS REPORTNET

Description	<ul style="list-style-type: none">Cognos ReportNet (CRN) is a web-based software product for creating and managing ad-hoc and custom-made reports. ReportNet uses web services standards such as XML and Simple Object Access Protocol and also supports dynamic HTML and Java. ReportNet is compatible with multiple databases including Oracle, SAP, Teradata, Microsoft SQL server, DB2 and Sybase
Applicable to	<ul style="list-style-type: none">Reporting Tools
Reference(s)	<ul style="list-style-type: none">Reportnet http://www.cognos.com/products/business_intelligence/reporting/index.html
Remarks	

4.15. IBM RATIONAL SOFTWARE

Description	<ul style="list-style-type: none">IBM Rational Software Modeler made by IBM's Rational Software division is a Unified Modeling Language UML 2.0-based visual modeling and design tool. Rational Software Modeler is built on the Eclipse open-source software framework and includes capabilities focused on visual modeling and model-driven development (MDD) with the UML for creating resilient, thought-out applications and web services.IBM Rational Software Architect, (RSA) made by IBM's Rational Software division, is a comprehensive modeling and development environment that leverages the Unified Modeling Language (UML) for designing architecture for C++ and Java 2 Enterprise Edition (J2EE) applications and web services. Rational Software Architect is built on the Eclipse open-source software framework and includes capabilities focused on architectural code analysis, C++, and model-driven development (MDD) with the UML for creating resilient applications and web services.IBM Rational Application Developer for WebSphere Software (RAD) is an integrated development environment (IDE), made by IBM's Rational Software division, for visually designing, constructing, testing, and deploying Web services, portals, and Java 2 Enterprise Edition (J2EE) applications.
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Applicable to	<ul style="list-style-type: none"> Modelling, Design and Development
Reference(s)	<ul style="list-style-type: none"> IBM Rational Software http://www-01.ibm.com/software/rational
Remarks	

4.16. ORACLE DEVELOPER SUITE

Description	<ul style="list-style-type: none"> Oracle Developer Suite is a suite of development tools released by the Oracle Corporation. The principal components were initially Oracle Forms and Oracle Reports, although the suite was later expanded to include JDeveloper amongst others.
Applicable to	<ul style="list-style-type: none"> Modelling, Design and Development
Reference(s)	<ul style="list-style-type: none"> Oracle Developer Suite http://www.oracle.com/technology/products/ids/index.html
Remarks	

4.17. MICROSOFT VISIO

Description	<ul style="list-style-type: none"> Microsoft Visio, marketed as Microsoft Office Visio, is a diagramming program for Microsoft Windows that uses vector graphics to create diagrams.
Applicable to	<ul style="list-style-type: none"> Modelling, Design and Development
Reference(s)	<ul style="list-style-type: none"> Microsoft Visio http://office.microsoft.com/en-gb/visio/default.aspx
Remarks	

4.18. MICROSOFT VISUAL STUDIO SOFTWARE

Description	<ul style="list-style-type: none"> Microsoft Visual Studio is an Integrated Development Environment (IDE) from Microsoft. It can be used to develop console and graphical user interface applications along with Windows Forms applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight.
Applicable to	

	<ul style="list-style-type: none"> Modelling, Design and Development
Reference(s)	<ul style="list-style-type: none"> Microsoft Visual Studio http://microsoft.com/VisualStudio
Remarks	

4.19. ECLIPSE SOFTWARE

Description	<ul style="list-style-type: none"> Eclipse is a multi-language software development environment comprising an IDE and a plug-in system to extend it. It is written primarily in Java and can be used to develop applications in Java and, by means of the various plug-ins, in other languages as well, including C, C++, COBOL, Python, Perl, PHP, and others.
Applicable to	<ul style="list-style-type: none"> Modelling, Design and Development
Reference(s)	<ul style="list-style-type: none"> Eclipse http://www.eclipse.org
Remarks	

4.20. IBM COGNOS BI

Description	<ul style="list-style-type: none"> IBM's Cognos 8 BI, combines the features of several previous products: ReportNet, PowerPlay, Metrics Manager, Noticecast, and Decision Stream. It uses reports, analysis, dashboards and scorecards to monitor business performance, analyze trends and measure results. A service-oriented architecture makes it easy to deploy and manage.
Applicable to	<ul style="list-style-type: none"> Business Intelligence
Reference(s)	<ul style="list-style-type: none"> IBM Cognos Business Intelligence http://www-01.ibm.com/software/data/cognos
Remarks	

4.21. ORACLE BI

Description	<ul style="list-style-type: none"> Oracle provides comprehensive suite of enterprise BI products that delivers a full range of analysis and reporting capabilities. Featuring a unified, highly scalable, modern architecture, Oracle BI provides intelligence and analytics from data spanning enterprise sources and applications—empowering the largest communities with complete and relevant insight. In Oracle Database environments, Oracle Business Intelligence Discoverer or Discoverer comprises a tool-set for ad-hoc querying, reporting, data analysis, and Web-publishing. Oracle Corporation markets it as a business intelligence product.
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Applicable to	<ul style="list-style-type: none"> Business Intelligence
Reference(s)	<ul style="list-style-type: none"> Oracle Business Intelligence Foundation http://www.oracle.com/appserver/business-intelligence/index.html Oracle Discoverer http://www.oracle.com/technology/products/discoverer/index.html Oracle BI EE 11g - http://www.oracle.com/us/solutions/ent-performance-bi/enterprise-edition-066546.html
Remarks	

4.22. SAP BUSINESS OBJECTS BI

Description	<ul style="list-style-type: none"> SAP BusinessObjects business intelligence (BI) solutions based on Crystal Reports 2008 provide comprehensive business intelligence functionality. It provides advanced analytics, dashboards and visualization, information infrastructure, query, reporting, and analysis.
Applicable to	<ul style="list-style-type: none"> Business Intelligence
Reference(s)	<ul style="list-style-type: none"> SAP BusinessObjects Business Intelligence http://www.sap.com/solutions/sapbusinessobjects/large/business-intelligence/index.epx
Remarks	

4.23. MICROSOFT BI

Description	<ul style="list-style-type: none"> Microsoft business intelligence is delivered through an orchestration of several Microsoft products viz. SQL Server, Sharepoint Server and products in Office Suite.
Applicable to	<ul style="list-style-type: none"> Business Intelligence
Reference(s)	<ul style="list-style-type: none"> Microsoft Business Intelligence http://www.microsoft.com/bi
Remarks	

5. APPENDICES

5.1. APPENDIX A: ABBREVIATIONS AND ACRONYMS

Abbreviation / Acronym	Application
HTTP	Hypertext Transfer Protocol
IMPP	Instant Messaging and Presence Protocol
XMPP	Protocol Extensible Messaging and Presence Protocol
SOAP	Simple Object Access Protocol
UDDI	Universal Description Discovery and Integration
WSDL	Web Services Definition Language
ebXML	Electronic Business using extensible Markup Language
WS	Web Services
CDL	Choreography Description Language
BPML	Business Process Modeling Language
HTML	Hypertext Markup Language
WSRP	Web Services for Remote Portlets
VB	Visual Basic
AJAX	Asynchronous JavaScript and XML
REST	Representational State Transfer
SGML	Standard Generalized Markup Language
CSS	Cascaded Style Sheet
XML	Extensible Markup Language
XSLT	Extensible Stylesheet Language Transformations
JSP	Java Server Pages

5.2. APPENDIX B: RELATED DOCUMENTS / LINKS

Acknowledgement of major references for international technology standards and Specifications:

- Internet Engineering Task Force (IETF)
<http://www.ietf.org>
- International Standards Organization (ISO)
<http://www.iso.org>
- World Wide Web Consortium (W3C)
<http://www.w3c.org>

Acknowledgement of other references for international technology standards and specifications:

- American National Standards Institute (ANSI)
<http://www.ansi.org>
- ECMA International
<http://www.ecma-international.org>
- Institute of Electrical and Electronics Engineers (IEEE)
<http://www.ieee.org>
- National Institute of Standards and Technology (NIST)
<http://www.nist.gov>
- Object Management Group (OMG)
<http://www.omg.org>
- Open Mobile Alliance (OMA) and WAP Forum
<http://www.openmobilealliance.org>
<http://www.wapforum.org>
- Organization for the Advancement of Structured Information Standards (OASIS)
<http://www.oasis-open.org>
- Unicode, Inc.
<http://www.unicode.org>