The New Enterprise Alphabet - .NET, XML and XBRL

Making sense of interoperability using angle brackets

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NACSTech 2006
NACS PCATS

Session Overview

- **Session Title:**
  - **The New Enterprise Alphabet - .NET, XML and XBRL**
- **Abstract:**
  - New enterprise technologies are moving from hype to implementation.
    Learn how the next generation architectures will streamline and standardize how your business communicates with vendors and even the government.

- **Agenda**
  - What is Interoperability
  - SOA and Web Services
    - Achieving Interoperability
  - XBRL
  - The Future
    - The Trend Towards XML and Automation

The Imperative to Connect

Suppliers & Partners

Employees

Friends & Family

Businesses

Consumers

What is Interoperability?

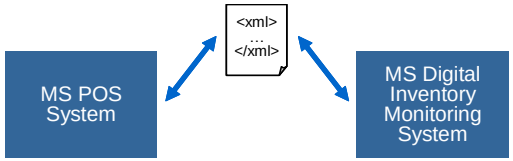
Applications working together

- Different platforms
- Different languages
- Different companies
- Different versions

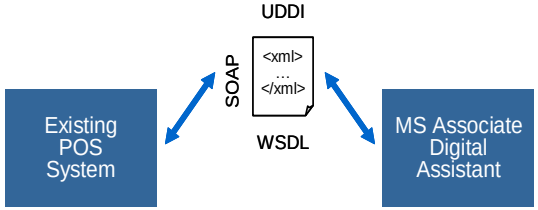
- **Integration** =
  - Combining software or hardware components or both into an overall system.
- **Interoperability** =
  - The ability to exchange and use information (usually in a large heterogeneous network made up of several local area networks)
  - The ability of software and hardware on multiple machines from multiple vendors to communicate
- *Source*: Dictionary.com
  - http://dictionary.reference.com/search?q=interoperability
  - http://dictionary.reference.com/search?q=integration

Retail Integration and Interoperability

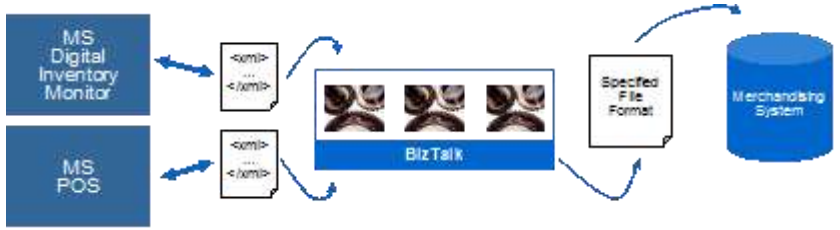
Applications used within the store that reside on the same box or same platform



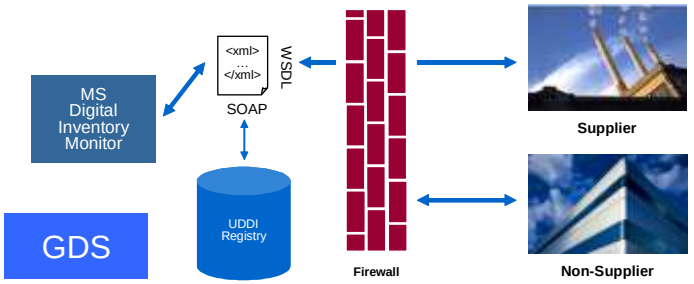
Systems used within the store that reside on different platforms



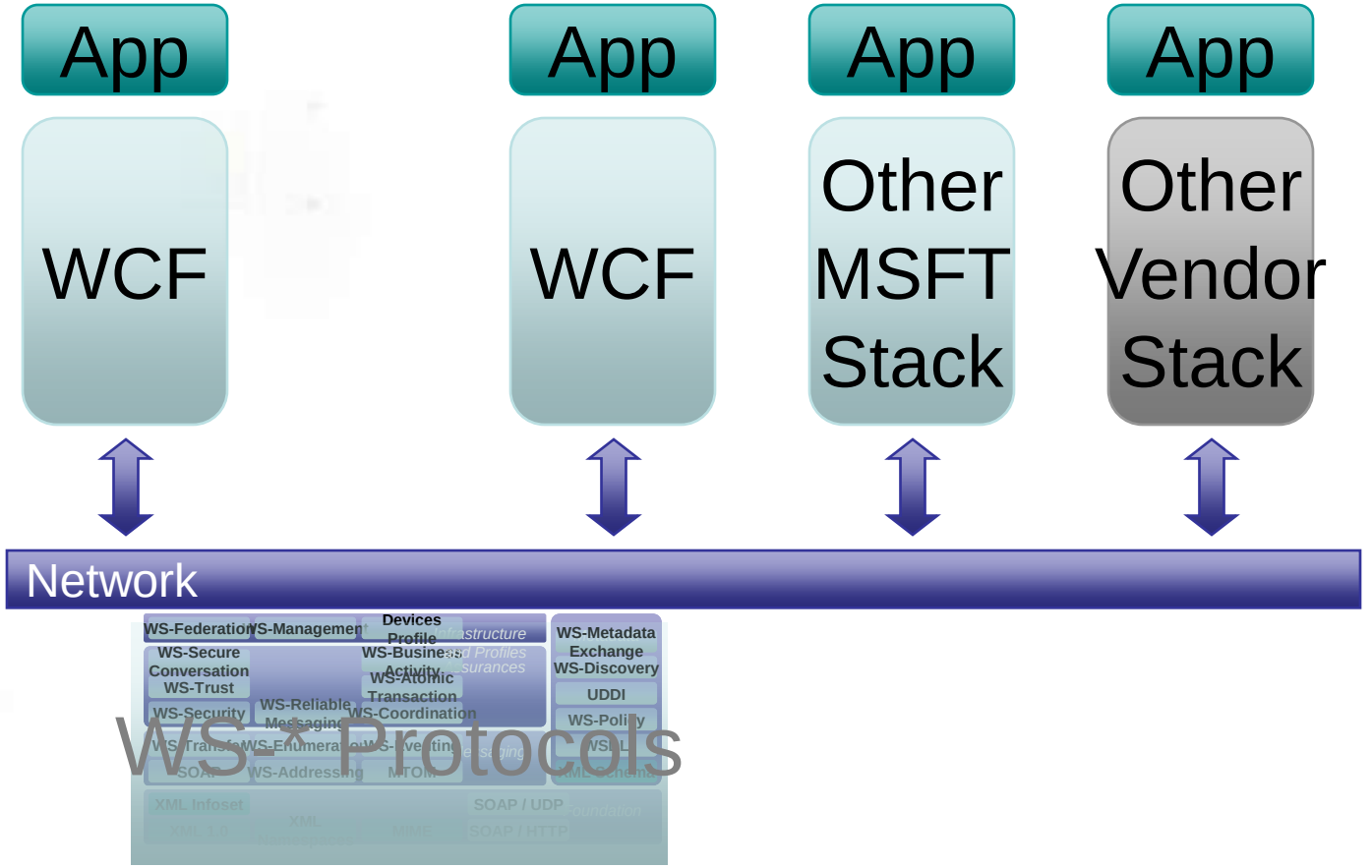
Systems used in the store and central office systems



Systems used in the store and external suppliers/partners



Integration via Wire Interoperability



Wire level interoperability achieves integration in a heterogeneous environment.

Microsoft's Commitment to Interoperability

- Bill Gates' Executive E-mail – "Building Software That Is Interoperable By Design"
  http://www.microsoft.com/mscorp/execmail/2005/02-03interoperability.asp

- Plus deep commitment at the execution level

  – Specification development and standardization
    - WS-* Spec authorship
    - Participation in Standards bodies
    - Participation in WS-I

  – Adopting XML and WS-* as the universal glue
    - eg. Systems Management, Connected Devices, Identity Management

  – Shipping products:
    - Early WS-* implementations (WSE)
    - Strategic WS-* platform ("Indigo" / WCF)
    - Easy-to-use development environment (Visual Studio)

  – Community feedback and testing
    - WS-* Workshop Process
    - Plug-fests - Product testing of multi-vendor interop

WinFX – The Next Gen Windows Technology Foundation

Windows Communication Foundation

- Secure Web services
- Reliable transacted distributed apps
- Interoperability with WS-* protocols
- Any transport and any host

Windows Presentation Foundation

- Vector-based
- Resolution independent
- Rich media
- 3D user interfaces

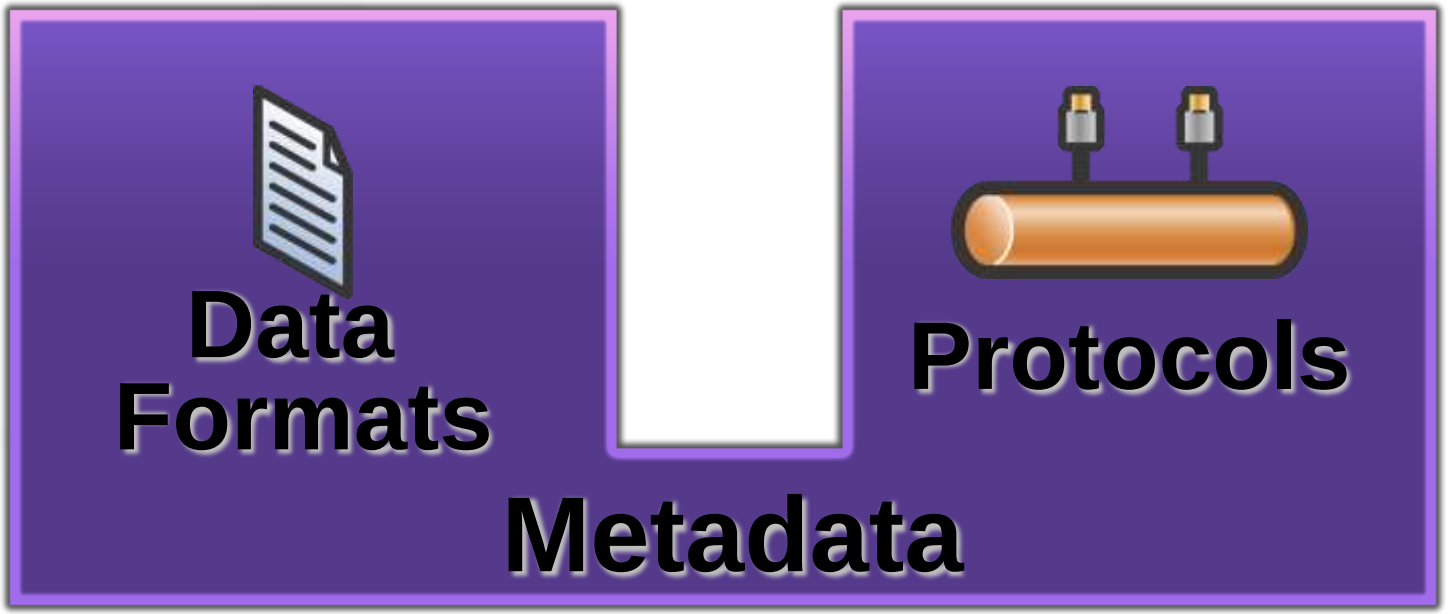
Windows Workflow Foundation

- Engine built into platform
- System and human workflow
- Composite apps

Windows InfoCard

- Streamlines user registration and one-click login
- Mitigates common attack vectors (Phishing)
- Seamless integration with WCF

Enabling Interoperability



Components of Business Interoperability

- Agreed syntax representations
  - E.g. XML
- Agreed protocols
  - E.g. SOAP + WS-* specs (such as WS-ReliableMessaging)
- Agreed payload formats
  - E.g. HL7 schemas for healthcare data
- Profiled composition
  - E.g. Pre-defined options to ensure functionality
- Agreed business scenarios
  - E.g. Well defined interaction scenarios / use cases

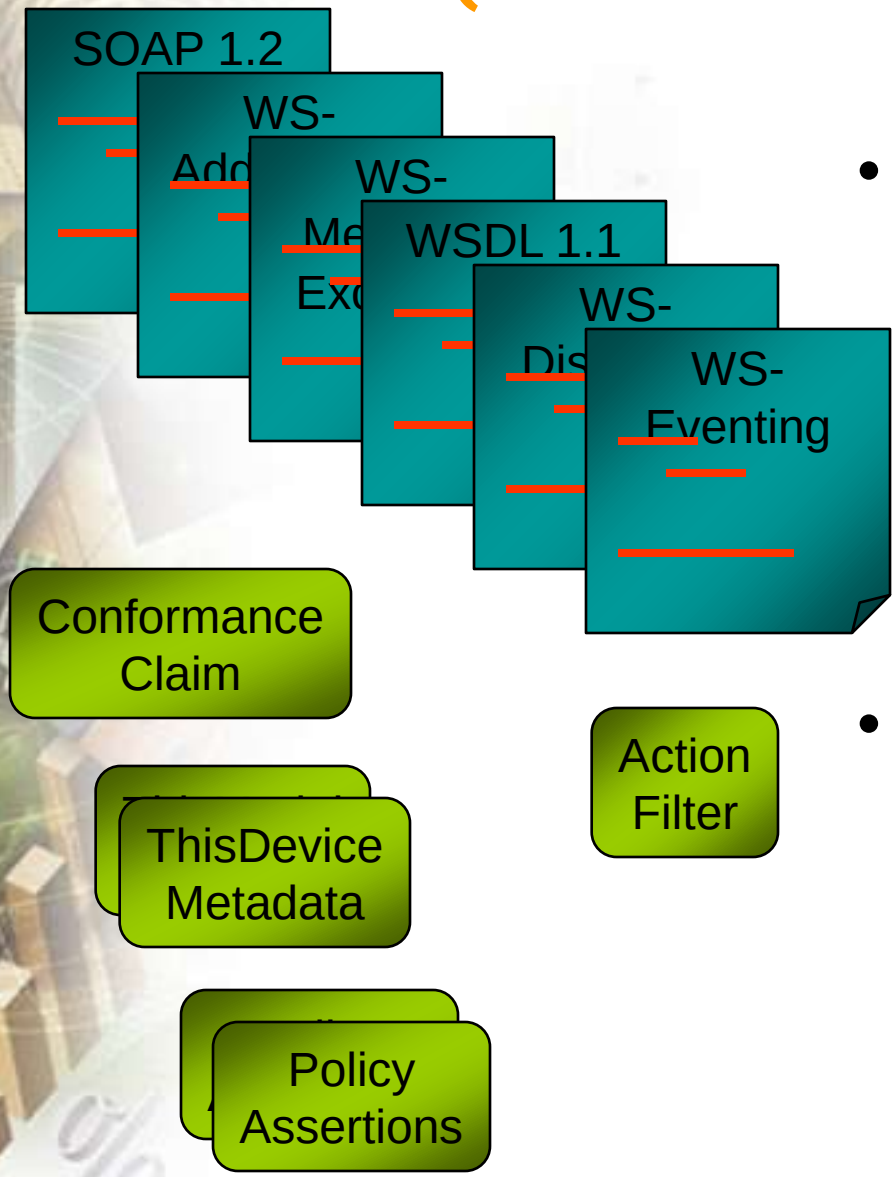
Why Do We Need Interop Profiles?

- Need to constrain / reduce runtime options to guarantee out-of-box interoperability
  - WS-* Architecture is designed for general applicability across a wide range of industries / scenarios
    - Often too much optionality in the base specifications
  - Tailor to specific domain / environment
    - E.g. Devices Profile only requires SOAP 1.2 not SOAP 1.1 to lower implementation footprint
- Guide implementation and deployment choices
- Achieve a proven composition of protocols and payloads
- Allows simplification of application deployment
  - e.g. WCF allows selection of interop profile to use

What Are Interop Profiles?

- Define a subset of specifications that are:
  - Composable
  - Scoped
  - Work together
- Examples:
  - Secure RM – WS-ReliableMessaging + WS-Trust/SecureConversation/Security
  - ACORD Messaging Profile – WS-* + ACORD payload schemas
- Who defines the profile?
  - Vertical domain org – eg. ACORD
  - Horizontal org – eg. WS-I
  - Customer – singly or in groups

Profile Recipe: Staple, Redline, Glue (Device Profile example)



- "Staple"
  - Pull relevant specs into scope
- "Redline"
  - Add constraints on use of those specs
- "Glue"
  - Define missing bits between specs
  - Some will migrate back into specs

Summary - Interoperability

- Interoperability is the best way to achieve system integration in a heterogeneous IT environment
- Wire-level interoperability is the real goal
- Web Services WS-* Architecture designed to support multi-vendor environments
- Profiling is an important tool for achieving business interoperability
- Microsoft is deeply committed to delivering products with proven interoperability that work well in heterogeneous environments
- Other vendors also delivering implementations for WS-* specs too

SOA – Service Oriented Architecture

Mechanisms for achieving interoperability

The Shift to Service Orientation

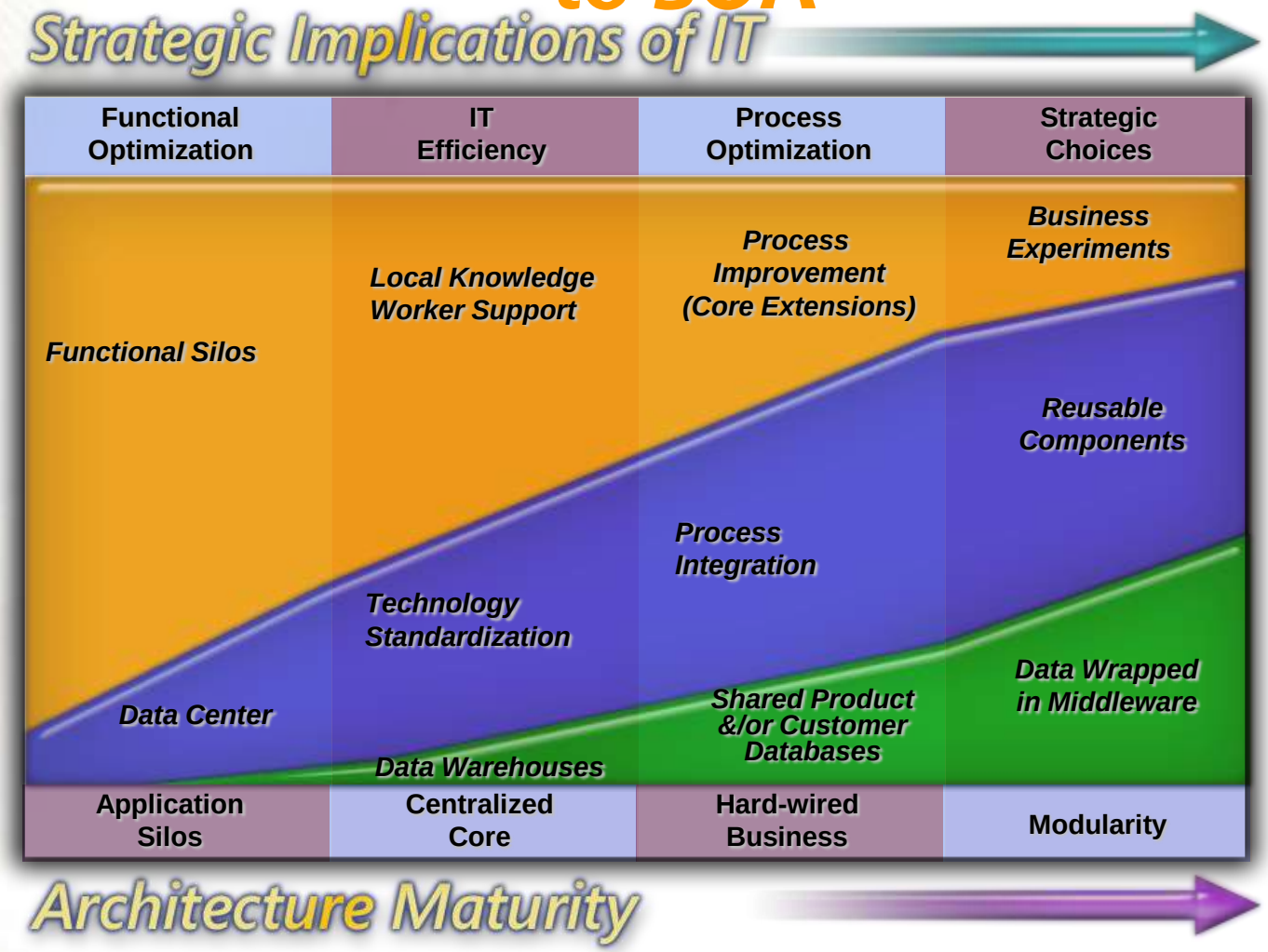
- Function-oriented
- Built to last
- Prolonged development cycles
- Tightly coupled
- Application silos

- Process-oriented
- Built for change
- Incrementally built and deployed
- Loosely coupled
- Connected Systems

Business Drivers

- Agility
- Adaptability
- TCO

The role of good architecture on the path to SOA

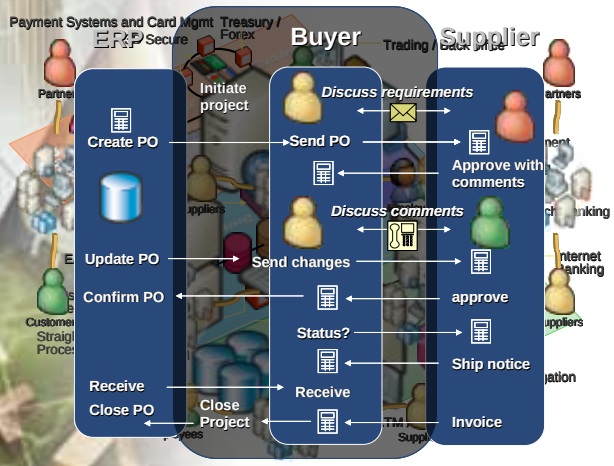


Source: MIT Sloan Center for Information System Research

Business-IT Context for Services Orientation

"Service-oriented architecture (SOA) helps to solve immediate problems such as connecting to business partners, accessing legacy applications, and integrating across technology boundaries but, at a more strategic and fundamental level, SOA is about creating an IT environment to support continuous business optimization."

Quote from Forrester[1]



Tightly coupled Processes, No Company's An Island & Applications

SOA speeds up business change	Eg. Loan Process Reengineering, Legacy Replacement	Enables Quick Time to Market
SOA facilitates business connections	Eg. Working Capital Services, Single Customer View	Creates Platform for Product Innovation
SOA enhances business control	Eg. Workflow Scorecard, Service Level Management	Provides 'Real-time' Decision-support

[1]*Source: Your Strategic SOA Platform Vision, Mar 29 2005, Forrester Research*

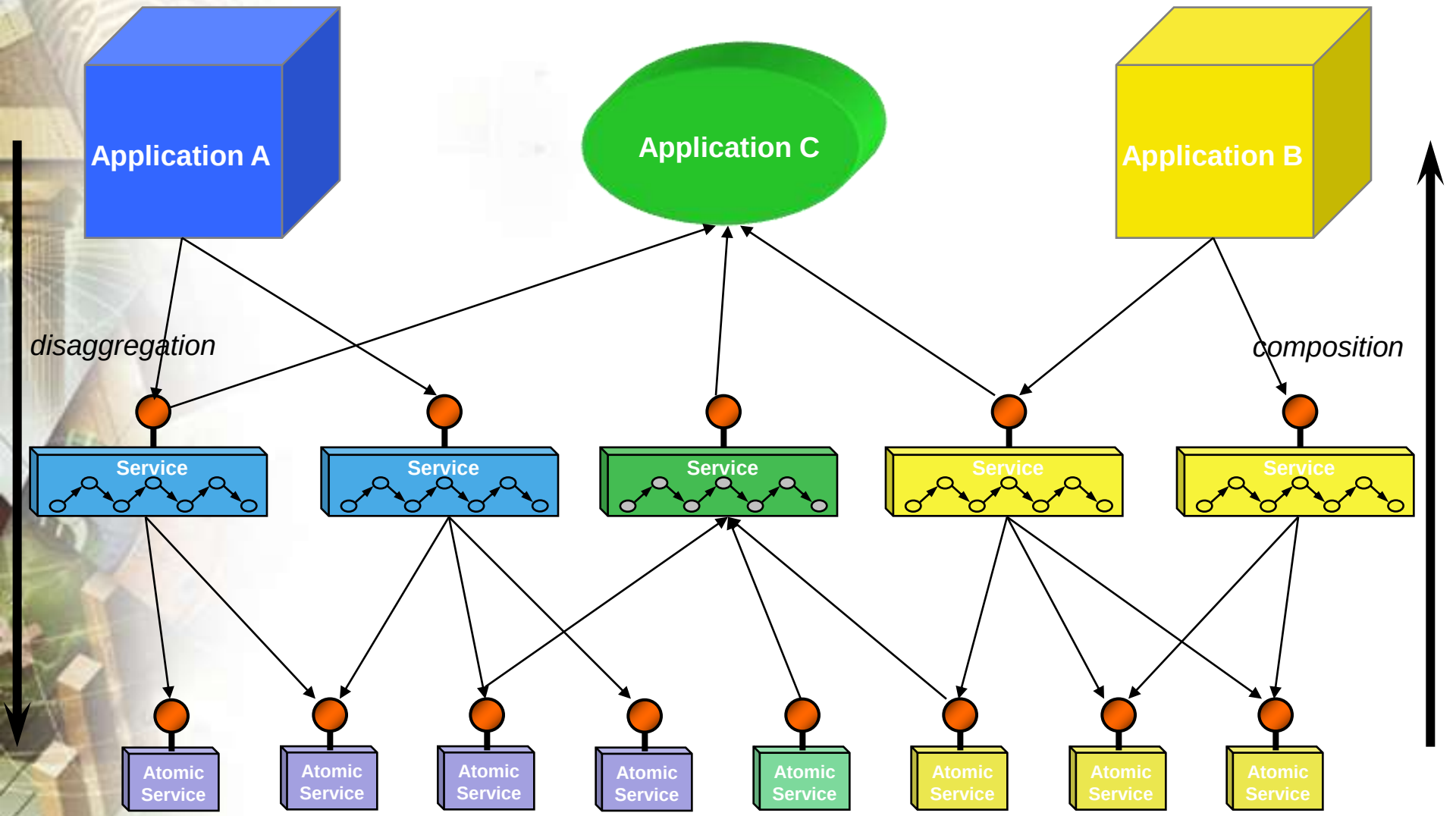
SOA – Defined

- Service orientation emphasizes the provision of services to consumers via published interfaces
  - Separation of concerns
- Service Oriented Architecture is an approach to organizing information technology in which data, logic, and infrastructure resources are accessed by routing messages between network interfaces
  - Focus on the LINES not the boxes
- Basic value proposition is to provide consistent, stable interfaces in front of diverse or volatile implementations
  - Establish context for information exchange across organizations
  - Encapsulate complexity within organizations
  - Enable context-sensitive information processing

Microsoft's Vision for SOA

- Service orientation will encapsulate and componentize processes and systems
  - Help manage complexity
  - Permit controlled change
  - Support continuous improvement
- Business capabilities and business processes will be modeled as services
  - Organizations will expose touchpoints into these processes to both internal and extra-organizational actors
  - Allows automation of processes that have defied automation until now
- On the path to the "Agile Enterprise"

SOA – How It Works



SOA - Another Holy Grail?

- No:
  - Web services works
  - Significant industry momentum towards interoperable solutions
  - Microsoft, IBM, and others making huge investments and 'betting their business'
- And – there is plenty to be done:
  - Not all the standards we need are quite there yet (although we are very close)
  - Interoperability is still 2nd generation (but improving fast)
  - A number of other 'to-dos' collectively and individually:
    - Proof, proof, proof
    - Schemas
    - Shared business processes
    - Federated identity management and trust
    - Architectural patterns and guidance
    - Policy development
    - Business model development and alignment
    - Lots of wrappering, refactoring, relearning to do…
    - Methodology?
    - …

Isn't This Just EAI (or EDI!)? Yes, but based on broader standards

- HTTP for communication
  - Thanks to Internet ubiquity
- XML for data representation
  - Thanks to success of HTML
- SOAP for interoperation
  - Thanks to experience with DCOM, Corba, …
- Unprecedented industry cooperation
  - Thanks to entrenched platforms and legacy systems
- Rapid agreement on SOA standards
  - Thanks to Microsoft, IBM, BEA, and others
- Rapid roll-out of SOA development tools
  - Thanks to long experience with OOP, modularity, …

The Role of Web Services

- Web Services are:
  - Optimized for XML transport / messaging
  - The only canonical cross-platform messaging and invocation stack
  - A strong fit for SOA needs
  - Based on open standards
  - Implementing a loosely coupled (late binding), multi-protocol, multi-format, multi-semantic, self-describing contract-based interface with very broad industry support…
- Microsoft developments are based on XML and Web Services wherever feasible

SOA Hype and Reality

At the crest of its hype, Service Oriented Architecture (SOA) have been touted as the next big architecture style to achieve application integration and business collaboration. But so, have other solutions in the past. Is it for real this time? What is different?

The Reality…

- It's been here for over 12 years.
- Evolutionary more that Revolutionary
- The Internet as the communication fabric has changed all! It represents the next logical step to the world wide web in business collaboration
- Commitment from every major vendor
- It is not a panacea. Alone, it does not solve all problems
- It is here to stay… for a long time (With its logical progression)

Its Value Proposition…

Overcome the Business-IT divide!

The Business Value of SOA

Potential Impact

- Something distinctly new and better
- What is really needed in a marketplace

TRANSFORMATIONAL
(Capability Management, SOA…)

- Cut Costs
- Reduce Cycle Time
- Improve Quality

EVOLUTIONARY
(BPR, Process Management)

- Radically new and better ideas that do not operate within the existing structure of the organization or marketplace but may, in fact, dismantle those structures
- **Radically distributed**

EFFICIENCY, QUALITY
(TQM, TOC, LEAN, CMM…)

Scope/Disruption

Some Initial Steps to SOA Development

- Migrate from ‘batch’ to ‘real time enterprise’ using event-based, asynchronous messages as default paradigm
- Build out applications as sets of services aligned around an enterprise-class object (process/data) model
- Leverage orchestration and human-orientated workflow where feasible, evolving to be the default paradigm ‘above the encapsulation boundary’
- Proactively look for simple processes to make agile, particularly with partners

XBRL

eXtensible Business Reporting Language

An example of next-generation interoperability

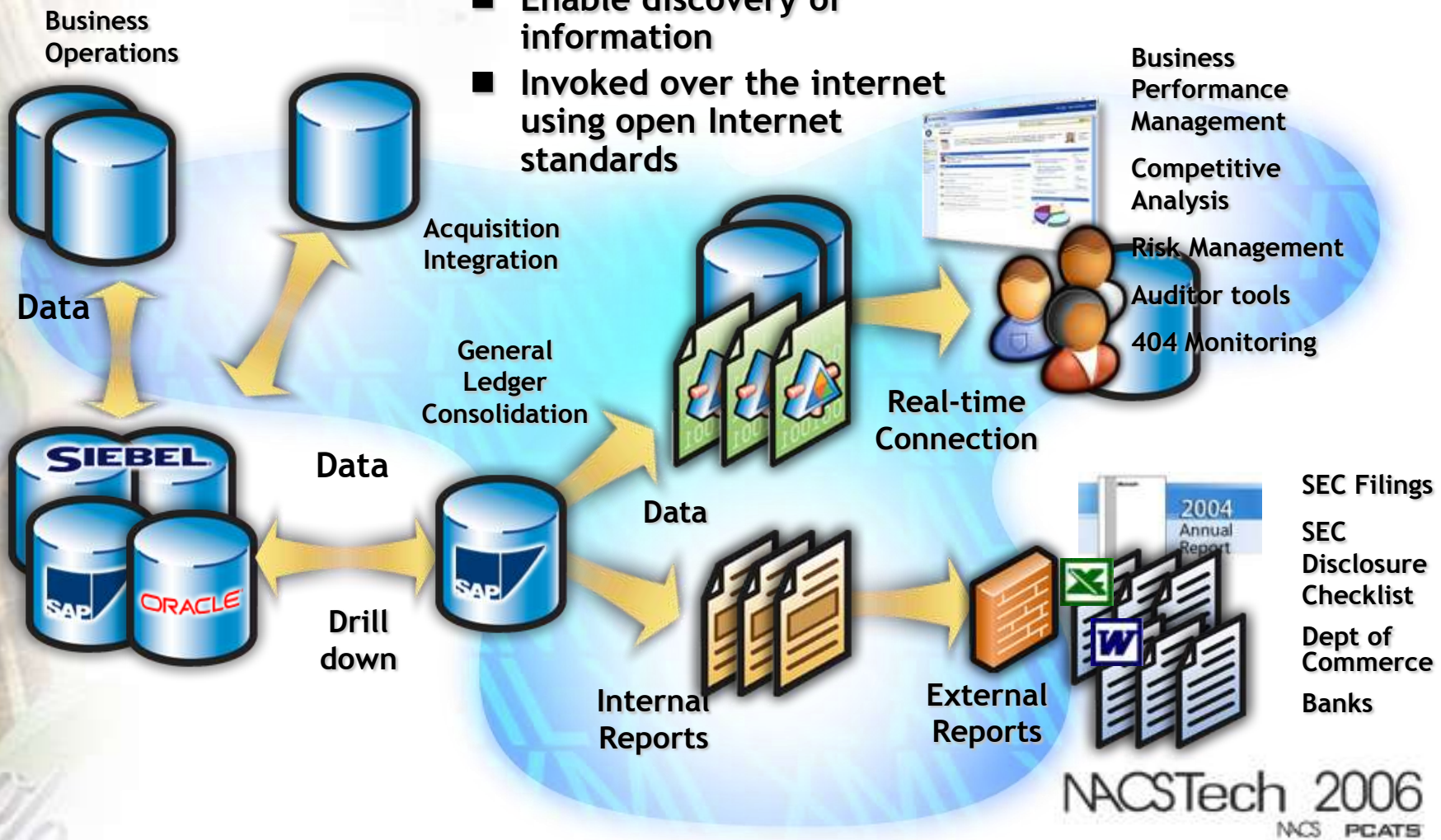
Overview - Extensible Business Reporting Language (XBRL)

- An XML-based language for the electronic communication of business and financial data
- Fast becoming a worldwide standard means of communicating information between businesses
- XBRL uses XML to:
  - Provide an identifying tag for each individual item of data, like a bar code that contains contextual information about the data.
  - Allow datasets to be selected, analyzed and processed intelligently and without manual re-keying of data.
  - Handle data in different languages and accounting standards.
  - Adapt to meet different requirements and uses.

Enterprise Use of XBRL

A "Web service" is a technology that can be used by applications to:

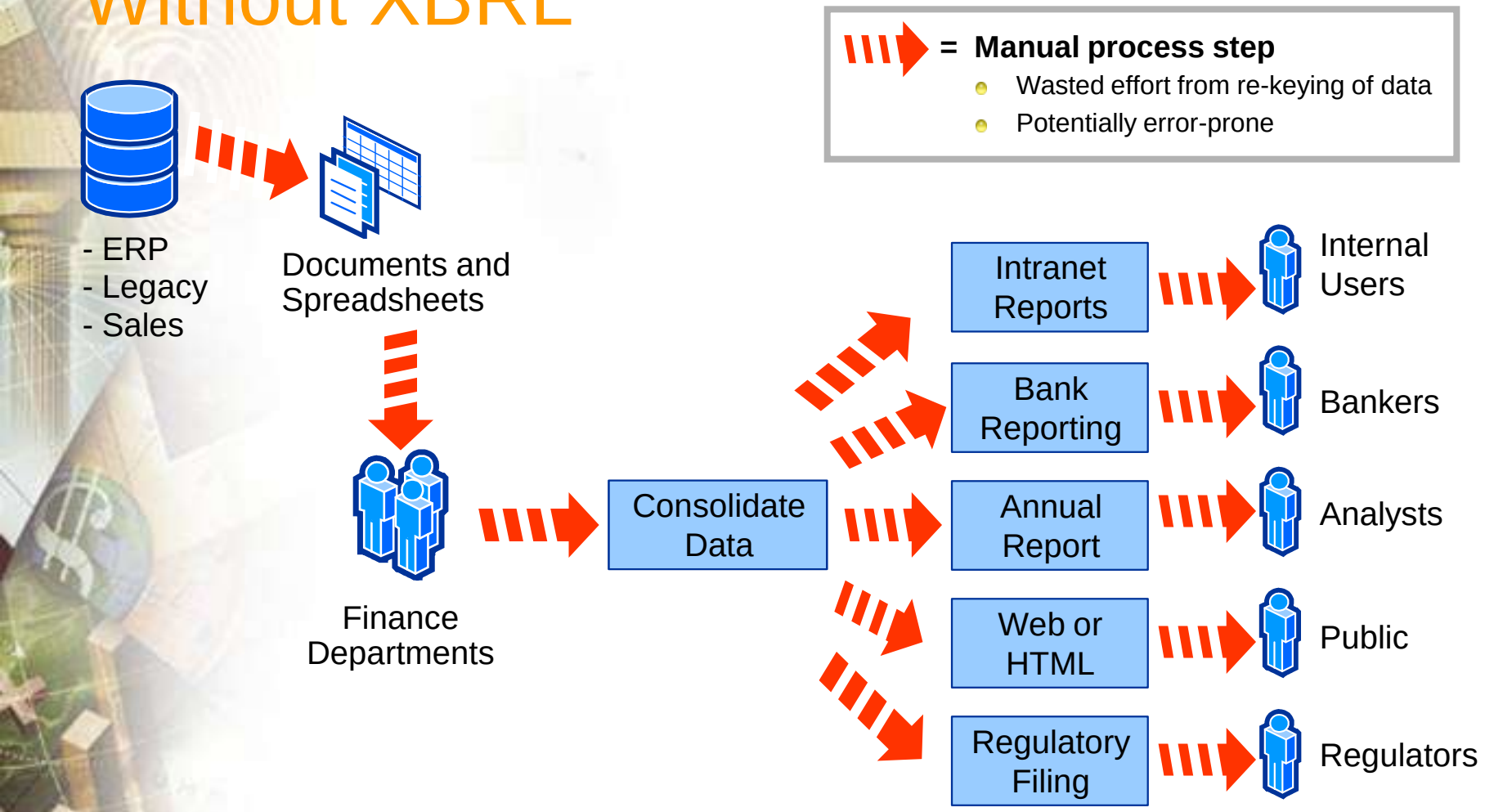
- Publish information
- Enable discovery of information
- Invoked over the internet using open Internet standards



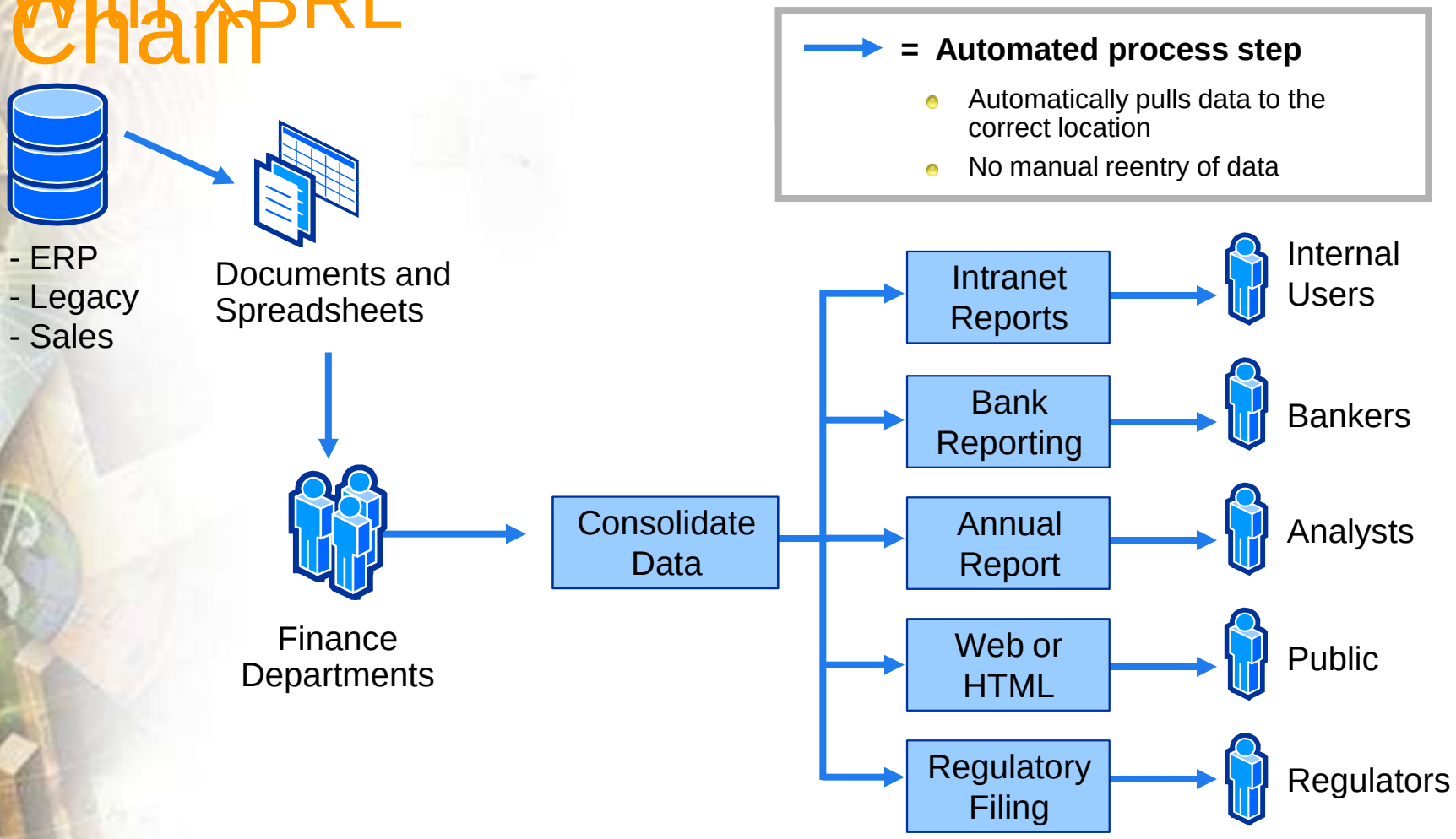
Financial Reporting Challenges

Business Challenges	Example Solution Overview
Authoring reports is costly, time-intensive, and error-prone because data must be manually entered from multiple sources	**Authoring** XBRL-based reports with familiar Microsoft Office-based tools streamlines report creation and decreases the chance of error
Analyzing data is costly, time-intensive, and error-prone because data must be manually entered and validated	**Analyzing** is easier because of standards in reporting, automated data entry tools, and automated verification of financial data
Sharing data is difficult because there is no automated means to pull data from reports	**Sharing** data is easier because data inherently contains context
Verifying data accuracy is costly and time intensive because data is manually validated	**Verifying** data can be automated, efficiently helping to ensure data accuracy

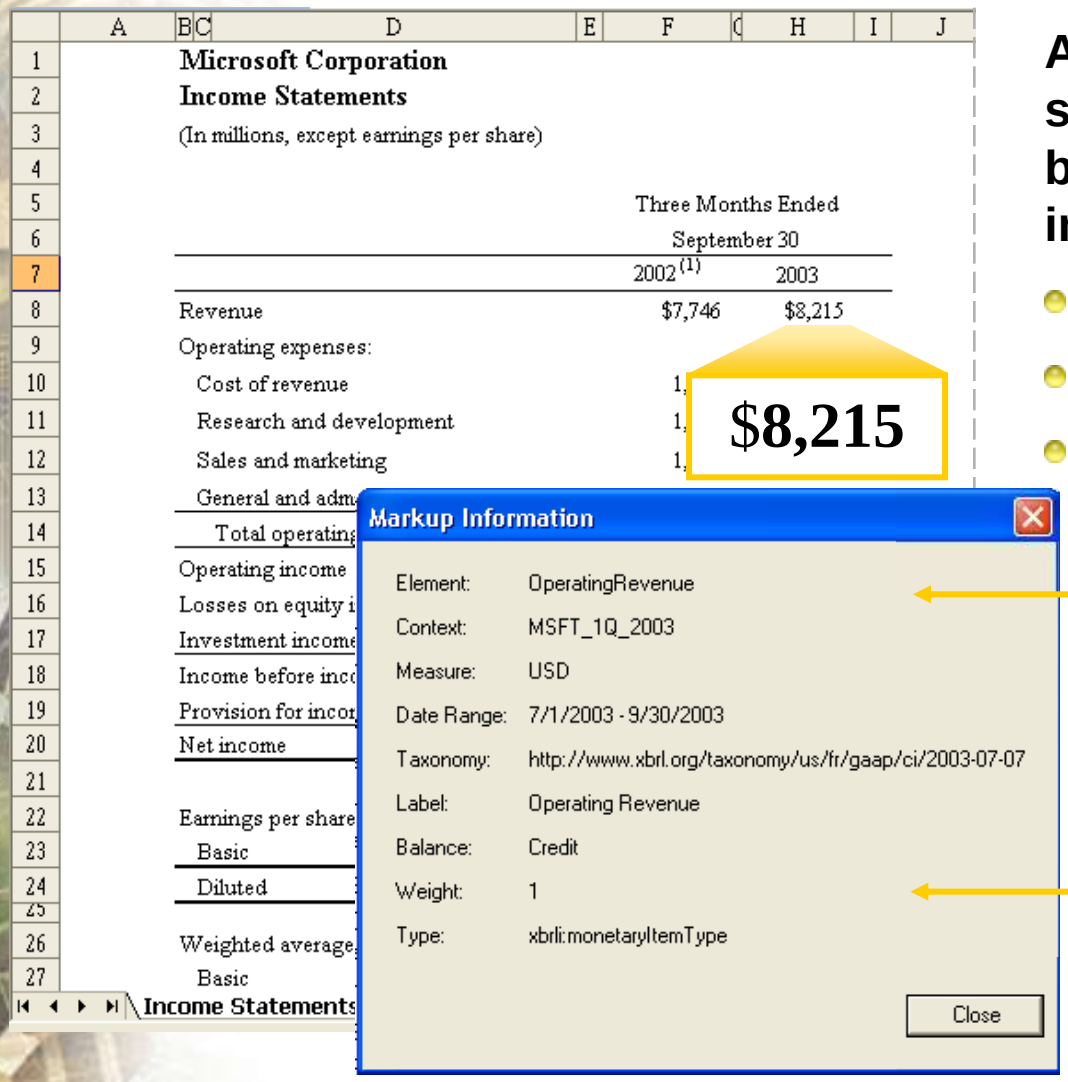
The Financial Reporting Supply Chain Without XBRL



The Financial Reporting Supply Chain With XBRL



XBRL Adds Meaning to Data



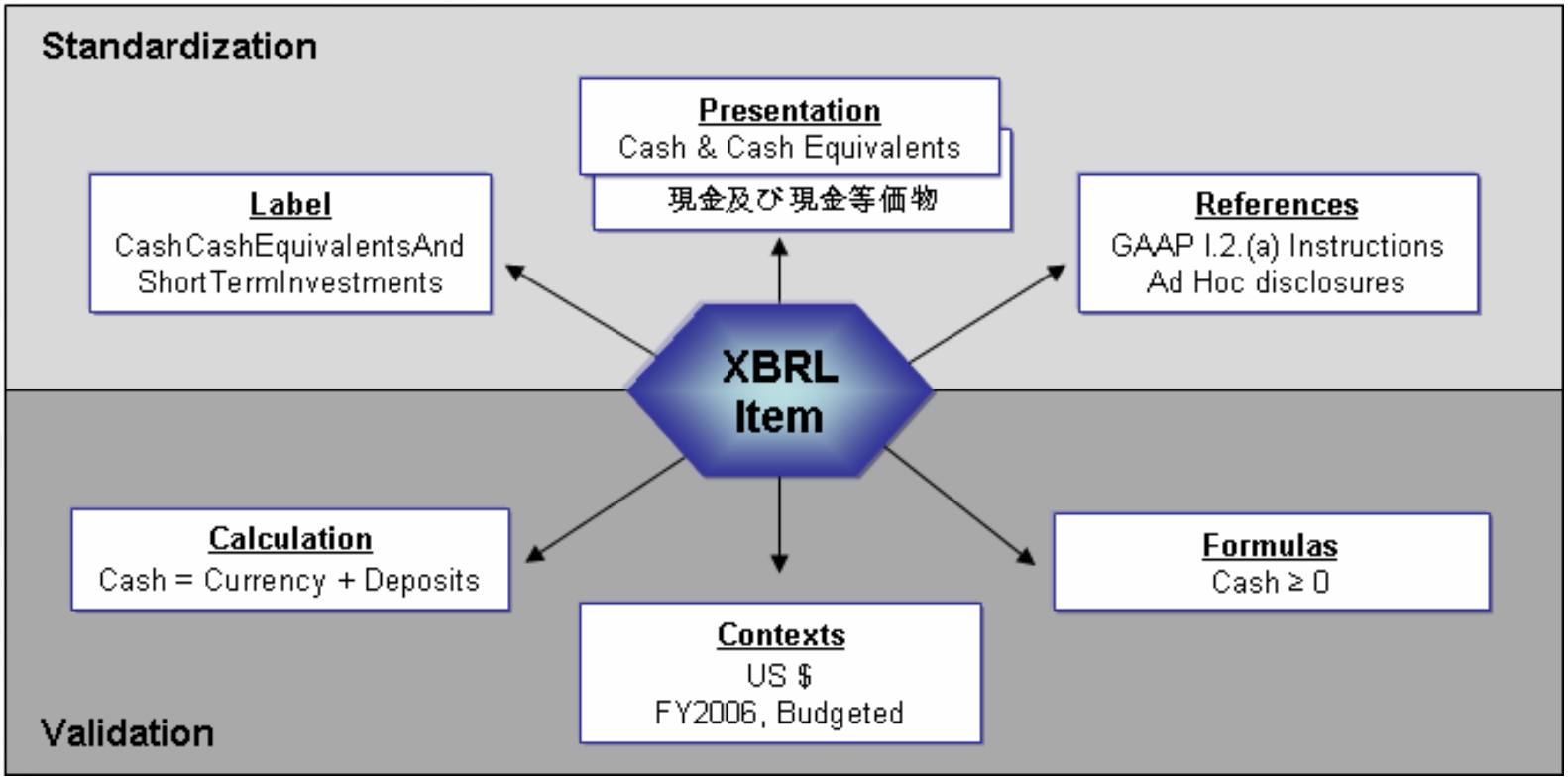
A number in a document or spreadsheet only has meaning because of the surrounding information such as:

- **Microsoft Income Statement**
- **2003**
- **Revenue**

Adding XBRL tags provides data with "bar codes" that give meaning to a number outside of the context of the surrounding document

Adding XBRL tags makes a number machine-readable

Components of an XBRL Item

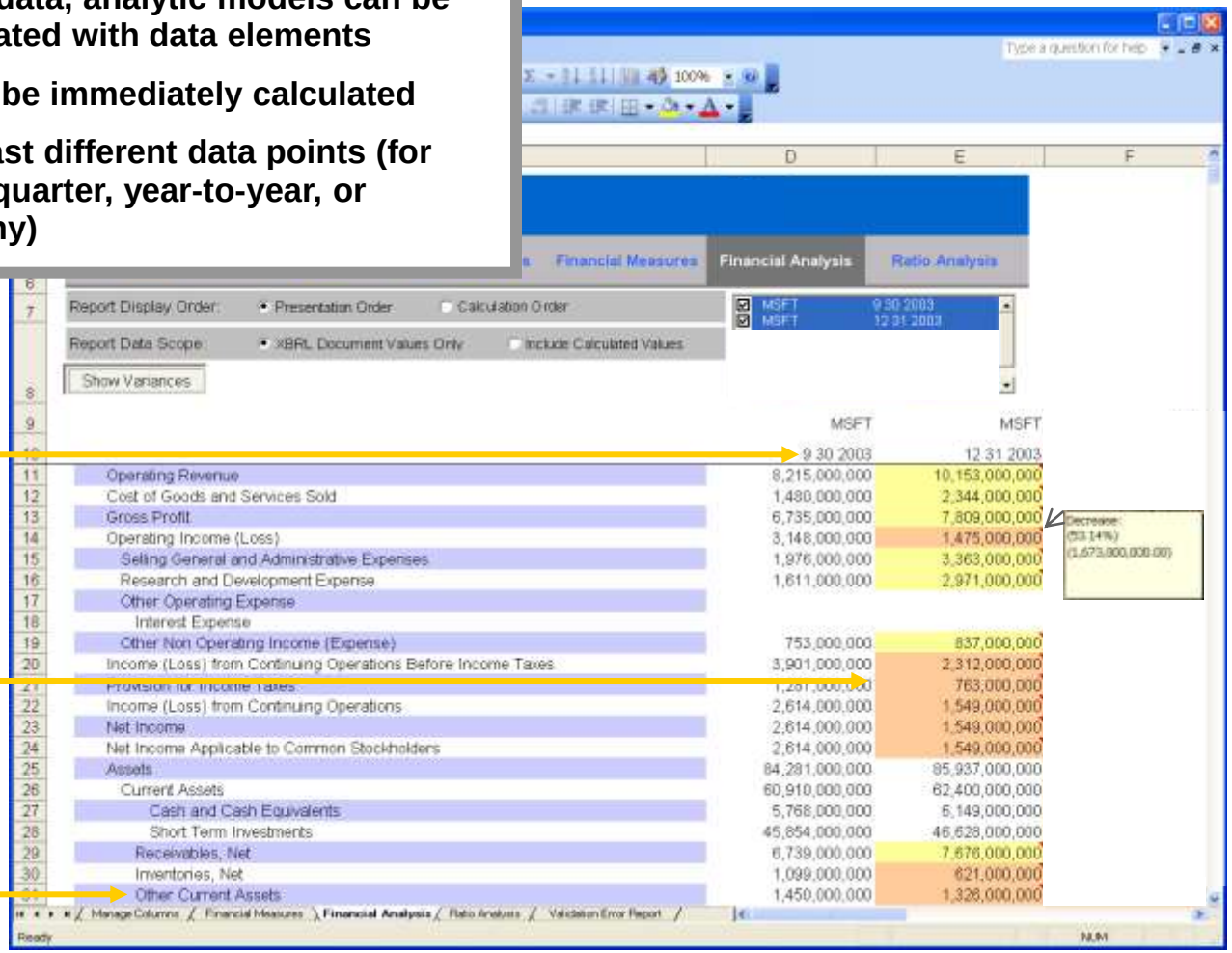


Side-by-Side Data Analysis

Value to Businesses

- With zero keying of data, analytic models can be automatically populated with data elements
- Financial ratios can be immediately calculated
- Compare and contrast different data points (for example quarter-to-quarter, year-to-year, or company-to-company)

Example Solution



XBRL data can be pulled in representing different period data for the same company or from different companies

Utilities can be built that provide flags or automatic notification based on pre-defined limits

All reported data elements are automatically imported

SEC Voluntary Reporting Program on the EDGAR System

- Effective date March 16, 2005
- Allows companies to “furnish” XBRL tagged financial statements
- Added Rule 401 to Regulation S-T allowing filers to furnish supplemental information using XBRL
- Allows for company flexibility in filing financial statements, with or without footnotes and MD&A
- Can submit XBRL tagged document either with the official filing or as an amendment, however, there is no submission deadline
- Must correlate to a standard GAAP Taxonomy
- Relief for liability if error is not materially misleading or false

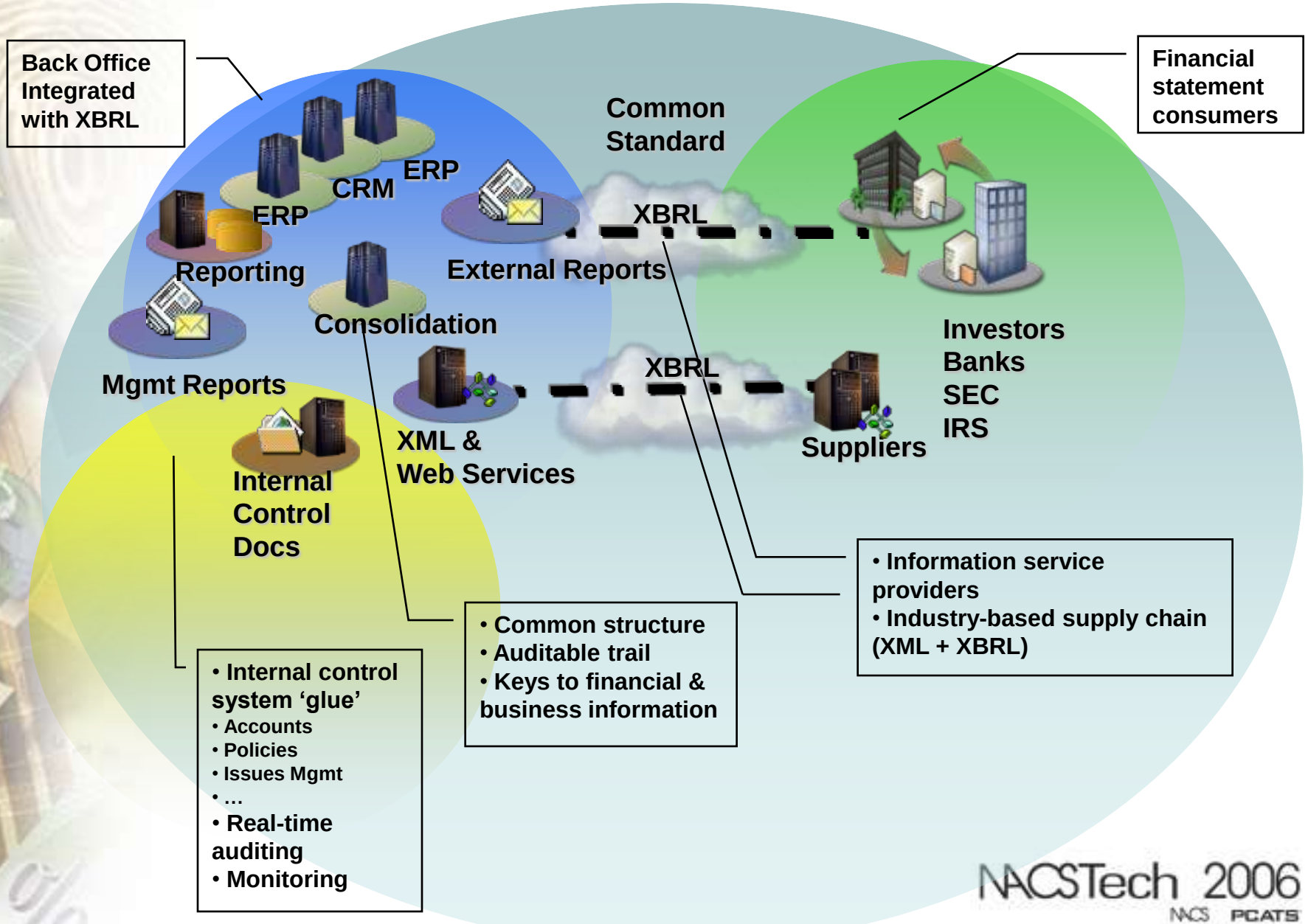
XBRL Lessons and Observations

- Requires paradigm shift from presentation view to data
- Creating that data view represents a new task
- Tools in the “v1” stage…but will get better!
- US GAAP taxonomies need sustained industry management
- Process gets easier every quarter

XBRL Futures

- SEC consulting with industry about making XBRL mandatory
  - Speech by SEC CIO Corey Booth – 16-May-2006 http://www.sec.gov/news/speech/2006/spch051606rcb.htm
  - But, still some wrinkles to iron out…. with the help of industry
- FDIC has mandated XBRL for quarterly call reports for the 9000+ banks it regulates

Future with SOA & XBRL



Tax and XML

- Schemas available for a a variety of federal tax forms
  - Forms 1120/1120S, 990/990-EZ, 990-PF and 1120-POL, Fed/State Employment Tax Program (FSET), and the Employment Tax e-file System, Forms 940/941
- Other federal forms planned / under development
- Schemas for state-specific filing being created
- App-to-app as well as manual upload
  - Federal form 1120/1120S e-filing is already live using XML
  - Can us digital certificates for A2A authentication
- IRS resources for Tax XML developers http://www.taxadmin.org/fta/edi/xmldev.html
- OASIS Technical Committee working on international Tax XML harmonization http://www.oasis-open.org/committees/tax/

A Pointer To The Future
- Other Government XML Initiatives

- Mandatory XBRL on the horizon
- IRS – Tax XML and e-filing
- UK and EU Governments are very active in using XML and eGovernment
  http://en.wikipedia.org/wiki/EGovernment
- And many more …..

- General trends:
  - Away from binary formats towards XML formats
  - Away from manual upload towards A2A communication and automation
  - The challenge of security and authentication

XML is part of the e-government future!

Summary

- XML is at the core of the new generation of interoperability
- Overall Trends:
  - From presentation to data view
  - From binary formats to XML
  - From manual processing to automatic
  - From silos to distributed applications
  - Service orientation for flexibility and agility
  - Both governments and commercial orgs

- Now 3 things in life are inevitable
  - Death, Taxes and XML!

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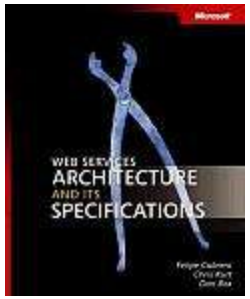
Backup Information

XBRL Resources

- Learn more about the XBRL standard from the XBRL International Consortium
  - http://www.xbrl.org
- Tutorial on technical aspects of XBRL
  - http://www.us.kpmg.com/microsite/xbrl/kkb.asp
- EDGAR site
  - http://www.edgar-online.com/services/xbrl_fundamentals.aspx
- See how Microsoft uses XBRL
  - http://www.microsoft.com/msft/xbrlinfo.mspx
- More information on XBRL using MS Office
  - http://www.microsoft.com/office/showcase/xbrl

Web Services and Interoperability Resources



- **Web Services Architecture and Its Specifications**
  L. Cabrera, et al, Microsoft Press
- Microsoft Developer Network Links
  - Microsoft Interoperability home page
    - http://www.microsoft.com/interop
  - MSDN Web Services Developer Center
    - http://msdn.microsoft.com/webservices/
  - WS-* Specifications index page
    - http://msdn.microsoft.com/webservices/understanding/specs/
  - WS-* Workshops home page
    - http://msdn.microsoft.com/webservices/community/workshops/
  - WS-* Workshop Process Overview
    - http://msdn.microsoft.com/library/en-us/dnwebsrv/html/wkshopprocess.asp
  - Microsoft Retail Industry Center
    - http://msdn.microsoft.com/retail

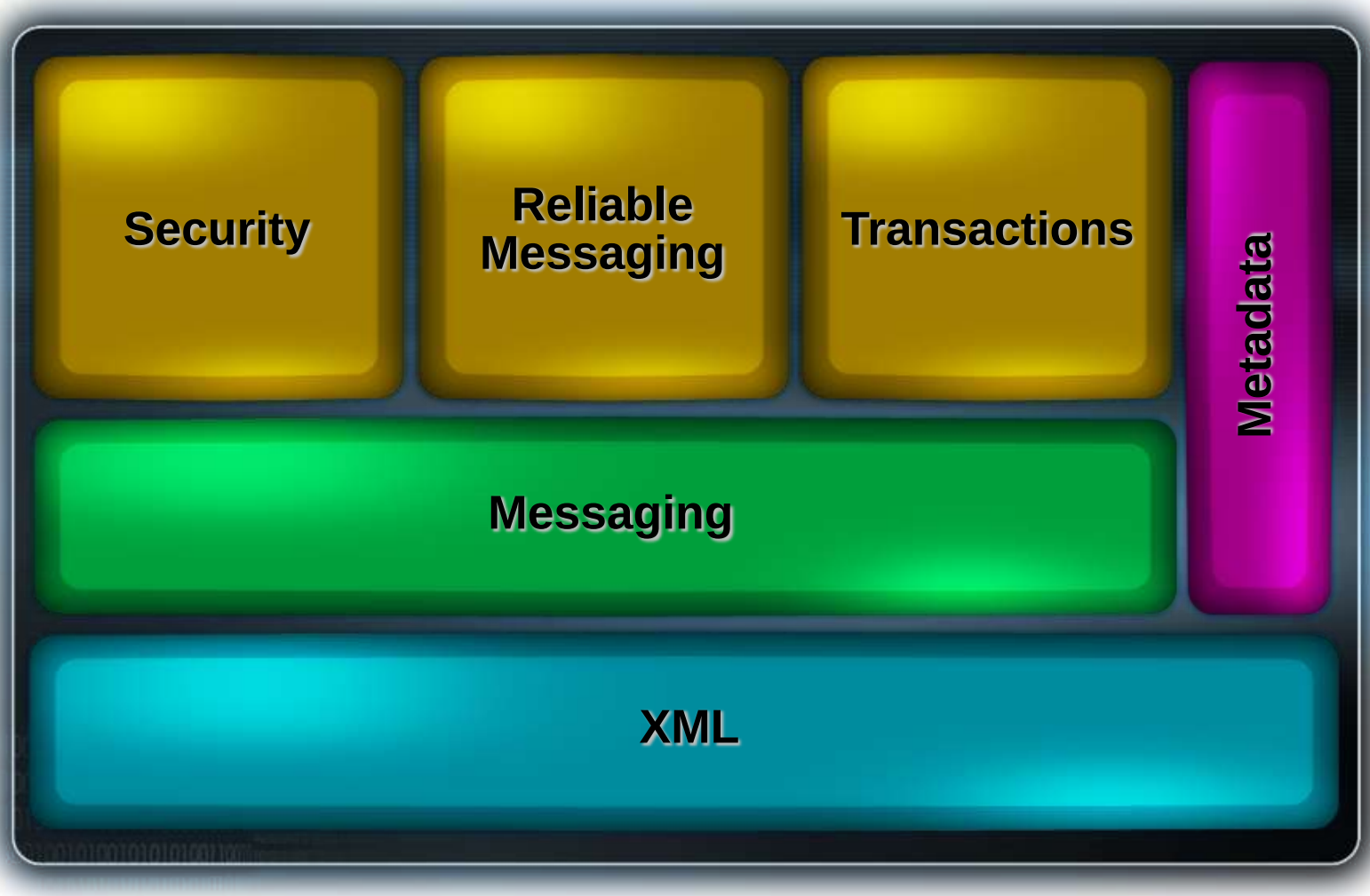
What is WS-*?

- A protocol framework
  - Layered, factored, composable, extensible
- Interoperability baked in
  - XML, HTTP, URI
- Uniform data model – XML Infoset
- Metadata-driven
  - Self describing and dynamic
- Collaborative engineering process
  - Quality, time to market, industry support

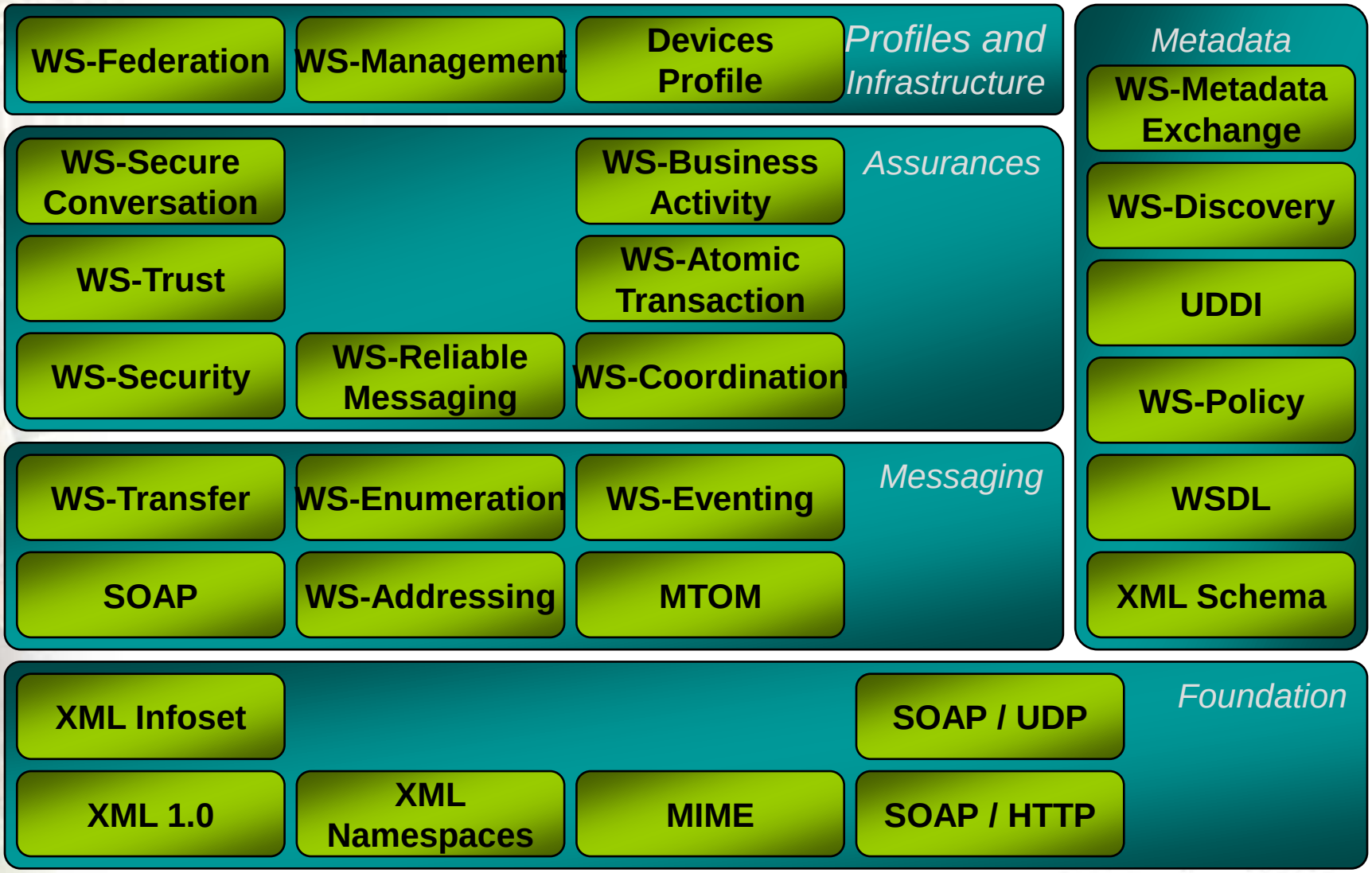
WS-* 101

- Endpoints send *messages* that conform to *contracts*
  - Application messages and/or
  - Infrastructure messages and headers enable security, reliability, transactions, ...
- Endpoints are described with *metadata*
  - Address on the “network”
    - *URL or Endpoint Reference*
  - Binding capabilities and requirements
    - *Policy*
  - Contract for structure and behavior
    - *WSDL and XML Schema*

WS-* Protocol Layers



WS-* Architecture Specifications



Web Services - Messaging

SOAP	XML-based message format with simple extension model and support for relays
WS-Addressing	SOAP-based addressing and dispatch
MTOM	Hybrid XML / binary format for SOAP (a.k.a. “attachments”)

Web Services - Secure

WS-Security	End-to-end security in the face of relays requires more than transport-level security
WS-Trust	Issuing tokens based on credentials
WS-Secure Conversation	Session-based tokens to reduce per-message crypto costs

Web Services - Reliable and Transacted

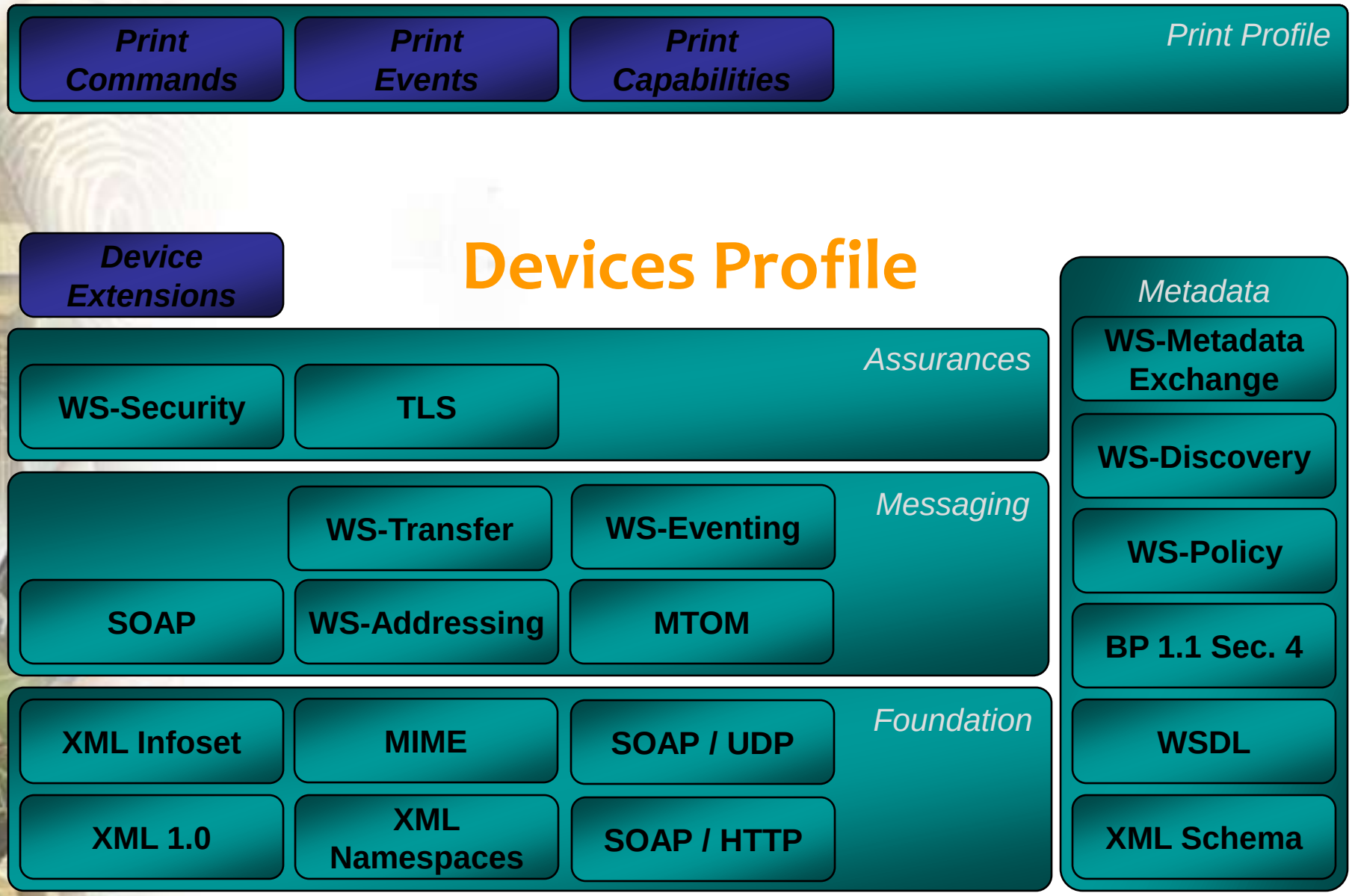
WS-Reliable Messaging	End-to-end delivery assurances in the face of relays requires more than transport protocol
WS-Coordination	SOAP-based multi-party protocols
WS-Atomic Transaction	SOAP-based two-phase commit
WS-Business Activity	SOAP-based workflow and compensation

Web Services - Metadata

WSDL	Description of service contract
WS-Policy	Parameterized assertions about service capabilities and requirements
WS-Metadata Exchange	SOAP-based inspection of a service's metadata
UDDI	SOAP-based registry service lookup

Web Services - Profiles and Infrastructure

Basic Profile 1.0/1.1	Simple SOAP messaging, description, and discovery
Basic Security Profile 1.0	Simple transport and SOAP message security
Devices Profile	SOAP-based discovery, description, control, and eventing of devices
WS-Management	SOAP-based management of computing systems
WS-Federation	SOAP-based identity management


Print Commands
Print Events
Print Capabilities
Print Profile
Device Extensions
Devices Profile
Assurances
WS-Security
TLS
Messaging
WS-Transfer
WS-Eventing
SOAP
WS-Addressing
MTOM
Foundation
XML Infoset
MIME
SOAP / UDP
XML 1.0
XML Namespaces
SOAP / HTTP
Metadata
WS-Metadata Exchange
WS-Discovery
WS-Policy
BP 1.1 Sec. 4
WSDL
XML Schema

WS-* - Industry Adoption

Messaging	SOAP / WSDL	MTOM
Microsoft	✓	✓
IBM	✓	
BEA	✓	
SUN	✓	🛠
Google	✓	
Amazon	✓	
eBay	✓	
Apache	✓	✓
Whitemesa	✓	✓
gSOAP	✓	✓
Ricoh	✓	🛠
Epson	✓	🛠
HP	✓	🛠
Xerox	✓	🛠
Fuji-Xerox	✓	🛠
Intel	✓	🛠
Canon	✓	🛠

Security	WS-Security	WS-SecureConv	WS-Trust	WS-Fed
Microsoft	✓	✓	✓	🛠
IBM	✓	🛠	✓	✓
BEA	✓	🛠	🛠	A
RSA	✓	🛠	🛠	A
Systinet	✓	🛠	🛠	
Apache	✓	🛠	🛠	
Layer7	✓	A	✓	
DataPower	✓		✓	
CA	✓	A	A	
SUN	✓			
SAP	✓			
Tibco	✓			
IONA	✓			
WebMethods	✓			
Nokia	✓			
Cape Clear	✓			
Sonic	✓			
gSOAP	✓			
Ping ID	🛠	A	✓	✓
Netegrity	🛠	A	A	🛠
Verisign	🛠	A	A	A
OpenNetwork	A	A	A	🛠
Oracle/Oblix	🛠	🛠	🛠	🛠

Assurances	WS-RM	WS-AT
Microsoft	✓	✓
IBM	✓	✓
BEA	✓	A
Cape Clear	✓	
Systinet	✓	
Blue Titan	✓	
Rogue Wave	🛠	
Sonic	✓	
IONA	✓	✓
JBoss		✓
Choreology		✓
Apache	✓	✓
Tibco	🛠	

Metadata	MEX	WS-P
Microsoft	✓	✓
IBM	A	🛠
BEA	A	✓
SAP	A	🛠
Sun	A	🛠
Verisign		A
Sonic		✓
Layer 7		🛠
Apache		🛠
CA	A	
WebMethods	A	
Systinet		✓
gSOAP		✓

Devices	WS-D	DPWS
Microsoft	✓	✓
Intel	🛠	🛠
Canon	🛠	🛠
BEA	A	
WebMethods	A	
Ricoh	🛠	🛠
Epson	🛠	🛠
HP	🛠	🛠
Xerox	🛠	🛠
Fuji-Xerox	🛠	🛠
Brother	🛠	🛠
Toshiba	🛠	🛠
Exceptional Innovation	🛠	🛠
Peerless	🛠	🛠
Schneider	🛠	🛠
Systinet	🛠	
gSOAP	✓	
Lexmark		A

Mgmt	WS-M	WS-XFer / Enum
Microsoft	✓	✓
Intel	🛠	🛠
Sun	🛠	🛠
Dell	🛠	🛠
AMD	A	
CA		A
Sonic		A
gSOAP		✓
Systinet		A
WEBM	🛠	🛠
NetIQ	🛠	🛠

✓ *Released product*

🛠 *Public interop*

A *Co-Author Only*