Microsoft .NET Core Basics

Jeff Jurvis

Technical Consultant
Technology Leadership Group
HP Consulting & Integration

HP WORLD 2003
Solutions and Technology Conference & Expo

Session outline

- .NET Baseline
  - How many of you are software developers?
  - How many of you are Windows developers?
  - How many of you are familiar with the core basics of Microsoft .NET (i.e., the .NET Framework, .NET Web services, Visual Studio .NET, etc.)?
- What .NET is and what .NET isn't
- A closer look at .NET Web services
- HP & .NET
- Summary

What .NET is and isn't

- .NET is…
  - A complete rethinking of object-oriented programming at Microsoft and on the Windows platform
  - Frameworks, languages, tools, and architecture
  - Designed for pervasive client environments
    - Desktops, handhelds, smart phones, consumer devices
  - About as close to "open" as we'll see Microsoft get

- .NET isn't
  - A branding push (although it was hijacked for awhile)
  - An operating system
  - A line of server software products
  - Completely "closed" and proprietary

.NET client environments

- In theory, .NET embraces a progressive view of computing clients
  - The usual desktop PC
  - Pocket PC
  - Smartphone
  - SPOT (Smart Personal Objects Technology) watch
  - Any computing device that contains .NET
- .NET is designed from the ground up for adaptability
- The desktop framework is full featured and completely supported. The .NET Compact Framework (for Pocket PC and Smartphone) is a subset squeezed by processor speed and memory constraints.

Rethinking software development

- Old
  - Component Object Model (COM)
  - Component-level scoping
  - Interface-based "inheritance"
  - Unmanaged code
  - DLL hell
- New
  - Everything is a class
  - True inheritance
    (http://msdn.microsoft.com/msdnmag/issues/01/11/instincts/)
  - Design patterns (http://msdn.microsoft.com/architecture/)
  - Managed (and unmanaged) code
  - Assemblies

The .NET Framework

- A platform for building, deploying, and running Web services and applications

- Better support for deployment (reduces possibility of version conflicts)

- Better security (safe execution of code)

- The .NET Framework consists of three main parts:
  - A hierarchical set of unified class libraries
  - A new and improved version of Active Server Pages called ASP.NET
  - The Common Language Runtime (CLR)

.NET Framework class library

- A collection of classes that integrate with the CLR
- Provides common functionality for
  - Strings
  - Collections
  - Database connectivity
  - File access
  - Lots more
- Provides context for
  - Windows client apps (Windows Forms)
  - ASP.NET apps (Web Forms)
  - XML Web services
  - Windows services
  - Console apps

ASP.NET

- Separation of code from the presentation (e.g., no need to mix Visual Basic with HTML)

- Pages are compiled vs. always interpreted

- Interacts with the CLR just like any other managed application

- Written in any .NET language

- ASP.NET controls adapt to the requesting browser
  - Downgrade browsers
  - Pocket IE on Pocket PC and Smartphone
  - WAP 2.0 and WAP 1.2 on mobile phones
 - 200 supported devices

.NET languages and tools

- Visual Studio .NET 2003

- Borland Delphi & C# Builder

- Sybase PowerBuilder

- Languages:
  - From Microsoft: C#, Visual Basic, C++, J#, Jscript
  - From others: Eiffel, Perl, Fortran, Pascal, COBOL

- Ultimately it all gets converted into Microsoft Intermediate Language (MSIL), a processor independent set of instructions

- MSIL is compiled to machine code by a just-in-time (JIT) compiler or precompiler

Common Language Runtime

- Code management (loading and execution)
- Application memory isolation
- Verification of type safety
- Conversion of intermediate language to native code
- Access to metadata (enhanced type information)
- Managing memory for managed objects
- Enforcement of code access security
- Exception handling, including cross-language exceptions
- Interoperation between managed code, COM objects, and pre-existing DLLs (unmanaged code and data)
- Automation of object layout
- Support for developer services (profiling, debugging, and so on)

Assemblies

- Assemblies use four part naming
  - Name, version, culture, public key token
- Assemblies can be signed
- Global Assembly Cache
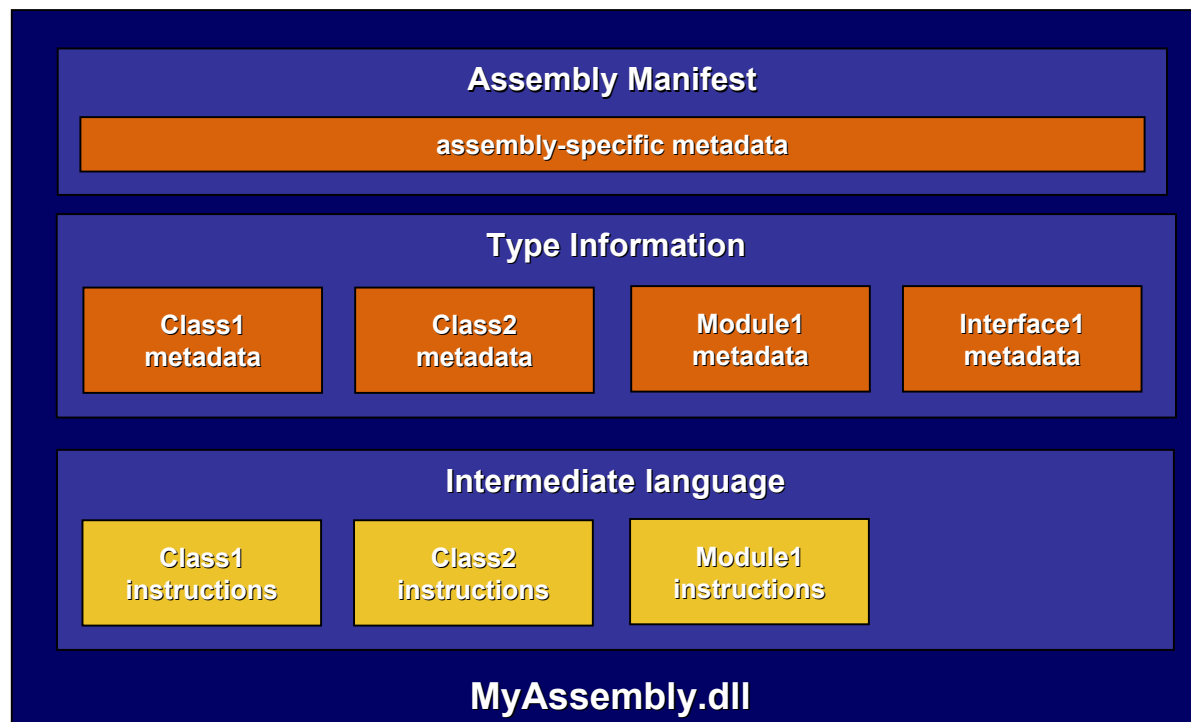
Source: Microsoft and DevelopMentor

.NET Web services

- Uses industry standard protocols
  - XML
  - SOAP (Simple Object Access Protocol)
  - WDSL (Web Services Description Language)
  - UDDI (Universal Description, Discovery and Integration)
- Community process via Web Services Interoperability Organization (http://www.ws-i.org)
- Microsoft, IBM, BEA, Verisign, HP, many others are co-developing and submitting proposals to W3C, OASIS, IETF, OMG, etc.
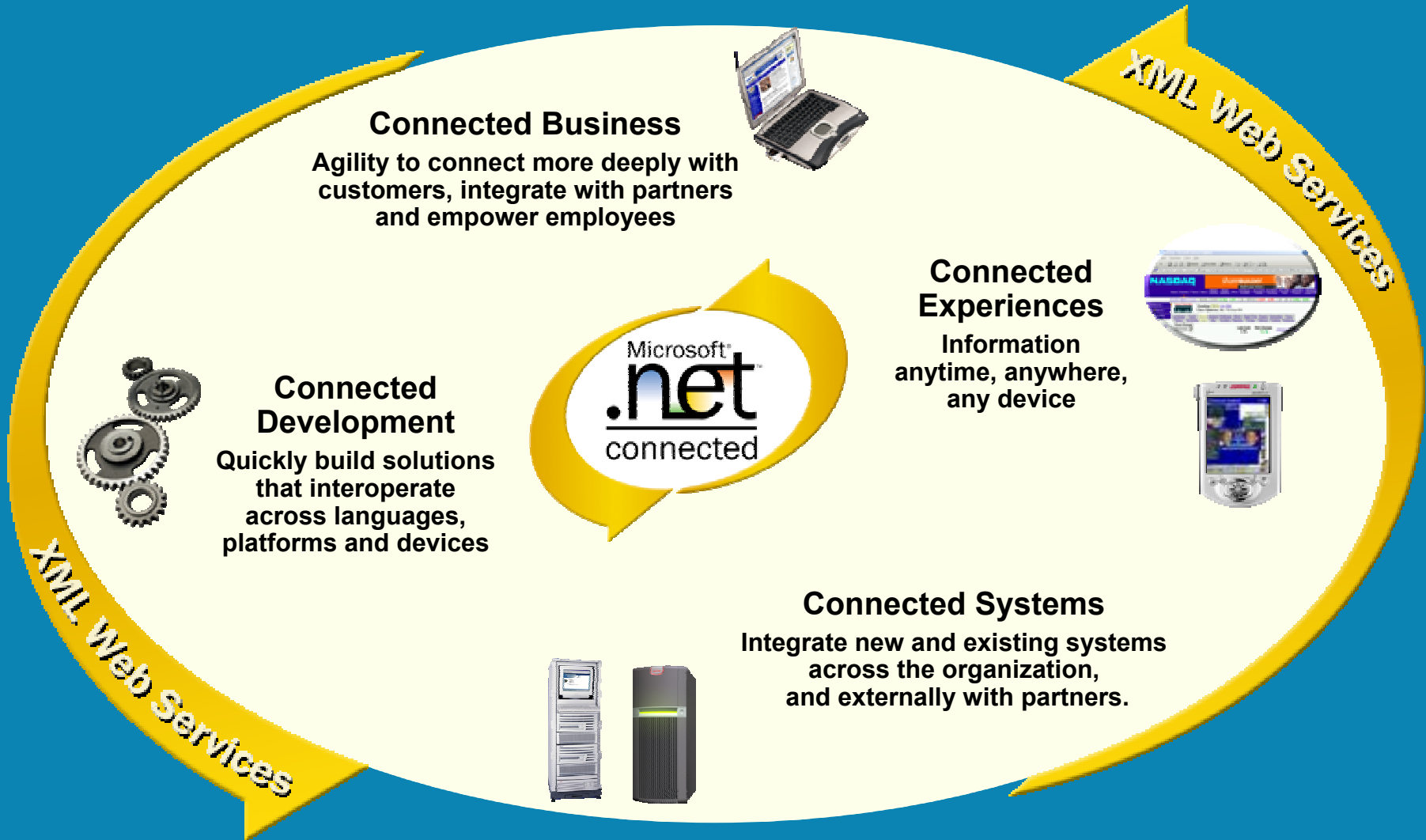- HP is committed to supporting Web services for .NET, but also remains a strong supporter of J2EE

What are XML Web services?

- XML Web services expose functionality to Web clients through a standard protocol such as SOAP
  - Stocks, weather, sports
  - Supply chain, manufacturing, health care
  - Message exchange vs. RPC?
- XML Web services describe their interfaces with a Web Services Description Language (WSDL) document
- XML Web services providers register them with Universal Discovery Description and Integration (UDDI)
  - Public: uddi.microsoft.com, uddi.ibm.com, uddi.sap.com
  - Private: HP internal UDDI directory
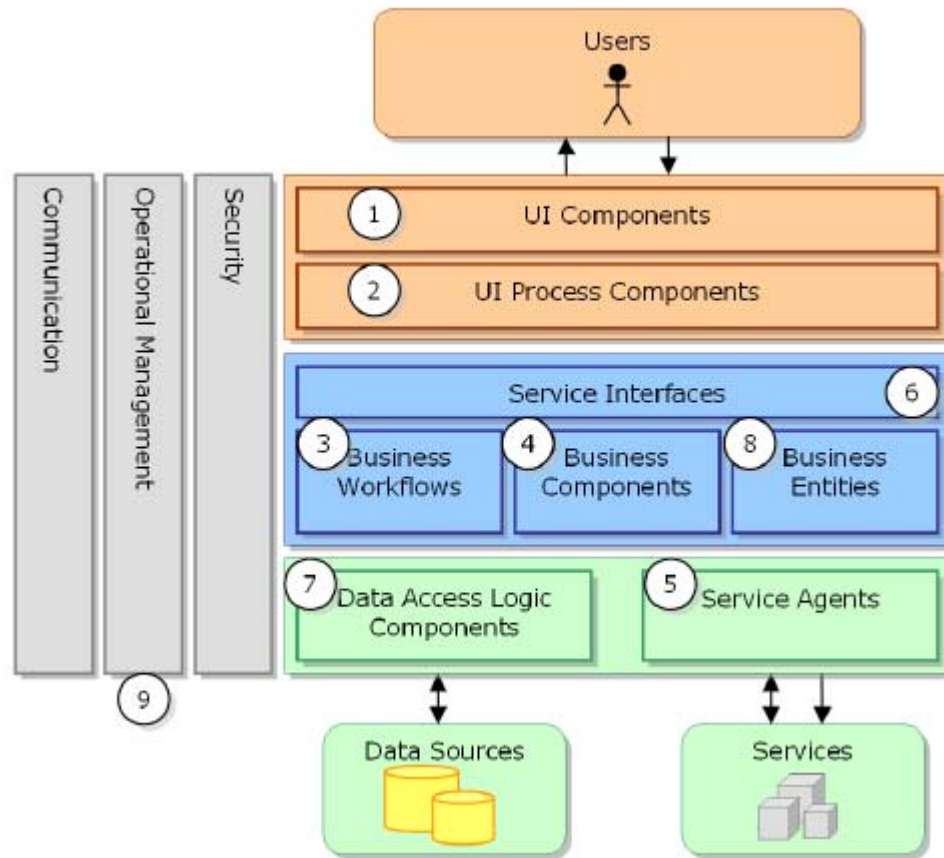- Web Services Enhancements

How does .NET leverage Web services?

- Web services are central to the design of .NET

- Visual Studio .NET automates the consumption of XML Web services
  - Add a reference to a WDSL document to a solution
  - VS.NET generates proxy classes that make Web services calls more user friendly

- Consider using Web services instead of DCOM

- Build Web services with ASP.NET WebMethods or lower level HTTP handlers and XML APIs

Microsoft's .NET vision

Connected Business

Agility to connect more deeply with customers, integrate with partners and empower employees

Connected Experiences

Information anytime, anywhere, any device

Connected Development

Quickly build solutions that interoperate across languages, platforms and devices

Microsoft® .net connected

Connected Systems

Integrate new and existing systems across the organization, and externally with partners.

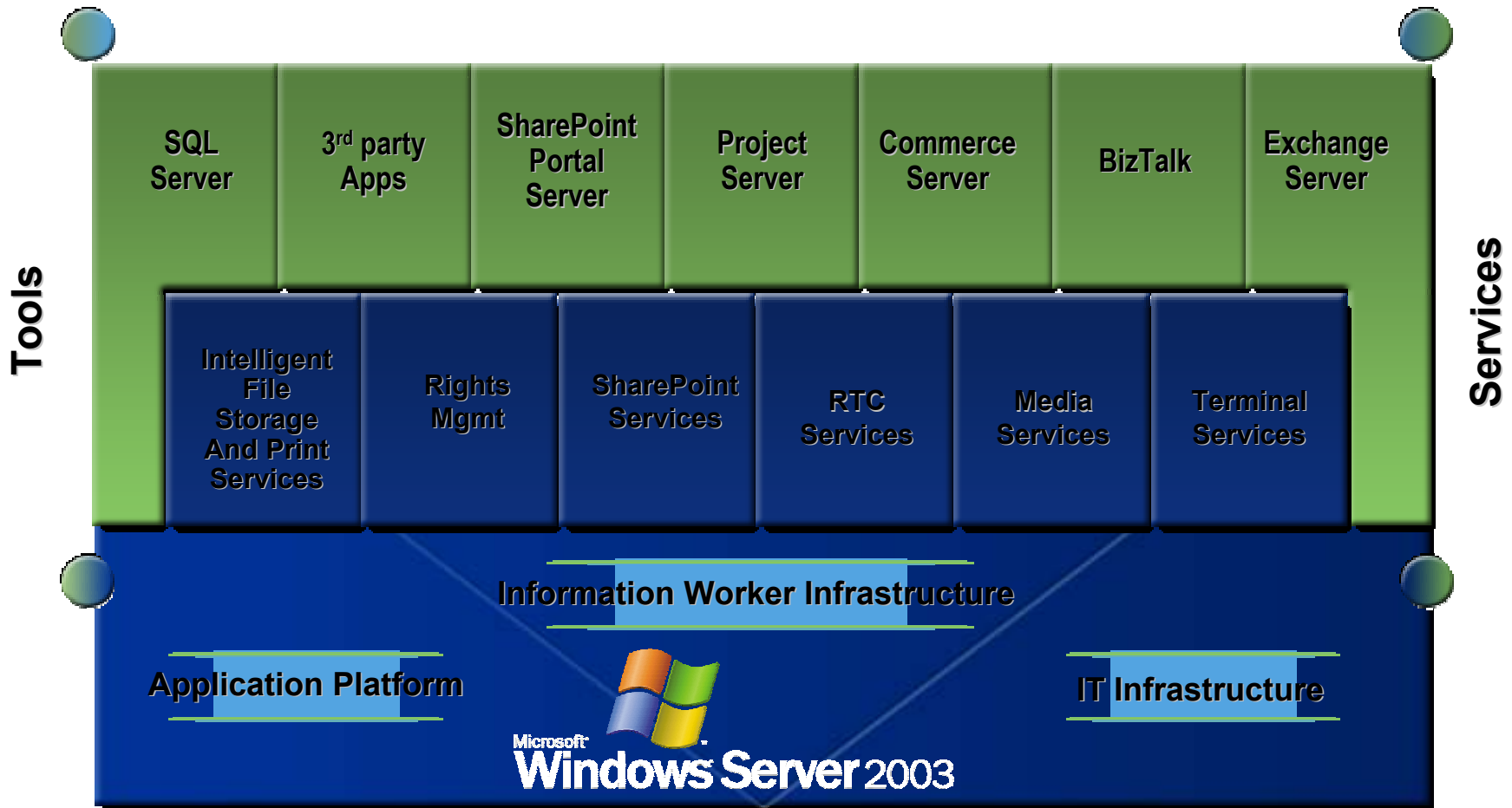XML Web Services

.NET across the enterprise

Source: Microsoft, "Application Architecture for .NET: Designing Applications and Services"

Example components:

- 1. Windows Forms, Web Forms

- 2. UI controllers

- 3. BizTalk

- 4. .NET classes

- 5. Web services

- 6. Web services, .NET methods, remoting

- 7. ADO.NET

- 8. ADO.NET

- 9. Built upon features of the .NET Framework

.NET systems

MapPoint .NET Web Service

- Cartographic, demographic, business listing, construction, traffic and other data

- Programmatic access to maps and driving directions, addresses and places, and proximity searches

- Find, render, route, and common services

- Try it at http://mappoint.msn.com or build your own (http://www.microsoft.com/mappoint/net/evaluation/)
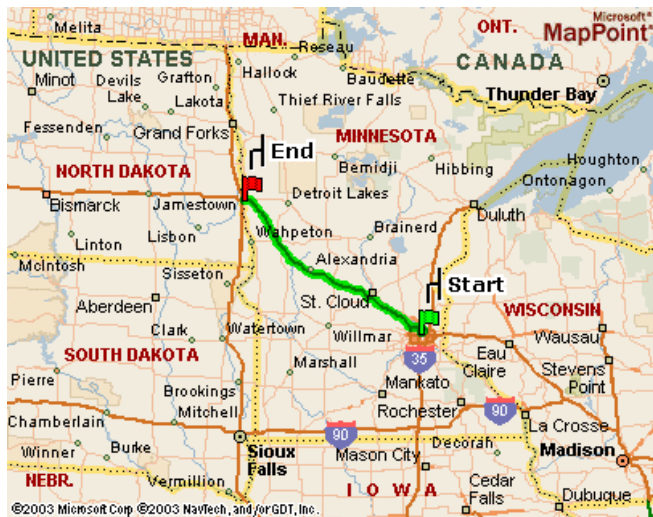
Start: 3433 Broadway St NE, Minneapolis, MN 55413

End: Fargo, North Dakota, United States

Total Distance: 238.6 Miles

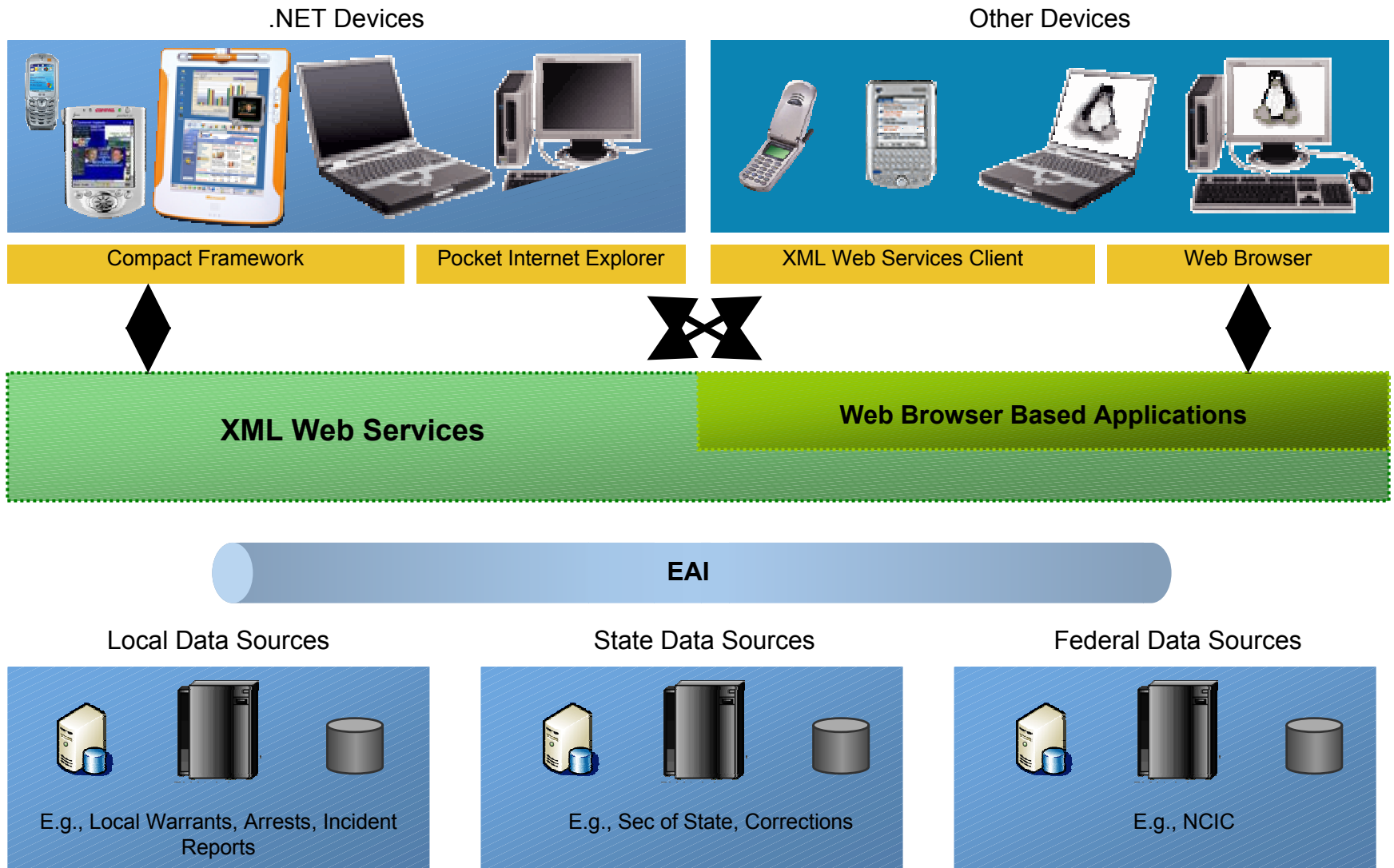**Estimated Total Time:** 3 hours, 47 minutes

.NET and HP

- $50 million joint investment with Microsoft called .NET Results

- HP Consulting & Integration external projects

- Internal projects

.NET Results

- HP is a worldwide prime integrator of .NET technologies

- More than 3,000 consultants to be certified

- HPCI has an elite group of senior consultants dedicated to closing and delivering .NET deals called the "A Team"

- External projects include:
  - General Mills Retail Planner
  - State of California Parolee Tracking
  - Web Services for Law Enforcement

Web Services for Law Enforcement – Architecture View

.NET Devices

Other Devices

| Compact Framework | Pocket Internet Explorer | XML Web Services Client | Web Browser |

XML Web Services

Web Browser Based Applications

EAI

Local Data Sources

State Data Sources

Federal Data Sources

E.g., Local Warrants, Arrests, Incident Reports

E.g., Sec of State, Corrections

E.g., NCIC

WSLE – Oakland County, MI Implementation

.NET Devices

CLEMIS Mobile Justice

- Wireless access to plates, DL, VIN, people
- Voice input for alpha/digits
- Query history for fast retrieval
- UI optimized for mobile users
- High value functions only
- Open upgrade path

.NET Compact Framework

Web Services for Law Enforcement

- In-state License Plate
- Out-of-state License Plate
- In-state Operator's License Number
- Out-of-state Operator's License Number
- Vehicle Identification Number
- Person (Registrations, OLN, warrants, etc.)

EAI (Core Technology Corp. Data Miner)

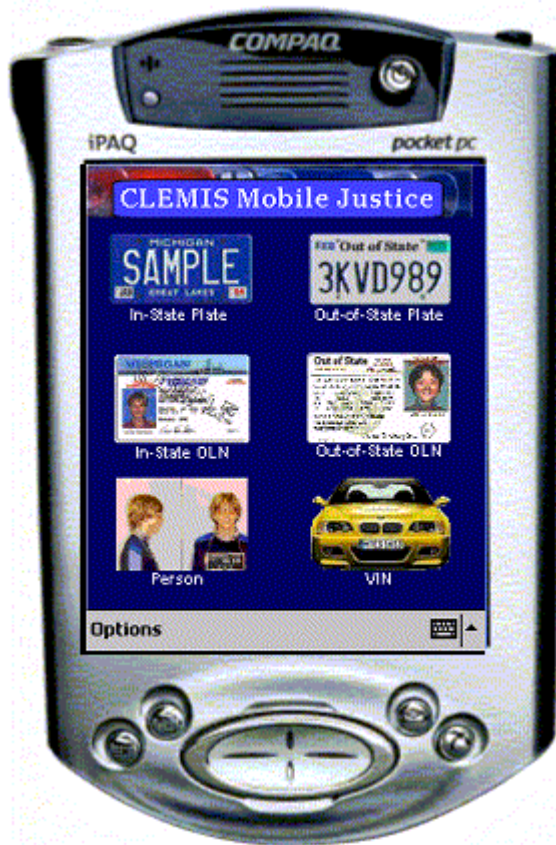| Local Data Sources	State Data Sources	Federal Data Sources
E.g., Local Warrants, Arrests, Incident Reports	E.g., Sec of State, Corrections	E.g., NCIC

WSLE – Oakland County, MI "Mobile Justice"

1. Officer taps the "In-State Plate" icon.

2. Officer enters plate number via voice or other iPAQ input methods

3. Car and driver info are retrieved via wireless connection to HP WSLE.

HP Projects

- Web Services Management Framework
  - Submitted for review as an industry standard
  - Enterprise application integration
  - Enterprise resource planning
  - Software configuration management
  - Web services
- HP's internal UDDI directory
- Automated account and mailbox migration
- Payment processing integration
- Monitoring and tracking parts
- Content authoring and management
- Many others

Summary

- .NET is a radically better approach to software development on Windows platforms

- XML Web services are embraced across the industry

- XML Web services are central to .NET

- HP is strongly committed to .NET, both with internal use and external consulting via HP Consulting & Integration

- Learn a ton more in these sessions:
  - 1187 .NET Web Services Case Study: Qwest
  - 1282 A Toolkit for Automated Provisioning of ProLiant Servers using Microsoft .NET
  - 1297 Migrating HP e3000 Applications to Microsoft .NET Using ASP.NET
  - 1356 .NET Mobility Technologies and Trends
  - 1373 .NET Interdependencies with Server Hardware Advancements
  - 1500 .NET and J2EE Interoperability
  - 2429 Collaborative Business Infrastructure Powered on the Windows .NET Platform

Interex, Encompass and HP bring you a powerful new HP World.