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**From:** Steven Guggenheimer  
**Sent:** Tuesday, June 20, 2000 6:01 PM  
**To:** Rick Belluzzo Direct Reports, Yusuf Mehdi  
**Subject:** Latest F2K white paper draft - Please do not forward

**Attachments:** F2K WP draft 62000.doc

This is good pre-reading for tomorrow morning on F2k and NGWS. There are still revisions going on in terms of terminology and other details but the basic framework has been stable for the last 12 hours and I expect it to remain mostly unchanged.

Cheers

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F2K WP draft  
62000.doc (75 KB)..

## **Microsoft.NET: Realizing The Next Generation Internet**

### **A Microsoft White Paper**

#### **Overview: A Revolutionary Business**

Revolutions are a way of life in the computer industry. Only 20 years ago, the world was still in the mainframe era. Few people had access to computers, except via the nearest IT department. The PC and the graphical user interface changed all that, democratizing computing for tens of millions of people and transforming the computer into a truly mass-market product. Corporations realized that networks of PCs and PC-based servers could reinvent the way they did business, while for consumers the PC quickly established itself as an alternative home-entertainment center. Then the Internet came along. It revolutionized the way we communicate, created a rich new source of information and entertainment, and added an "e" to commerce. Today, close to 300 million people worldwide use the Web. According to IDC, more than a quarter of a trillion dollars of business will be transacted over the Internet this year.

Yet for all these wonders, there is still plenty of room for improvement. Today's Internet largely mirrors the old mainframe model. Despite bountiful bandwidth, information is still locked up in centralized databases, with "gatekeepers" controlling access. Users must rely on the Web server to perform every operation, just like the old timesharing model. Web sites are isolated islands, and cannot communicate with each other on a user's behalf in any meaningful way. Today's Web does little more than simply serve up individual pages to individual users – pages that mostly present you with HTML "pictures" of data, but not the data itself (at present, making both available is too technically demanding for most Web sites). And the browser is in many respects a glorified read-only dumb terminal – you can easily browse information, but it is difficult to edit, analyze or manipulate (i.e., all the things knowledge workers actually *need* to do with it). Personalization consists of redundantly entering and giving up control of your personal information to every site you visit. You have to adapt to the technology, instead of the technology adapting to you.

These problems are multiplied if you use more than one PC or mobile device. To access your online information, email, offline files and other data, you have to struggle with multiple (and often incompatible) interfaces, varying levels of data access, and only intermittent synchronization of all the information you need (i.e., when you physically link your device with your PC). Online data is presented in an incomplete and pre-defined format, greatly limiting its usefulness. The concept of a customized "personal information space" that adapts to your needs is still a dream.

Is today's Web really as good as it gets? Everyone believes that the Web will evolve, but for that evolution to be truly empowering for developers, businesses and consumers, a radical new vision is needed. Microsoft's goal is to provide that vision, and the technology to make it a reality.

#### **Microsoft.NET: Beyond Browsing, Beyond The Dot.Com**

Microsoft is creating an advanced new generation of software that melds computing and communications in a revolutionary new way, offering every developer the tools they need to transform the Web and every other aspect of the computing experience. We call this initiative Microsoft.NET, and for the first time it enables developers, businesses and consumers to harness technology on *their* terms. Microsoft.NET will allow the creation of truly distributed Web services that will integrate and collaborate with a range of complementary services to serve customers in ways that today's dot.coms can only dream of. Microsoft.NET will help drive the Next Generation Internet. It will mean information that really is available any time, any place, and on any device.

The fundamental idea behind Microsoft.NET is that the focus is shifting from individual Web sites or devices connected to the Internet, to constellations of computers, devices and services that work together to deliver broader, richer solutions. People will have control over how, when and what information is delivered to them. Computers, devices and services will be able to collaborate with each other to provide rich services, instead of being isolated islands where the user provides the only integration. Businesses will be able to offer their products and services in a way that lets customers seamlessly embed them in their own electronic fabric. It is a vision that extends the personal empowerment first offered by the PC in the 1980s.

Microsoft.NET will help drive a fundamental shift in the Internet from HTML-based presentation to programmable XML-based information. XML is a widely supported public industry standard defined by the World Wide Web Consortium, the same organization that created the standards for the Web browser. It was developed with Microsoft input, but is not a proprietary Microsoft technology. XML provides a means of separating actual data from the presentational view of that data. It is a key to the Next Generation Internet – it offers a way to unlock information so that it can be organized, programmed and edited, a way to distribute data in more-useful ways to a variety of digital devices; and it allows Web sites to collaborate and provide a constellation of Web services that will be able to interact with each other.

Microsoft.NET comprises:

- **Microsoft.NET Platform** – .NET Infrastructure and Tools to build and operate a new generation of services; .NET User Experience (UE) to enable rich clients; .NET Building Block Services, a new generation of distributed megaservices.
- **Microsoft .NET Products and Services** – .NET devices, a new breed of smart Internet devices, Windows.NET, which incorporates a core set of Building Block Services and new UI, MSN.NET; Premium .NET added services (e.g., gaming, entertainment); Office.NET, Visual Studio/MSDN.NET, bCentral.NET.
- **Third-party .NET Services** – A vast range of partners and developers will have the opportunity to produce corporate and vertical services built on the .NET platform.

Microsoft.NET will take computing and communications far beyond the one-way Web to a rich, collaborative, interactive environment. Powered by advanced new software, Microsoft.NET will harness a constellation of applications, services and devices to create a personalized digital experience – one that constantly and automatically adapts itself to your needs, and those of your family, home and business. It means a whole new generation of software that will work as an integrated service to help you manage your life and work in the Internet Age.

For consumers, that means the simplicity of integrated services; unified browsing, editing and authoring, access to all your files, work and media online and off; a holistic experience across devices; personalization everywhere; and zero management. It means, for example, that any change to your information – whether input via your PC or handheld or smart credit card – will instantly and automatically be available everywhere that information is needed.

For knowledge workers and businesses, it means unified browsing, editing and authoring, rich coordinated communication; a seamless mobile experience; and powerful information-management and e-commerce tools that will transparently move between internal and Internet-based services, and support a new era of dynamic trading relationships.

For independent software developers, it means the opportunity to create advanced new services for the Internet age – services that are able automatically to access and leverage information either locally or remotely, working with any device or language, *without having to rewrite code for each environment*. Everything on the Internet becomes a potential building block for this new generation of services, while every application can be exposed as a service on the Internet.

The Microsoft.NET vision means empowerment for consumers, businesses, software developers and the entire industry. It means unleashing the full potential of the Internet. And it means *the Web the way you want it*.

### **The Microsoft.NET Platform: Building The Next Generation Internet**

Built on the standard integration fabric of XML and Internet protocols, the Microsoft.NET platform is a revolutionary model for developing an advanced new generation of software. Previously, programming models have focused on a single system, even attempting to mask interactions with other systems to look like local interactions. Microsoft.NET is explicitly designed to allow the integration or orchestration of any group of resources on the Internet into a single solution. Today, this type of integration is extremely complex and costly. Microsoft.NET will make it intrinsic to all software development.

The loosely coupled XML-based Microsoft.NET programming model introduces the concept of a high productivity, fault-resilient component-based architecture for creating Web services within a reusable, object-oriented framework. XML is no longer just a format for encoding arbitrary data – it becomes the programming model itself. Whereas today's Web sites are hand-crafted and don't work with other sites without massive development, the Microsoft.NET programming model provides an open mechanism to design any Web site or service so that it will federate and collaborate seamlessly with any others. Just as the introduction of interchangeable components accelerated the Industrial Revolution, Microsoft.NET promises to hasten the development of the Next Generation Internet.

For developers, Microsoft has created an entirely new set of Microsoft.NET development tools, designed from the ground up for the Web, and spanning client, server and services. These tools will enable developers to transform the Web from today's static presentation of information into a Web of rich interactive services. Microsoft's breakthrough Visual Studio 7 tool suite automates the development of Web services via the drag-and-drop rapid-application development paradigm pioneered by Visual Basic – services that can be consumed on any platform that understands XML. VS7 automatically generates XML code. Microsoft is also announcing a new set of BizTalk Orchestration tools that allow visual programming of business-processes by composition of services. This will enable a new breed of developer – the business analyst.

The Microsoft.NET programming model gives independent developers the opportunity to focus fewer of their resources on *where or how* an application runs and more on *what* it does – on where they can add real value. Microsoft.NET addresses some of the biggest challenges facing developers, who today are wrestling with the tradeoff between functionality and manageability. It takes ASPs and application hosting to a new level, enabling the integration of hosted applications with other applications (hosted or not); the customization of those applications, and the ability to program against those applications; and the facility to run the applications offline.

In addition, developers will be able to leverage and customize a range of core Microsoft.NET Building Block Services in their own applications and services, reducing the effort required to create compelling products. These core Microsoft.NET Building Block Services correspond to areas of functionality where Microsoft has deep expertise and can provide value to a broad set of developers. In many cases, Microsoft is unifying developer building blocks in Windows with similar capabilities that are Internet-based today, to deliver a truly distributed solution that can be used on a standalone client system, within an organization, and across the entire Internet.

With the option of subscribing to these core Microsoft.NET services off-the-shelf, developers can make a "buy or build" decision and decide where they want to spend their development resources. Some may elect to build basic service capabilities themselves. But many will likely opt for a well-packaged solution with strong development tools support, just as many developers

choose not to write their own printer drivers or windowing system with Windows, and instead focus their resources on differentiating their own higher-level products.

The core Microsoft.NET services that will be offered include:

- **Identity** – Building on Microsoft Passport, provides levels of authentication ranging from passwords and wallets to smart cards and biometric devices. Enables developers to build services that provide personalization and privacy for their customers, who in turn can enjoy new levels of safe and secure access to their services, no matter where they are or on what device. In next major release of Windows, codenamed Whistler.
- **Notification and Messaging** – Integrates instant messaging, email, fax, voice-mail, and other forms of notification and messaging into a unified experience, delivered to any PC or smart device. Builds on Hotmail, Exchange and Instant Messenger.
- **Personalization** – Puts *you* in control by enabling you to create rules and preferences that implicitly and explicitly define how notifications and messages should be handled; how requests to share your data should be treated, and how your multiple devices should be coordinated (e.g., always synchronize my laptop computer with the full contents of my Microsoft NET storage service).
- **Schematized Storage** – Uses a universal language (XML) and protocol (SOAP) to describe what data means, enabling data to maintain its integrity when transmitted and handled by multiple Web sites and users. The result is that Web sites become flexible services that can interact, and exchange and leverage each other's data. Microsoft.NET also offers a secure, addressable place to store data on the Web. Each of your devices can access this, optimally replicating data for efficiency and offline use. Other services can access your store with your consent. Brings together elements of NTFS, SQL Server, Exchange and MSN Communities. Delivered with Whistler.
- **Calendar** – A crucial dimension of user control is time: when is it permissible to interrupt me, when should I be left alone? This becomes especially important as people use more devices more of the time, and as users and services interact more richly. Microsoft.NET provides the basis for securely and privately integrating your work, social, and home calendars so that they are accessible to all of your devices and, with your consent, other services and individuals. Builds on Outlook and Hotmail calendar.
- **Directory and Search** – Microsoft.NET makes it possible to find services and people with which to interact. Microsoft.NET directories are more than search engines or "yellow pages." They can interact programmatically with services to answer specific schema-based questions about the capabilities of those services. They can also be aggregated and customized by other services and combined with them.
- **Update** – Enables Microsoft and developers to dynamically offer incremental levels of functionality and reliable automatic upgrades, without user installation or configuration. Microsoft.NET proactively adapts to what you want to do, on any of your devices. This inversion of the traditional installation-dependent application model is a necessity in a world where users will enjoy the benefits of services on multiple devices.

Microsoft.NET's distributed services are available both online and off. A service can be invoked on a standalone machine not connected to the Internet, or provided by a local server running inside a company, or accessed via the Internet cloud. Critically, each of these instantiations can work together – for example, a corporate directory service can federate with a service in the Internet cloud. It is this ability to federate, collaborate and interoperate that sets services based on Microsoft.NET far apart from today's Internet-based offerings.

Microsoft.NET Building Block Services can be consumed on any operating system. However, Microsoft is confident that Windows 2000 – the most solid, manageable, scalable and reliable OS in the industry – will be the best possible client or server OS for Microsoft.NET. Windows will offer the best environment to create and deliver Web services, while Windows clients will be optimized to distribute Web services to every kind of device. And Microsoft DNA 2000 already provides the first comprehensive XML-enabled infrastructure for building and operating Web services.

## The Microsoft.NET User Experience: Intelligent Interactivity

Today, computing revolves around two separate worlds – the world of applications on PCs and devices, and the world of Web sites. Microsoft .NET enables these two worlds to collaborate seamlessly, combining rich functionality with the Internet's infinite ocean of information. It will transform today's Web into the truly "intercreative space" that Tim Berners-Lee has envisioned.

Today, working across online and offline environments – even when using only a single PC – is a frustrating and inefficient experience. It is more *disintegrated* than integrated: Web browsing (read-only), Office (authoring and editing), communications (email, instant messaging), calendar and contacts (offline, device-dependent) each require separate applications that have widely varying functionality and compatibility. Most people would prefer a single, unified environment that adapts to whichever environment they are working in, moves transparently between local and remote services and applications, and is largely device-independent – a kind of universal canvas for the Internet age. To make this a reality, Microsoft.NET offers:

- **.NET Universal Canvas** – An XML compound information architecture that integrates browsing, communications and document authoring in a single, unified environment, enabling users to synthesize and interact with information in a unified way. The Universal Canvas builds upon XML schema to transform the Internet from a read-only environment into a read/write platform, enabling users to interactively create, browse, edit, annotate and analyze information. Because the underlying information is XML, the Universal Canvas can bring together multiple sources of information from anywhere in the world to enable seamless data access, synthesis and use.
- **.NET Passport** – Manages your identity and persona over the Internet and provides greater control of how Web sites and services interact with you. Maintains your history, context and preferences – your past, present and future on the Internet. Supports privacy enabling technologies. Unlike today's Internet, your personal information remains under your control and you decide who can access it. Enables you to create your personal preferences just once, which you can then permit any Web site or service to use.
- **.NET Natural User Interface** – A collection of technologies that enable the next generation of interactions between humans and computers – including speech, vision, handwriting, and natural-language input via a new "type-in" box. Technologies can be combined for multi-modal user interface. Natural User Interface provides the right UI for every device or environment.
- **.NET IntelliSense** – Extends IntelliSense to Web content, enabling your PC and devices to be smart about handling information from the Internet. Extensible architecture allows anyone to create adaptive UI and data handlers. Intrinsic knowledge of XML schemas.
- **.NET Update** – Electronically delivers software that is optimized to take advantage of the richness of the PC and the immediacy of the Web. Provides "just-in-time" tools, updates and support, offering users the functionality they need any time, any place and on any computer. Enables dynamic, automatic software downloads and updates, optimized for online or offline use, ensuring that users have access to their software regardless of their location. Allows developers to deliver integrated new solutions to users on-demand.
- **.NET Integrated Digital Media** – Integral support for audio, video, pictures and other digital content, including secure content.

Working with a new breed of smart devices, Microsoft.NET will also be the Web *where* you want it. Next Generation Internet devices will be designed to leverage hosted services and offer rich local processing capabilities. They will use the network intelligently, exploiting broadband links but being economical with wireless bandwidth, and come in a range of new form factors (such as the tablet PC). Programmable and customizable, with automatic updates and zero administration, these smart devices will see explosive growth during the next five years. And they will partner with the ultimate smart Internet device: the PC.

## Microsoft.NET Services: Partnering for The Next Generation Internet

As Alexander Graham Bell once noted, "great discoveries and improvements invariably involve the cooperation of many minds." Platforms provide a context for cooperation across the industry so you don't have to build everything yourself. When DOS became popular on the PC, it created opportunities for a new generation of independent developers to build businesses around DOS-based applications. Windows took those opportunities to an even higher level.

The opportunities for every developer afforded by Microsoft.NET will be greater still. Unlike DOS and Windows, Microsoft.NET not only scales from Pocket PCs to Web server farms; it will also be the platform of choice for an entirely new generation of services, applications and devices. During the next three years, Microsoft will invest \$2 billion to enable partners, independent developers and corporate IT developers to build Microsoft.NET services.

In the long term, all applications software will likely be provided as a service, subscribed to over the Internet. This will allow Microsoft and other software service providers to provide better customer service, transparent installation and backup, and a positive feedback loop into the product-development process. Software delivered as a service would also allow Microsoft and independent developers to respond more swiftly with backups and antivirus protection.

We envision the majority of our software applications evolving into subscription services over time, at the same time as we continue to innovate our existing platforms and applications. From the outset, however, Microsoft will offer a range of .NET products and experiences to a number of our core customer constituencies. These will complement Windows.NET, which will incorporate a range of core .NET Building Block Services and a new user interface.

- **Consumers** – MSN.NET, which will combine MSN content and information services with .NET platform services and a new client to deliver a complete, simple-to-use and integrated consumer experience. Premium .NET services will also be available.
- **Knowledge Workers** – Office.NET, a subscription-based version of Microsoft's popular suite of productivity tools, delivered as a hosted service. There will also be a new version of today's licensed Office suite.
- **Developers** – XML-based programming model and tools, fully supported by VS7 and MSDN, and DNA 2000 servers.
- **Small Businesses** – bCentral.NET, subscription-based hosted services and tools for small and growing businesses.
- **The Enterprise** – In addition to Office.NET, Windows.NET and other enterprise products, corporate developers will be able to leverage the Microsoft.NET platform to build rich, customized knowledge-, data- and information-management applications and services.

## Conclusion: The .NET Revolution

Ten years ago Microsoft set out a vision of a world with Information at Your Fingertips. Back then, information was anything but. modems connected at 4800 baud, most messages were sent by fax rather than email, and few people had even heard of the Internet. Although we envisioned a world in which people could connect with the information they wanted, when they wanted it, from whatever device they wanted, we had no idea what technologies would help us make this a reality. Today, we know that Internet protocols, XML, SOAP, broadband and wireless are the key. They are at the heart of Microsoft.NET.

The Microsoft.NET platform will revolutionize computing and communications in the first decade of the 21<sup>st</sup> century by being the first platform that takes full advantage of both. Microsoft.NET will make computing and communicating simpler and easier than ever. It will spawn a new generation of Internet services, and enable tens of thousands of software developers to create revolutionary new kinds of online services and businesses. It will put *you* back in control, and enable greater control of your privacy, digital identity and data. *And software is what makes it all possible*

Microsoft.NET will only succeed if others share broadly in its success. Microsoft's business philosophy has always been to produce low-cost, high-volume, high-performance software that empowers individual and business users, and creates opportunities for our customers, partners and every independent developer. That philosophy is what sets Microsoft apart from its competitors – and Microsoft.NET takes it to a new level.