Microsoft

Driving Connectivity

Microsoft Auto provides a flexible, robust, high performance infotainment platform that enables you to:

Create innovative, differentiated solutions for your customers

Reduce development cost and shorten time to market

Keep your vehicles up-to-date with support for the latest technology

Microsoft Auto

Welcome and Foreword

The automotive industry is at an inflection point, where software plus services will redefine the future of the in-vehicle experience, and innovation is the new currency. This innovation goes beyond the features and scenarios enabled inside the vehicle cabin, it creates new vehicle ownership scenarios enabled on the web, the PC, and the mobile phone, and extends the relationship with the customer beyond the point of sale. These new scenarios require innovation in the business models and design and engineering processes used to bring breakthrough products to market. Consumers are expecting more from their vehicle systems, and from the level of integration those systems have with their other electronic devices and services. The key challenge facing automakers is how to bring these innovative solutions to their customers *quickly* and *affordably*, while maintaining a competitive edge and differentiation. The Microsoft Auto platform and Microsoft Auto Services are the critical components needed to deliver end to end scenarios on that challenge.

Automakers face many challenges today, from competitive pressure and cost pressure at every point in the supply chain, to globalization of manufacturing and ensuring global applicability of solutions, and in marketing solutions in new and creative ways to sell cars faster. Microsoft is partnering with the automotive infotainment industry deeply to help address these challenges. New methods of using existing technology, as well as developing advanced platforms that offer all of the standard 'commoditized' features built in, allow suppliers and automakers to focus their resources where they are truly needed – on bringing unique, differentiating solutions to their customers, and marketing these solutions to win new customers and make their existing customers even happier. Our partnership goes far beyond the platform development and licensing. We bring over a decade of specialized in-vehicle infotainment, leveraging nearly 20 years of embedded platform and software development. We have a rich history of development tools, and the largest development community in the world developing on the Win32 APIs. We bring a broad ecosystem of partners that deliver unique value across the entire supply chain. We provide custom software development options through a Partnership Response Team. We offer Advanced Technology Centers and Early Adopter Programs to engage with automakers' and suppliers' own research and advanced engineering departments to help redefine the cutting edge of product development and customer experiences.

Thank you for taking the time to understand more about the ways Microsoft Auto and Microsoft Auto Services can help you make the next generation of infotainment experiences a reality.

Tom Phillips
General Manager, Microsoft Automotive Business Unit

The Infotainment Market Opportunity

The market is ripe for a new generation of in-car systems. Consumers are increasingly demanding on-the-go access to multimedia content and productivity applications; they want in-vehicle infotainment solutions that let them use their existing digital devices and formats, including mobile phones, MP3 players, DVDs, and CDs. They want innovative, connected services for entertainment, driver assistance (such as navigation and emergency calling), productivity (like e-mail, Web browsing, and calendaring), and communication (including conferencing and calling)—all seamlessly integrated as if the vehicle was just another node on the home and office network.

Research from the U.S. Department of Transportation and National Highway Traffic and Safety Administration estimates that Americans spend more than 500 million commuter hours per week in their vehicles, and that 73 percent of mobile phone users talk on their phones while driving.

Consumers report[1] that they would frequently use monetized services such as location-based search and digital audio entertainment if they were available, and that free or included services substantially impact their willingness to switch car choice or mobile operators. Clearly, there is a healthy market for in-vehicle infotainment devices and services.

Providing for these demands in a mobile, rugged environment while accounting for the special needs drivers and passengers, however, is no easy task.

Hands-free driving legislation has been adopted in a number of countries and states. This has lead to significant demand on OEMs to find cost-effective solutions for the provisioning of hands-free devices, and has led to a swell in consumer demand for Bluetooth. In Europe, the European Union is considering to make eCall a mandatory service in every new car in the near future, potentially propelling European Telematics into the number one position. This will certainly drive the uptake of speech and Bluetooth technology, with a positive influence on in-dash systems.

Another important thing to consider is the environmental issues, and how companies continue to explore and implement new ways to preserve and improve the environment. Environmental efforts at Microsoft are focused in two key areas. The first is applying Microsoft technology expertise to help solve environmental challenges and the second is reducing the company's environmental footprint. Microsoft works with partners to achieve this, and in the automotive space, brings the same focus. We see it as a key responsibility to enable OEMs to create their environmental-friendly concepts on the Microsoft Auto platform.

Fiat is creating a vision and services around better environmental protection. With Blue&Me powered by Microsoft Auto, they were able to create solutions like eco:Drive to help consumers monitor and be more environmentally considerate.

The key issue here is how Microsoft can support car makers to use technology to create more ecologically friendly vehicles. We at Automotive Business Unit are committed to deliver a flexible and updatable infotainment platform, Microsoft Auto, which will help carmakers deliver solutions that are more environment conscious, without cutting back on edgy technology.

[1] ABI Research 2008

Microsoft Vision in Automotive

The rapidly emerging and evolving field of vehicle-centered software plus services is transforming the driver and passenger experience. Bringing the vehicle into the digital lifecycle and changing expectations of what customers expect, Microsoft Auto delivers entertainment and communications features, plus the opportunity to provide new capabilities and drive new revenue through remote services. It also gives automakers and their partners the means to draw much closer to their customers, enabling them to sharply pinpoint mobility products and services to those demanding them. Microsoft offers several solutions that make auto mobility a reality.

Microsoft Auto – Bringing the digital lifestyle into the car

Already very active in this arena, Microsoft has introduced many of the solutions that the automotive community will need as the products and market evolve.

About Us – Microsoft Automotive Business Unit

In 1995, Microsoft created the Microsoft Automotive Business Unit (ABU) in response to the growing desire of consumers to remain connected to their information and entertainment while traveling in their cars. The ABU—a multidisciplinary group composed of product developers and business leaders in North America, Japan, and Germany—is a dedicated partner to the automotive industry. It provides innovative technologies and flexible software to help deliver reliable, easy-to-implement, and cost-effective in-car infotainment solutions that can help automakers and suppliers distinguish themselves in the marketplace.

Microsoft Auto

We are committed to providing:

- *Integrated features*—Including high quality state-of-the-art communication, navigation, entertainment, and service features at low cost.
- *Robust platform*—Providing a platform to reduce risk, shorten time to market, and drive down overall cost for suppliers and carmakers.
- *Rich tools*—Using industry leading tools for application and HMI development by engineers and designers.
- *Relevance*—Upgradable to evolve with consumer trends and technology improving customer satisfaction and loyalty.
- *Services*—Connectivity to Web-based services content to deliver real-time information, entertainment and security for drivers.

Microsoft Automotive Business Unit has offices in all of the major geographies for automotive development.

Teams located near the main centers of automotive development

About Microsoft Auto

Enrich the in-vehicle experience with an industry leading platform for communication, entertainment, navigation and connected services

Microsoft Auto is based on a vision to: "enrich the in-vehicle experience for drivers and passengers by bringing an industry leading platform software and services for communication, entertainment, navigation and information services to the mass market". Taking a closer look at what this means…

Enrich the in-vehicle experience for drivers and passengers
The technology in Microsoft Auto is designed to enable easy to use, appropriate and relevant experiences for the front and rear seat, facing drivers and passengers alike. To stay relevant, the platform provides update capabilities to ensure state of the art support with modern consumer electronic devices through device updates, service content, and improving the time to market for automakers.

Integrated Features	Include **high quality** state-of-the-art **communication**, **navigation**, **entertainment**, and **service** features at low cost
Robust Platform	Provide a platform to **reduce risk**, **shorten time to market**, and **drive down overall cost** for suppliers and carmakers
Rich Tools	Use industry leading tools for application and **HMI development** by engineers and designers
Always Relevant	**Upgradable to evolve** with consumer trends and technology improving **customer satisfaction** and **loyalty**
Services Enabled	Connectivity to **web-based services** content to deliver real-time information, entertainment and security for drivers

An industry leading platform and services
Microsoft Auto is a robust, extensible software platform to help deliver more reliable and cost effective in-car infotainment systems. Our goal is to reduce the cost, risk, and time to market of Telematics and infotainment solution development, by providing a platform with integrated communication, entertainment, and navigation service features, and the tools capable of creating unique solutions that help automakers and suppliers set them apart from the competition.

For Communication, Entertainment, Navigation and Information
The integrated components in Microsoft Auto help carmakers and Tier 1 suppliers connect drivers with a wide range of devices, services and technology, including hands-free Bluetooth phone communication, media and mobile device integration, rich content through connected services and state-of-the-art graphical capabilities and high-fidelity digital entertainment. What's more, these technologies are not delivered in silos, separated from each other as individual components, but rather integrated to provide a seamless experience for customers. However, Microsoft Auto does not define or require a specific human-machine interface (HMI) or HMI technology. The end result is a complete, state of the art infotainment system that matches the look and feel of your target customer.

To the mass market
Our platform enables suppliers to create devices at a lower per-device cost, as well as lower design and engineering cost. It provides the ability to get to market faster through the use of standardized components and partners. Combined, these allow automakers to bring features once found only in luxury vehicles to consumers of any vehicle across all model lines.

Benefits of the Standardized Microsoft Auto

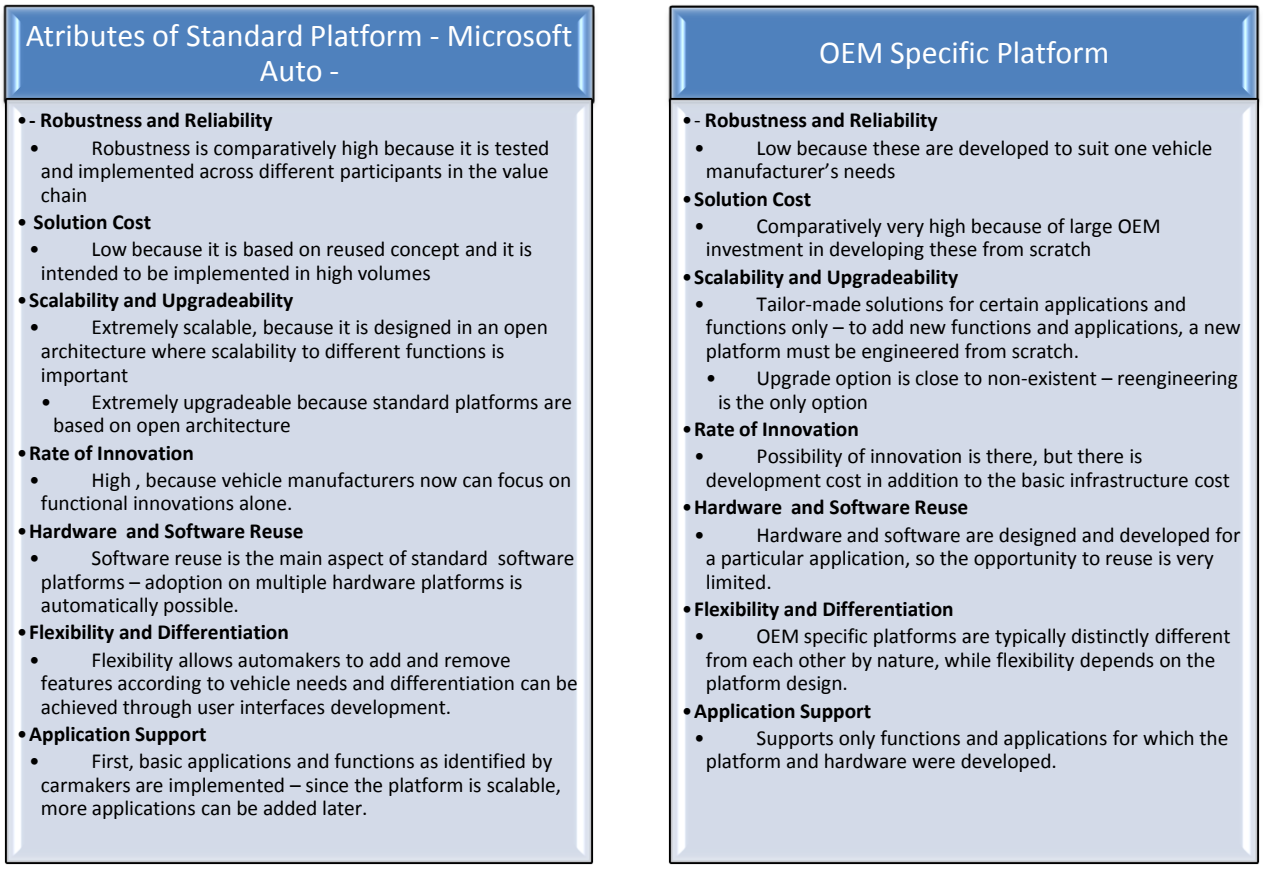
Over 80 percent of information technology resources on the plant floor run on Microsoft platforms and technologies, representing the most mission-critical elements of their IT infrastructure.

Knowing the end customer has long been one of the prime challenges facing the automotive industry. It has become essential for the automaker, at the demographic level, to know who their customers are in order to develop the right models for the right market segments. And at the personal level, automakers are challenged to establish stronger relationships with buyers to secure the kind of loyalty that could turn into repeat sales.

The rapidly emerging and evolving field of vehicle-centered software plus services is transforming the driver and passenger experience. Bringing the vehicle into the digital lifecycle and changing expectations of what customers desire, Microsoft Auto delivers entertainment and communications features, plus the opportunity to provide new capabilities and drive new revenue through remote services. It also gives automakers and their partners the means to draw much closer to their customers, enabling them to sharply pinpoint mobility products and services to those demanding them. Microsoft offers several solutions that make auto mobility a reality.

Today, a new generation of software and services promises to transform the driver and passenger experience. Already very active in this arena, Microsoft is constantly innovating to develop many of the solutions that the automotive community needs as the products and market evolve.

Attributes of the Open Microsoft Auto Platform



Microsoft Auto – Benefits of an open architecture

As a world leading developer of operating system software, the choice of Microsoft for a robust and reliable operating system is obvious. Microsoft has many years of experience in the consumer electronics and services sector, and is thus ideally suited for providing standard interfaces inside vehicles so that drivers can use their own portable devices. Microsoft can save automakers and suppliers the time it takes to develop basic functions, leaving them free to customize their product. According to the 2008 Best Global Brands List by Interbrand, Microsoft is the third strongest brand worldwide with a brand value of over 59 billion US dollars. This is a unique asset that no other player in the automotive supplier environment is able to offer.

Microsoft the Right Partner for You

We at Microsoft believe we live in a connected world with a growing number of complementary technologies.

Microsoft Auto brings the advantage of partnering with Microsoft, a known, stable company with a long history of customer commitment.

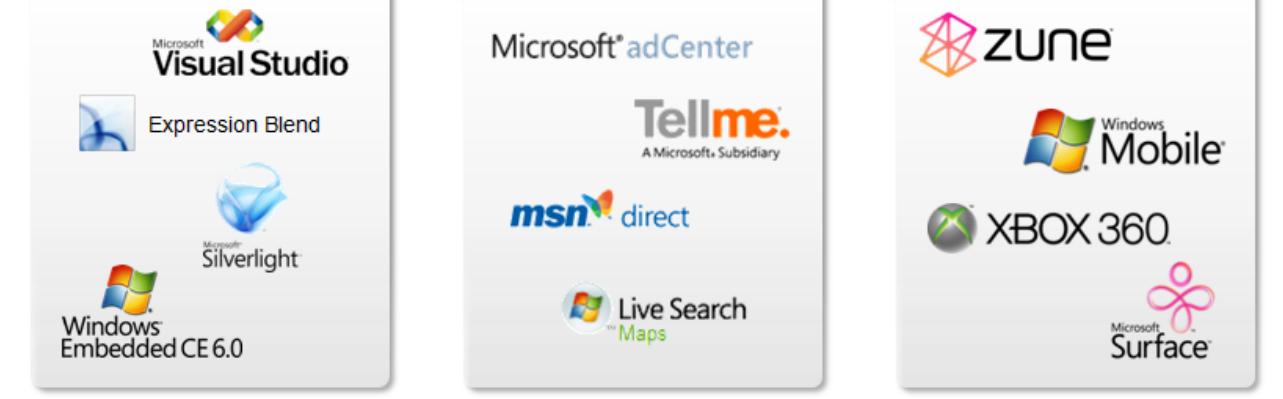
- *Microsoft is committed to understanding and serving consumers*—at work, at home, and on the go. Microsoft products and services reach more than 420 million households, delivering digital experiences to more than 1 billion consumers every month.
- *Microsoft is committed to planned innovation that evolves predictably*—innovation that is compelling today and remains compelling tomorrow. Planned innovations eliminate the risk associated with using "rip and replace" alternatives, which may seem worthy today, but if not financially supported, will not be there tomorrow—potentially leaving you with the responsibility for on-going maintenance, support, and technical evolution.

Here are four key reasons why Microsoft is the right partner for you:

1. We deliver state-of-the art software platforms.
2. We leverage IP for lower project implementation risk and faster time to market.
3. We employ a collaborative approach to achieve solution fit and knowledge transfer.
4. We leverage world-class partners and technology centers to conduct efficient and professional projects.

Additional Microsoft Assets

Partnering with Microsoft also enables the leveraging of relevant Microsoft assets, as shown in the figure below.



Examples of Microsoft Assets

Connected Services

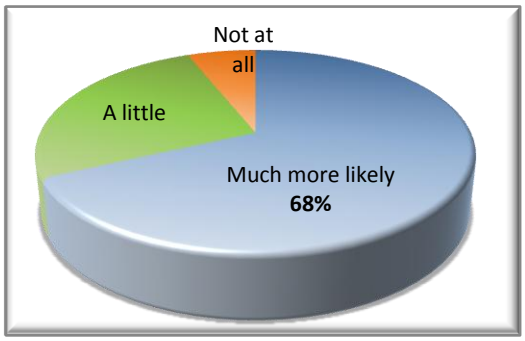
Customers demand for connected services is addressed by Microsoft Auto Services to enable innovative connected service scenarios, providing a solution framework that acts as a consolidation point for content delivery to vehicles and other mobile devices. It features:

- *Local business listings, weather, gas prices, and movie show-times*—Information like this is provided to customers on the go through Microsoft-generated content over a Microsoft-hosted infrastructure. This use of existing content and a delivery infrastructure already in place affords economies of scale across aggregated service delivery and benefits service-based business models.
- *Solution framework for aggregating location-based services*—The solution framework is composed of adapters: a business adapter provides the infrastructure for reporting and attaching business models, a license adapter manages device and partner access to services, and a protocol adapter optimizes delivers based integration model. This makes is easier to provide new services to customers.
- *Microsoft Auto client components*—exposes the Win32 API to developers, reducing the cost of service integration. For example, use of the Win32 API provides 82.5 percent reduction in data size over typical SOAP results from Live Search. Live Search for Devices also supports existing in-car HMI models to ease adoption.
- *SDK support for other client platforms*—The SDK lets developers create service connected devices on other platform technologies, providing the broadest possible base for new services for customers.

Microsoft Auto – enrich the connected scenarios

Microsoft Brand - Customer Value Proposition

Automakers and tier 1 suppliers can leverage the "Powered by Microsoft" brand, as well as the award-winning applications and ubiquitous services it implies, to elevate their own brands. Customers are familiar with the Microsoft name, and believe that it adds value.



Powered by Microsoft – Consumer feedback

When consumers were asked whether Blue&Me [2] had a significant influence in the car choice, 79 percent of the surveyed said "a lot." When these customers were asked, "How much more or less likely would you be to buy a vehicle featuring a Microsoft infotainment system?" a full 68 percent said they would be much more likely, as shown in Figure 3 . Ford notes that SYNC equipped vehicles turnover twice as fast as non-SYNC vehicles, and 80 percent of SYNC owners would recommend SYNC to a friend. Ford SYNC topped 30,000 sales in 2007, with sales in the final quarter of 2007 averaging approximately 10,000 units per month[3], and expecting to reach 1 million by early 2009. This makes it one of the fastest growing new products in the auto industry. At a time when carmakers are struggling, Ford SYNC's "Powered by Microsoft "proves that the Microsoft brand has a direct and positive impact on the purchase willingness of the consumers.

Microsoft Auto Development Ecosystem

Microsoft Engineering

The headquarters-based engineering team develops the platform, applications, middleware, online services and tools that make up the Microsoft Auto system. Sitting in the new "Studios West" campus in Redmond, Washington, this engineering team is co-located with the engineering teams of most of the components provided with Microsoft Auto, including Windows Embedded CE, Zune and Windows Mobile. This proximity provides the best collaboration possible for the engineering teams, but also provides a unique opportunity to stay well connected to the communication and entertainment trends in the consumer electronics world. This tight relationship helps keep Microsoft Auto at the leading edge of innovation.

[2] Fiat Group Automobiles SpA, March 2008
[3] Ford Motor Company 2008

Microsoft Auto – part of Microsoft Entertainment and Devices Division

Partner Response Team

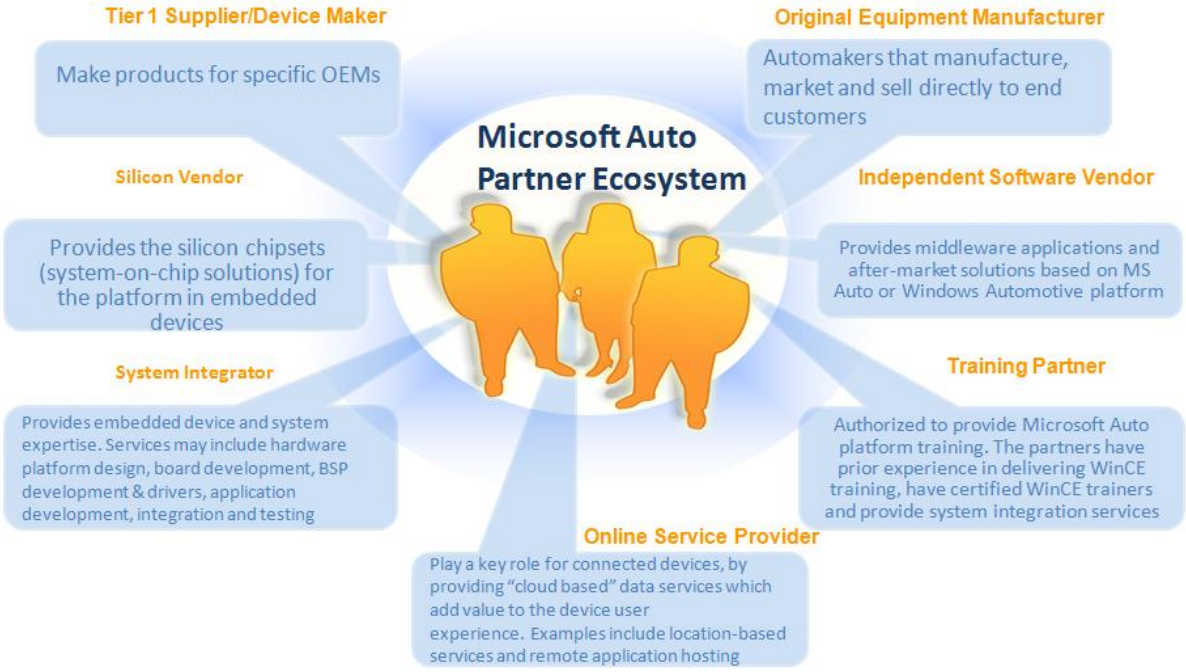
In addition to standard product support offered by Microsoft in several payment models, Microsoft Auto also provides access to a team of highly skilled, resources called the Partner Response Team (PRT).

The PRT options give customers the opportunity to secure ABU-managed engineering resources dedicated to the success of their projects. These resources will work on any task the customer and Microsoft agree are appropriate, particularly focusing on project elements which are technically complex and difficult for them to implement. The ultimate objective of the PRT engineers is to accelerate the project's time to market, and to make sure it satisfies all of the necessary requirements.

Both Microsoft and the customers are working towards a common goal; developing high quality in-car infotainment devices in the shortest time possible and in a very innovative way. These support options provide a cost-effective way to ensure that goal is reached.

Automotive Business Unit Partner Ecosystem

The ecosystem connects you with Microsoft, tier 1 suppliers and other partners in a thriving community of Microsoft platform expertise. In addition, it is a channel to find partners of every type, all around the world, at every phase of the development cycle and provides benefits to help you find and support your next customer. No matter what type of services you offer in the automotive industry, the partner ecosystem will help you provide next generation infotainment experience to market faster, drive down overall cost, and gain competitive advantage in the marketplace. As the use of Microsoft Auto platform continues to rapidly grow, so has the demand for technology partners that can deliver innovative new applications and services. Microsoft Auto partner ecosystem provides simplified discovery of qualified independent software vendors (ISVs), system integrators (SIs) and hardware vendors. Providing technical training and support for this growing partner community is also at the forefront of the expanding Microsoft Auto partner program.



Microsoft Auto partner ecosystem

The Microsoft Auto partner ecosystem provides carmakers and suppliers with increased business opportunities, market awareness, and technology advice to build next generation infotainment.

For carmakers this means: Grow your business, get your smart, connected devices to market faster, gain strength in the marketplace and differentiate from the competition.

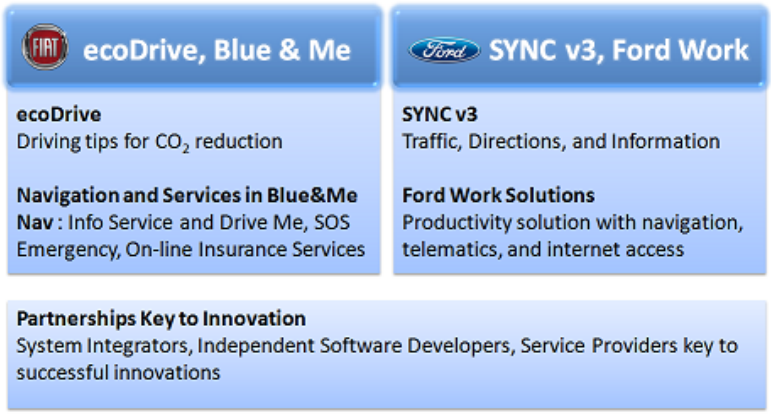
For suppliers this means: Reduce risk and shorten development time by leveraging a robust and extensible platform with inherently flexible entertainment and communication applications built in.

Broad partner ecosystem, leadership in the consumer market, together with over a decade of experience in automotive industry, Microsoft helps carmakers and suppliers accelerate Telematics design cycles to quickly adapt to consumer electronic trends and innovations. Our ongoing commitment allows vehicles to stay relevant with device compatibility updates and features, and drivers to stay connected to new devices, applications, and content.

Success Stories – Microsoft Auto on the Road

In 1999, Microsoft has developed the first infotainment system known in the industry as the AutoPC. The Auto PC won a "Best of what's New" award from Popular Science in 1999. It also received an "Excellent" rating as a navigation system, from a leading consumer product rating publication. Terms such as "revolutionary," "redefining the industry," and "innovative" have been used to describe the product. Many were impressed by its features and understood the Auto PC's potential.

Today, drivers and passengers can experience Microsoft Auto technology, enjoying hands-free communication, navigation, access to digital music, services and more in more than 80 vehicle models worldwide.



Microsoft Auto – success stories

Fiat Blue&Me

Fiat Auto Group and Microsoft jointly developed the infotainment system Blue&Me, which empowers customers to connect their personal mobile devices with the integrated solution found in many vehicle models from Fiat, Alfa Romeo, Lancia, and Fiat Light Commercial Vehicles. In less than two years a totally new infotainment concept was created from scratch. As of March 2009 over 700,000 Fiat equipped with Blue&Me Powered by Microsoft have been sold.

The competitively priced Microsoft Auto-based infotainment package is voice controlled and it comes with *Bluetooth®* wireless technology and USB connectivity, allowing drivers to connect to a large number of mobile phone models, in addition to media players. The Blue&Me system is based on a modular structure, and can therefore be easily updated to support different services. For example, customers can download language packs from the Fiat Web site and update their system to support a language not originally installed or add a new application soon as the carmaker makes it available.

Blue & Me Nav extends the phone and media functionalities with a GPS system and embedded phone. It provides drives a simple, user-friendly satellite navigation system through pictograms and it can be activated by voce command and/or buttons on steering wheel. *Blue & Me Nav with Services* – offers SOS Emergency, Info Services and Insurance services that can be personalized.

Blue&Me MAP is a multi-functional portable navigator, which gives drivers a completely integrated and connected infotainment experience. With an original design developed with Magneti Marelli specifically for the Fiat 500, the device represents a new frontier in the portable navigation systems market.

Fiat eco: Drive another step in creating innovating applications —collects all necessary data relating to vehicle efficiency and, through the Blue&Me USB port, transmits it onto a normal USB key that the driver plugs this into a PC. The eco: Drive system presents the driver with detailed environmental performance of the car, including the CO2 emission level for each trip. It analyses the driver's style and then provides tips and recommendations on how to make modifications to achieve CO2 reductions – and save money on fuel.

The partnership has also garnered several industry awards for innovation, including the "Excellence in Technology of the Year Award for European Automotive Telematics and Infotainment market" from Frost & Sullivan, the "Telematics Update of Detroit", which recognized Blue&Me as the best Telematics solution of the year and the "Eurostars 2006" prize from Automotive News Europe.

Ford SYNC

Ford SYNC is a factory-installed fully-integrated in-car communications and entertainment system developed by Microsoft and Ford. Ford SYNC provides drivers with hands-free voice-activated control over mobile phones and digital music players. Ford SYNC automatically connects phones and music players with the vehicle's in-car microphone and sound system. Most popular media players work with Ford SYNC, including iPod, Zune, "Plays for Sure" players, and most USB storage devices. Supported audio formats include MP3, AAC, WMA, and WAV.

Ford SYNC is based on an ARM 11 processor, 64 MB of DRAM, and 256 MB of flash memory. Customers can use the USB port to update the software to work with the newest personal electronic devices-this is an important advantage, as customers tend to change devices more frequently than they change vehicles. Ford SYNC debuted in the fall of 2007 on 12 different 2008 models of Ford, Mercury, and Lincoln vehicles. By the end of 2009, Ford will install SYNC on all vehicle models.

Carmakers and tier one suppliers can ensure their systems stay current with the latest devices and services thanks to the inherently flexible design and built-in software update mechanisms of Microsoft Auto. Unique solutions and customized user interfaces can also be easily built on top of the existing platform.

Ford Work Solutions is an in-dash computer developed by Ford and Magneti Marelli, powered by Microsoft Auto that provides full high-speed Internet access via the Sprint Mobile Broadband Network and navigation by Garmin. This system allows customers to print invoices, check inventories and access documents stored on their home or office computer networks - right on the job site.

SYNC with Traffic, Directions and Information expands Ford's connectivity leadership by providing personalized, real-time information to help drivers get to where they're going with the information they need. SYNC with Traffic, Directions and Information is developed in partnership with TellMe, a Microsoft subsidiary, on Microsoft Auto software platform

and provides simple hands-free access to personalized traffic reports, precise turn-by-turn driving directions and up-to-date information including business listings, news, sports and weather updates.

911 Assist, an update made to Ford SYNC, will connect the vehicle's occupants, through their mobile device, to 911 operators in the event of an airbag deployment.

Continental Multi Media Platform (MMP)

Continental is using Microsoft Auto for its Multi Media Platform (MMP), which provides powerful, secure, flexible, and easy-to-update in-vehicle multimedia systems. The Continental MMP software architecture clearly separates vehicle functions and the functions related to entertainment features, making it possible to quickly react to future innovations and market trends. In the MMP hardware design, Continental uses a scalable concept to ensure top performance at high integration. For high-end systems, another CPU and graphics processor provides additional power for online services and 3D graphics applications.

The hardware is equipped with standard consumer electronics interfaces, so that mobile devices (such as USB storage devices, iPods, or SD cards) can be easily networked with the MMP. The MMP also provides a Bluetooth® wireless technology interface, so that consumers can use mobile phones for hands-free phone calls or mobile data services.

Awards

2009	***4 industry awards*** *including:* **Automotive News PACE Award** for Microsoft Auto **Popular Mechanics CES People's Choice** for Ford SYNC
2008	***3 industry awards*** *including:* **Bluetooth SIG – Best of CES 2008** for Ford SYNC
2007	***10 industry awards*** *including:* **CNET Editor's Choice Award 9.0/10.0** for JVC KD-NX5000 (Windows Automotive powered)
2006	***7 industry awards*** *including:* **J.D. Powers & Associates – Customer Satisfaction Award** for Alpine's Windows Automotive powered device

Microsoft Auto

Driving Connectivity – Microsoft Auto 4.0

Microsoft Automotive Infotainment Vision

Enrich the in-vehicle experience with an industry-leading platform for communication, entertainment, navigation, and connected services

Microsoft Auto 4.0 Delivers on the Vision…

Microsoft® Auto 4.0, the newest release of the embedded operating system from Microsoft designed specifically for developing state-of-the-art, in-vehicle infotainment systems. It offers a standardized, industry-proven platform for building communication, entertainment, and service enabled location-based solutions. This release includes a large set of integrated, tested, and flexible middleware components, as well as hundreds of components available with Windows® Embedded CE 6.0 R2, enabling Microsoft Auto–based systems to scale across a broad range of automotive makes and models. Capitalizing on these tools and on the broad Microsoft partner ecosystem, suppliers can reduce development costs and speed time to market while extending customers' lifestyles into the vehicles they drive.

Highlights of Microsoft Auto 4.0

Flexible

Microsoft Auto 4.0 provides a flexible, **component-based** middleware stack with the features needed to create an in-vehicle infotainment solution. These middleware components include Bluetooth® phone support for hands-free calling, text messaging, and media streaming; USB-based media device integration; AM/FM and digital radio support; CD playback and ripping; connected services, and a speech human-machine interface (HMI) integration platform. Built on the flexible Windows Embedded CE 6.0 R2 operating system, Microsoft Auto 4.0 offers an **open, layered architecture** that makes it easy for developers to extend functionality with custom solutions.

This **flexibility provides scalability** from cost optimized basic system, to sophisticated 3D navigation systems. Supporting a wide range of processors and system components, a custom hardware solution can be designed to meet your precise needs. And, to speed time to market by letting software and hardware developers work in parallel, Microsoft Auto 4.0 includes a robust development reference platform and complete Board Support Packages (BSPs) for ARM- and SH-based processors. To provide an even **greater range of scalability**, this release now supports Intel® architecture processors, including the newest options for the Intel® Atom™ Z5xx series processors.

Microsoft Auto supports **many vehicle networking options**, including Controller Area Networks (CAN), Ethernet, and Media Oriented Systems Transport (MOST). Version 4.0 also adds support for IEEE 1394 (FireWire, i.LINK, and Lynx) device interfaces to enable high speed audio and video streaming and data communication.

Reliable

Microsoft Auto, **used today in a wide variety of OEM vehicles and aftermarket devices**, was built and tested by a Microsoft team with over 10 years of automotive industry experience. It includes middleware applications, protocols, and services that have been tested together as a complete system. In addition, Microsoft has tested hundreds of mobile phones, media players and USB devices to **ensure broad market compatibility**. The platform is updatable, and semi-annual device compatibility updates ensure that infotainment devices remain in sync with consumer needs, and service packs help OEMs address device issues in the field.

To further ensure that solutions remain current, the Microsoft Auto system architecture and tools **facilitate easy system updates**. These updates can deploy fixes, updates, and new applications and services over the lifetime of vehicle ownership.

Connected

Microsoft Auto 4.0 provides **support for internet-connected services** with embedded platform components, and for service components which can be used across a variety of embedded platforms (not limited to Microsoft Auto-powered systems). Microsoft Auto 4.0 provides expanded support for services, including local search, and richer location-based information such as weather, gas prices, and movie show times. These service components provide innovative internet-based features to meet the demands of consumers in an increasingly connected world.

Performance Optimized

Microsoft Auto 4.0 **significantly reduces start-up time** relative to previous versions. By using a staged driver load design, and booting software from flash memory, the radio receiver, display, and cameras become operational no later than one second after system power up.

Microsoft Auto 4.0 adds features designed to improve the overall car infotainment experience. From best-in-class, software-based acoustic echo cancelling and noise reduction, to support for rich speech HMI development, to dedicated support teams for vehicle OEMs and tier 1 suppliers, Microsoft Auto 4.0 offers the best choice for next generation in-vehicle infotainment solutions.

The Microsoft Auto Platform

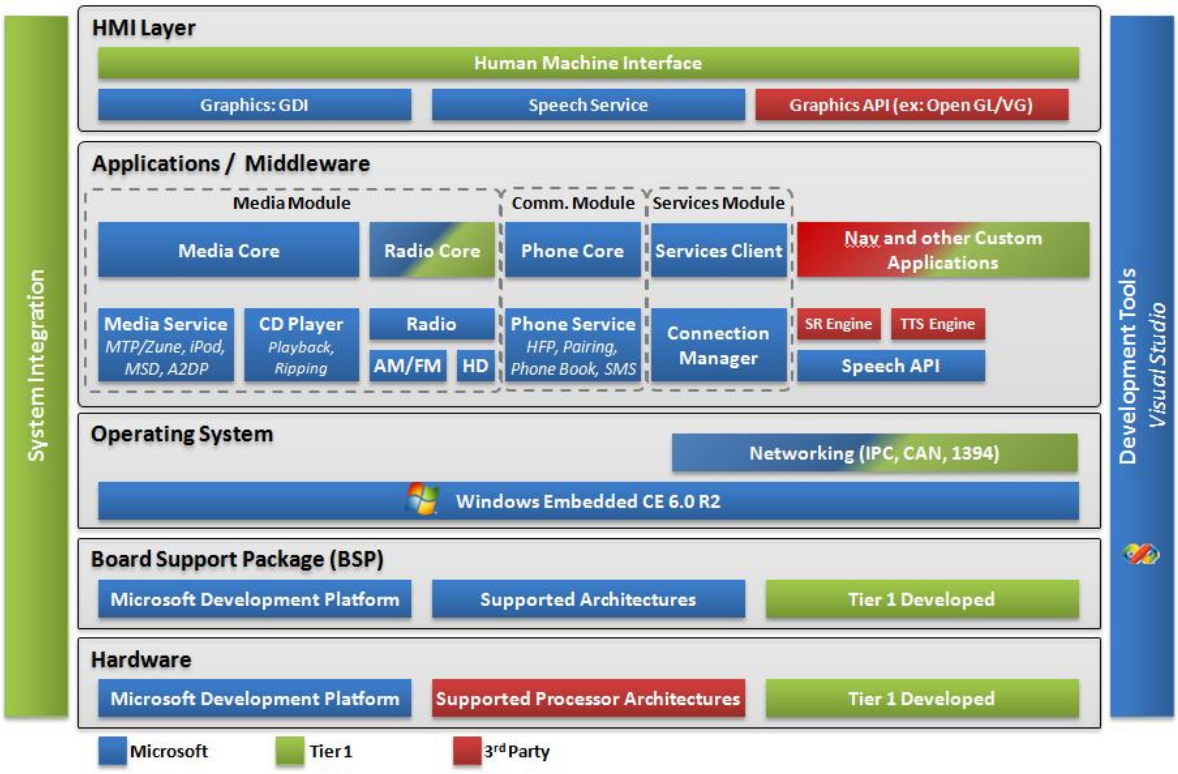
Third-party and HMI applications – Unique, innovative components can be easily integrated into the system at any level of the software stack. Additionally, OEMs and suppliers can chose from many development tools and runtime libraries, including OpenGL/OpenVG and Graphics Device Interface (GDI), to develop 2D or 3D graphical HMIs. The layered software architecture permits changes to the user experience without altering application functionality and provides additional asset scalability and reusability.

Microsoft Auto Middleware and Applications – Microsoft Auto 4.0 is based on a rich set of middleware and services, including a Bluetooth® wireless technology stack, phone pairing service, and media services. These services enable the creation of integrated applications, such as hands free phoning, media device integration, CD and radio support. The applications reduce development time while enriching implementation flexibility and the user experience (the HMI).

Windows Embedded CE 6.0 R2 – This is a component-based, real-time operating system used today in many embedded devices.

Board Support Package (BSP) / Drivers – BSPs and drivers are available in the Microsoft Auto 4.0 Platform Development Kit (PDK) and through hardware suppliers. The Microsoft Auto 4.0 PDK includes BSPs for Freescale i.MX31 and i.MX35, Texas Instruments Jacinto EVM, and Renesas SDK 7785.

Hardware – The Microsoft Auto development platform is a hardware implementation of all Microsoft Auto features that facilitates rapid prototyping. This development reference platform is built on a Freescale i.MX35 processor. Other hardware options available from our silicon partners include Freescale, Intel, Nvidia, Renesas, Samsung, Texas Instruments, and more.



Microsoft Auto 4.0 offers a feature-rich, open-architecture development platform

Microsoft Auto 4.0 Key Features

Microsoft Auto

Bluetooth Phone Features

- Support for hundreds of mobile phones, media players, and USB devices that were tested to ensure broad market compatibility
- Biannual device compatibility updates to ensure that automotive infotainment devices meet changing consumer needs
- Pocket Outlook Object Model (POOM) library that provides address book storage and contact picture storage, and is customizable for additional data types
- Support for the new Bluetooth® Phonebook Access Profile (PBAP), its preliminary implementation of Message Access Profile (MAP), and its new high-quality ringtones

Supported Bluetooth Technologies

- Generic Object Exchange 1.1
- Object Push Profile 1.1
- Serial Port Profile 1.1
- Phonebook Access Profile-PCE 1.0
- Advanced Audio Distribution Profile 1.2
- AVRCP-Controller 1.4
- Hands-Free Profile (HFP) - 1.5 and 1.0
- Dial-Up Networking Profile (DUN) 1.1
- Preliminary implementation of MAP 1.0

Media Player Features

- Enhanced media functionality for in-car entertainment, including media indexing and CD ripping
- Control over a broader set of devices, including internal hard disks, data CDs, DVDs, and other local storage
- Pluggable interface for music metadata databases
- Ability to tag music for online purchase (iPod users)
- Album art support across device types
- iPod video support
- Media Core support for the new Bluetooth Audio/Video Remote Control Profile (AVRCP) 1.4

Supported Media Class Devices

- iPod/iPhone (both 1 and 2 wire)
- Zune®
- MTP
- Mass storage (USB and SD)
- A2DP and AVRCP

Radio support

- Support for AM, FM, and HD and access to their data services
- Support for phase diversity tuning and scanning antenna diversity
- Extensible to other radio technologies, such as satellite and digital audio broadcasting (DAB)

Connected Services

Uniquely positioned to work with automotive partners to enrich the in-vehicle experience, Microsoft Auto 4.0 provides access to Microsoft service assets to develop innovative connected scenarios. Through our consumer, enterprise, and infrastructure assets, the services platform provides the ideal platform for creating compelling, connected experiences for in-vehicle consumption.

- **Microsoft Auto Service Center:** A solution framework for aggregating location-based services for delivery to any client platform, including non-Microsoft platforms.
- **Services Client:** An API to reduce the cost and time to market of service integration. Use of the client component can reduce data size by over 80% relative to SOAP results from Live Search.

Services Technology

Connections

- Bluetooth Dial-Up Networking (DUN)
- Wi-Fi
- TellMe
- MSN Direct

Content

- Local Business listings
- Live Search / MSN
- Virtual Earth
- Weather
- Gas Prices
- Movie Show times

Development Tools

Microsoft Auto 4.0 includes:

- Platform Builder for Windows Embedded CE 6.0 R2
- Microsoft® Visual Studio® 2005
- Platform Development Kit
- Development hardware
- Source code and binaries for the supported processor platforms
- Binaries for Microsoft Auto middleware
- Documentation
- Sample code
- Command-line tools

Device Management

While automakers determine specific device management scenarios, Microsoft Auto 4.0 supports both the update process itself and via USB key, SD card, or custom mechanisms.

Built on Best-in-Class Windows Embedded CE 6.0 R2

The Windows Embedded CE operating system technology, employed in the broadest and most demanding environments, provides a solid foundation for the next generation of in-vehicle 32-bit real-time devices.

Real-time support provides the bounded, deterministic response times that time-critical car infotainment applications require. Flash disk boot capabilities enhance reliability even in challenging temperature and vibration conditions. It also supports 256 levels of thread priority, nested interrupt support, and per-thread quantums.

Windows CE streamlines the development process by leveraging developer knowledge of existing tools (such as Visual Studio) for creating applications and drivers. From shared source code availability to a broad selection of production quality drivers, it offers a competitive advantage through faster, more efficient design cycles and an extensive array of features:

- A Win32 (API) subset, including file and memory management, device and service management, threads and process management, and networking stacks
- Varied networking protocols, security and encryption technologies, Internet client technologies, Wi-Fi, video, GPS support, support for hard disks, XML, Internet servers, graphic displays, and file system and database support
- Multilanguage support
- Microsoft.NET Compact Framework
- Microsoft Internet Explorer® Web Browser for Windows CE (based on Internet Explorer 6), with an OEM-replaceable user interface
- Comprehensive multimedia support through the MicrosoftDirectShow® API for a variety of formats, such as Windows Media® Audio, MP3, and DVD

Hardware and System Specifications

Processor Support

Freescale i.MX 31 & i.MX35
Texas Instruments Jacinto
Renesas SH7785
Intel iA86

Operating System

Windows Embedded CE 6.0
Native real-time OS that builds on industry proven capabilities of previous versions
Improved unified kernel architecture

- Improves system performance
- Increases security and robustness
- Offers high degree of backward compatibility

Support for more concurrent processes and improved virtual memory per-process

- Build devices with more robust user features
- Upgrade devices as end-user requirements change

IP Indemnification

- Microsoft provides intellectual property defense of these claims, subject to licensing agreement terms.

Improved driver support

- Kernel mode drivers for performance
- User mode drivers for robustness

Improved tools

- Accelerates time-to-market and manages development costs

Integrated board support

- Significantly reduces development time

Boot Times

First drivers: **350 ms**
Radio: **550 ms**
Minimum shell: **1.2 seconds**
Full (sample) applications: **~5 seconds**
* *as tested on the Freescale i.MX35 based Microsoft Auto 4.0 Development Platform*

Systems and Networking

IEEE 1394
AEC/NS
Audio Management (arbitration, mixer and more)

Media, Radio, and Speech

Audio File Types

Playlists: WPL, ASX, M3U, Zune, iPod and MTP
Media Files: .WMA, .MP3, .MP4, .AAC, .WAV
Codecs: WMA, MP3, AAC, PCM WAV
Extension interface for additional file types

Media Support	Fourth generation and newer iPod, iPhone and iPod Touch support, 1-wire and 2-wire Video browsing and playback supported on iPod and iPhone devices Zune (gen 1 and gen 2 devices) Devices certified for Windows Vista (includes most popular players from Creative, SanDisk, Philips, Samsung, Archos, and others) Album Art across player types Tags to purchase music CDs, data CDs, and DVDs CD ripping to local storage, including plug-in interface for metadata database
Radio Support	AM, FM and HD Radio Data from RDS, TMC HD Radio support for MPS, SPS, SIS and PSD Multiple tuners, Phase Diversity tuning and Scanning Antenna diversity Extensible architecture for additional radio types
Speech Engine Support	Speech Recognition and Text to Speech engines from any SAPI provider, including: • Nuance • SVOX SAPI 5.41 support creates a pluggable architecture for choice of speech engine

Bluetooth® Phone

Phone Support	Phonebook download using PBAP, SyncML, GSM AT and OBEX Send and receive text messages A2DP, AVRCP HFP 1.5 and 1.0 support Data connection using DUN Twice yearly device compatibility updates
Bluetooth® Profiles	Generic Object Exchange 1.1 Serial Port Profile 1.1 Phonebook Access Profile-PCE (PBAP) 1.0 A2DP-SNK 1.0 AVRCP-Controller 1.4 HFP-HF 1.5 (backward compatible to HFP 1.0) DUN-DT and GW 1.1 MAP 1.0 Many others provided in Windows Embedded CE 6.0 *Simplified extensibility model for new Bluetooth® profiles*

Microsoft Auto

For more information, please visit us online

For more information on how **Microsoft Auto 4.0** can help meet your customers' demands for a rich, interactive experience in their vehicles, visit us on the web at:
http://www.microsoft.com/auto

To find or become a **Microsoft Auto partner**:
http://www.microsoft.com/auto/partners.mspx

For information about supported **media players and phones**:
http://www.microsoft.com/auto/devices.mspx

For information on **Windows Embedded CE 6.0**:
http://www.microsoft.com/windowsembedded

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