

11. G.A. Williams and M.J. Holt, "The future of vehicle electrical power systems and their impact on system design," SAE Paper 911653, *Future Transportation Technology Conference and Exposition*, Portland, Oregon, Aug. 1991.
12. M.F. Matouka, "Design considerations for higher voltage automotive electrical systems," SAE Paper 911654, *Future Transportation Technology Conference and Exposition*, Portland, Oregon, Aug. 1991.
13. C.R. Smith, "Review of heavy duty dual voltage systems," SAE Paper 911857, *International Off-Highway & Powerplant Congress and Exposition*, Milwaukee, Wisconsin, Sept. 1991.
14. S. Muller and X. Pfab, "Considerations implementing a dual voltage power network," SAE Paper 98C008, *IEEE-SAE International Conference on Transportation Electronics (Convergence)*, Dearborn, MI, Oct. 1998.
15. J. Becker, M. Pourkermani, and E. Saraie, "Dual-voltage alternators," SAE Paper 922488, *International Truck and Bus Meeting and Exposition*, Toledo, Ohio, Nov. 1992.
16. J. O'Dwyer, C. Patterson, and T. Reibe, "Dual voltage alternator," *IEE Colloquium on Machines for Automotive Applications*, London, Nov. 1996, pp. 4/1-4/5.
17. J.C. Byrum, "Comparative evaluation of dual-voltage automotive alternators," S.M. Thesis, Dept. of Electrical Engineering and Computer Science, *Massachusetts Institute of Technology*, Sept. 2000.

Open Systems a

ABSTRACT

This paper will describe how one will address the convergence of information and technology for tomorrow's automotive systems. This approach presents a framework for incorporating diverse technologies into an effective and efficient system that offers both flexibility and performance. It offers a paradigm for integrating state-of-the-art class technologies from multimedia systems to satellite communications, changing customer de-

The approach to automotive customers' features and functions is driven by computing capabilities that are outside of their cars. Multimedia systems combinations of leading technologies involving computer, satellite communication, and car navigation product

The paper presents a systems approach to systems that enables automotive their customers, the ultimately the end custo

Consumer electronics products clearly have faster penetration rates reflecting both their perceived entertainment and informational value to customers. In the last 40 years, in-car entertainment systems have reflected similar shifts in priorities, as they have moved from simple radios powered by electronic tubes and providing very limited range and very poor sound quality to today's automotive CD and DVD systems offering stereo sound from multiple speakers combining with LCD displays to provide navigation and yellow page information. Tomorrow, we'll see further shifts to new features and functions embodied in increasingly software-dominated systems as shown in Figure 2.

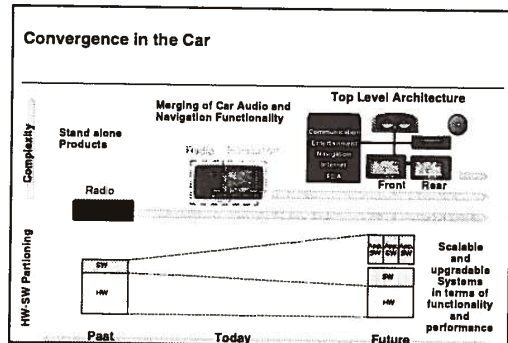


Figure 2. Convergence of entertainment, information and communications in the car.

Increasingly, automotive customer demand is created by consumer markets where new systems and services are being introduced seemingly on a daily basis. "Non-automotive" technologies and products are the first priority for customers. Examples include the following shown in Figure 3:

- New digital communications services—GPRS, UMTS, Bluetooth, etc.
- Digital broadcast systems—DAB and DVB-T
- Personal appliances—PDA, Smart Phone, Videophone

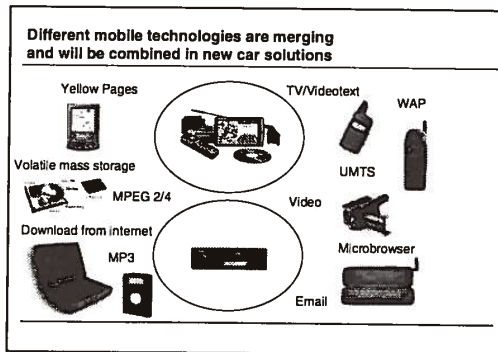


Figure 3. Automotive solutions will integrate entertainment, information and communications in new ways.

The Internet is, of course, the primary driver and carrier of many of these new services. The car is becoming an Internet device that merges systems for information, entertainment, communications, and driver assistance. The challenge for automotive electronics suppliers and OEMs is to define which services are most highly valued by the end customer and to provide them in the fastest and most efficient way. Stepping into the future of the connected automobile does not mean that a PC needs to be installed in every car. Rather, it means that the vehicle must provide PC connectivity and openness in a way that ensures drivers and passengers with desirable features and functions in the most cost effective, safe and attractive way.

As automotive electronics sup-

- Product I
- stantially
- thing we
- the past
- Key tech
- launched
- of core c
- The cent
- business
- to softwa

Clearly, our future success is not our being able to work outside our industry, and incorporate their technology. The keys to success will

- Identifying
- technologies
- aps")
- Partnering
- partners
- Accelerat
- implemen
- Market p
- Flexibility

TOP LEVEL ARCHIT

For VDO, the future on which to build solutions is a hardware architecture that we call Top Level Architecture ("TLA")—an open, scalable, upgradeable, modular multimedia concept standard, proprietary products and technology.

TLA recognizes the market place: one everything to every or

- Security
- Transparency mechanism for internationalization and localization
- Transparent input/output devices.

TLA consists of four levels of functionality: **Hardware, Resources, Services and Presentations**. Hardware is obviously the physical electronics providing the function. Resources are the hardware/software drivers that interface between the physical devices and the Services software. Services and Presentations software are described in Figure 6

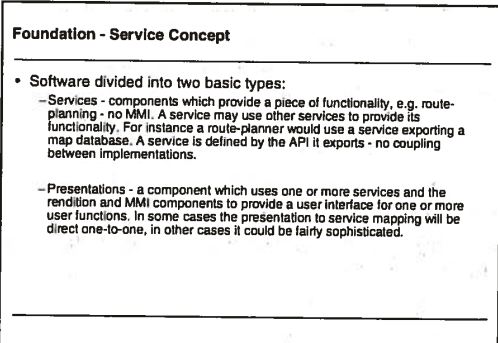


Figure 6. Foundation software is divided into two software functions: Services and Presentations

Services are software components that provide a basic functionality, e.g., route planning or music entertainment. Services have no man-machine interface, rather they interface with Presentations via an Application Programming Interface (API). Presentations are software components that utilize Services, e.g., route planning and yellow pages or

interfaces and can be tailored to be highly user-friendly.

TLA's software will utilize a component library strategy (Figure 7).

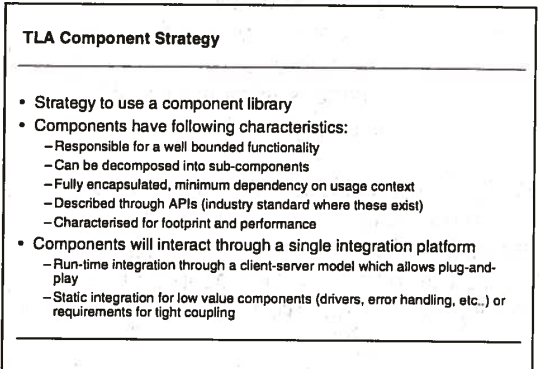


Figure 7. TLA uses a library of software components.

This means that software components will have the following characteristics:

- Responsible for well-bounded functionality (e.g., audio/radio, internet interface, communications services)
- Decomposable into sub-components
- Fully encapsulated with minimal dependency on usage context
- Described through APIs
- Characterized by footprint and performance

Moreover, components will interact through a single integration platform that will provide run-time integration through a client server model which allows plug-and-play and static integration for low value components (e.g. drivers, error

The overall TLA system is illustrated in Figure 8.

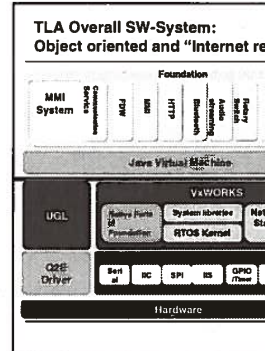


Figure 8. TLA's software and Internet ready.

Services and Presentations are contained within the Presentation Module which utilizes Services to implement specific functions (Figure 9).

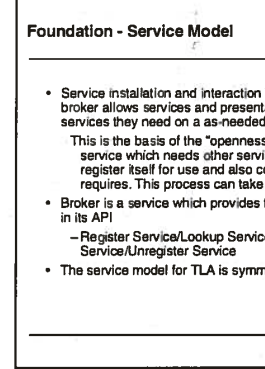


Figure 9. Foundation Services and Presentations as a broker system, allowing

Additional Services and Presentations can be added at will. New entertainment, communications technologies

ment technologies into the car in a cost effective and efficient manner. It addresses key challenges facing suppliers in fast-changing world of electronics where new technologies are emerging so rapidly that several product life times will occur during the life of the car. Moreover, it enables suppliers, like VDO, to partner with a broader range of suppliers from outside the automotive industry to meet and even anticipate customers' demands.

REFERENCES

- [1] Gates, Bill, "Business @ The Speed of Thought" Warner Books, 1999

CONTACT

Rolf-Juergen Bruess
Executive Vice President
Mannesmann VDO Car Communication
Philipsstrasse 1
35586 Wetzlar
Germany

ABSTRACT

The past, current and future role of electronics in reducing accidents, crash severity is discussed. A holistic approach to crash and post-crash factors in automotive safety is examined and the growing impact of electronics on factors affecting the three factors is discussed. This technology has already entered the automotive arena, and its utilization in the future is expected to move rapidly towards the goal of safer roads.

INTRODUCTION

The use of electronic components in automobiles has been increasing steadily since the late 1970s. In response to societal needs for fuel economy, emissions, and safety, the vast majority of automotive functions are now controlled by electronic components. Reliability and miniaturization of electronic components are key factors. Microprocessors are becoming faster and more powerful. Algorithms have been developed for a wide range of functions. Electronics has moved from simple automotive safety with applications such as Anti-Lock Braking System and Enhanced Stability Control to more complex systems. Early airbag systems have used simple sensors and systems for crash severity detection. Modern systems use diagnostics, display and design hardwired to the engine controlled. With further advances in electronics and micro-processor technologies, the role of electronics in automotive safety has increased significantly since the mid-1990's, and is expected to grow in the future.

The objective of this paper is to discuss the future role of electronics in automotive safety and the impact of electronics on automotive safety.