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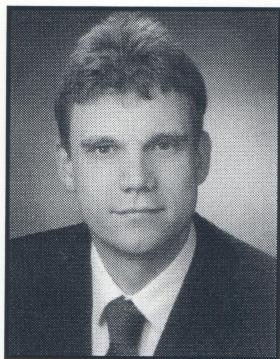
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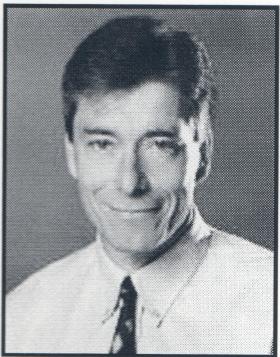
MARKUS SEIDEL,
Ohmstrasse 6, 80802
Munich, Germany. E-mail:
MarkusSeidel100@aol.com

Dr. Markus Seidel is an automotive specialist. During his career in automotives, he has concentrated on organisational development, innovation management, brand licensing and business process redesign.



SATJIV CHAHIL, 961
Los Altos Avenue, Los
Altos, California 94022,
USA. E-mail: Satjiv.Chahil@palmone.com

Satjiv Chahil is currently Advisor to the Chairman of Palm, Inc., a Board Member of PalmSource, Inc., and Chairman of Mobile Digital Media (MDM), a mobile content publisher.



CHRISTOPH LOCH,
INSEAD, Boulevard de
Constance, 77305 Fon-
tainebleau, Cedex, France.
E-mail: Christoph.Loch@insead.edu

Christoph Loch is Professor of Technology Management at INSEAD, France and a Senior Editor of Manufacturing and Service Operations Management. His research interests include the management of R & D and the product innovation process.



Quo Vadis, Automotive Industry? A Vision of Possible Industry Transformations

MARKUS SEIDEL, *Automotive Specialist, Germany*

CHRISTOPH H. LOCH, *INSEAD, France*

SATJIV CHAHIL, *Palm, Inc., California*

The automotive industry has reached a mature state, as is evidenced by its growth and by the nature of competition (cost, speed, variants, a rush into a few growing regions and segments), and industry consolidation. In parallel, technical progress continues to be dynamic. In this paper, we examine how the automotive industry might evolve in the long term. In the foreseeable future, current trends will likely continue toward a highly competitive consumer products industry, with increasing features driven by electronics. In this base scenario the "autobahn" will merge with the "infobahn", accompanied by possible market entry by software or electronics players, and a battle for dominance over the technology platform (which will have to be shared across car makers). Car makers will have to seek avenues for differentiation, for which we see three fundamental new business opportunities:

- ❖ **The tailored car:** Driven by production technology enablers, cars will be custom-made, not only by mixing and matching standard components, but by actually customizing the shape and style of components. And this at prices comparable to those of today.
- ❖ **Brand Worlds:** Car manufacturers extend their brands to other consumer product categories, attempting to "immerse" consumers in a "total brand experience" that includes, among others, financial, lifestyle, entertainment, and communication products.
- ❖ **Multiple Transportation Modes:** Cars will extend other modes of individual transportation, such as water (boat-car), air (flying car), etc.

This would imply entering other industries and creating new variants of those industries.

We offer a framework for proposing those scenarios. For each, we discuss technology drivers, current early indicators, economics, and supply chain implications (such as industry complexity). We conclude by evaluating the need for managers today to pursue not only the (inevitable) base case but also one or several of the three opportunities.

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Introduction

The automotive industry has reached a mature stage, as is evidenced by its slow growth that is driven by economic cycles, the nature of competition (cost, speed, variants, a rush into a few growing regions and segments), and industry consolidation. For example, the number of Daimler-Benz automobile models doubled from 7 to 15 between 1987 and 1998, and a similar change took place within other automotive companies (Cornet, 2002). The number of independent OEMs (Original Equipment Manufacturers, that is, car manufacturers selling to the end customer) in Europe has shrunk to 7 (4 disappeared in the 1990s) and, in the US, to 2 (Chrysler lost independence in 1998).

Car penetration in the major markets (USA, Europe, and Japan) has reached a level at which further growth will inevitably be slow. Figure 1a shows the penetration (cars per 1,000 people, including children), and Figure 1b shows the development of the motor vehicle population in the EU. Further market growth in the major markets is very likely to follow the trend shown in Figure 1b. New growing regions (such as East Asia) will not change these dynamics, as new players are created in these regions (for example, in China and India, but also in Malaysia). In this paper, we examine how, in the long term, this industry might evolve.

Although the industry has long been in a stage of maturity, it is unlikely that it will enter a "decline" in the foreseeable future. First, the desire for individualized mobility is so entrenched and deeply desirable that no replacement of the fundamental product is, at present, in sight. Second, the car has become a metaphor of self-expression and a place for socializing, providing additional benefits that will make it harder to be displaced by other modes of

transport. Although the car architecture (a self-carrying "Budd" body with an internal combustion engine on a four-wheel chassis) is stable, technical progress continues to be dynamic in the components that are integrated into the overall system (e.g., ABS, stability control, airbags, valvetronics, telematics, fuel cells, hybrid electric/combustion engines, etc.). Design and new *en vogue* topics, such as active safety (versus pedestrians), environmental friendliness and advanced car controls (such as partially automated driving) will continue to stimulate demand and permit "marginal" differentiation among competitors.

We identify four fundamental trends, with evidence for their likelihood. As Figure 2 indicates, a highly likely "base case" scenario features increasing mature competition that continues today's trends: the car resembles more and more a consumer product, with more and more varied features, driven by electronics. This implies competition for the control of an overarching system platform and possible market entry of software or electronics companies as powerful suppliers.

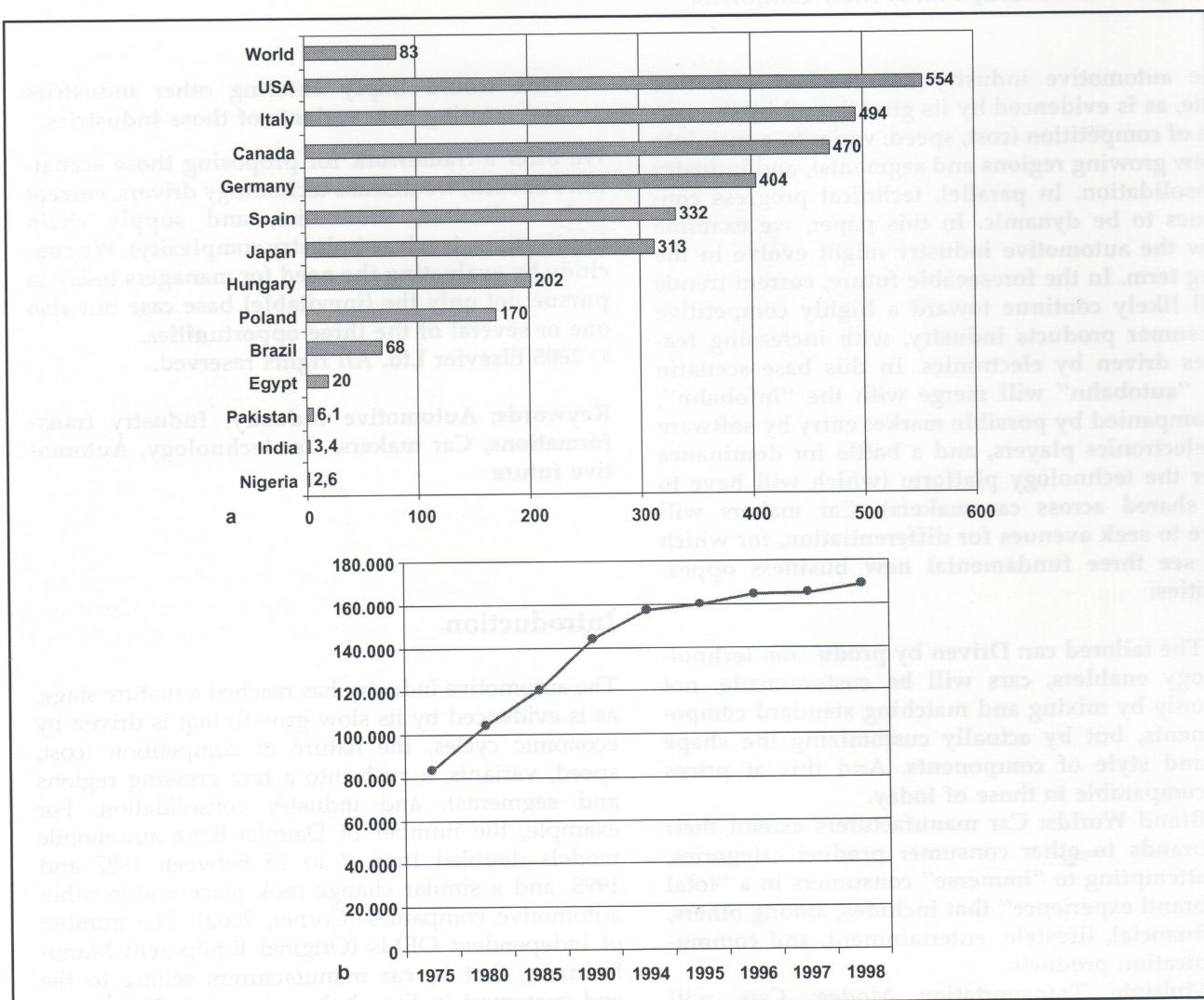


Figure 1 (a) Car Penetration in Vehicles/per 1,000 Inhabitants for 1993 (Fischer Weltalmanach). (b) Development of Motor Vehicles in Use in EU in Thousand Units (Source: Statistik Austria, Statistisches Jahrbuch 2001)

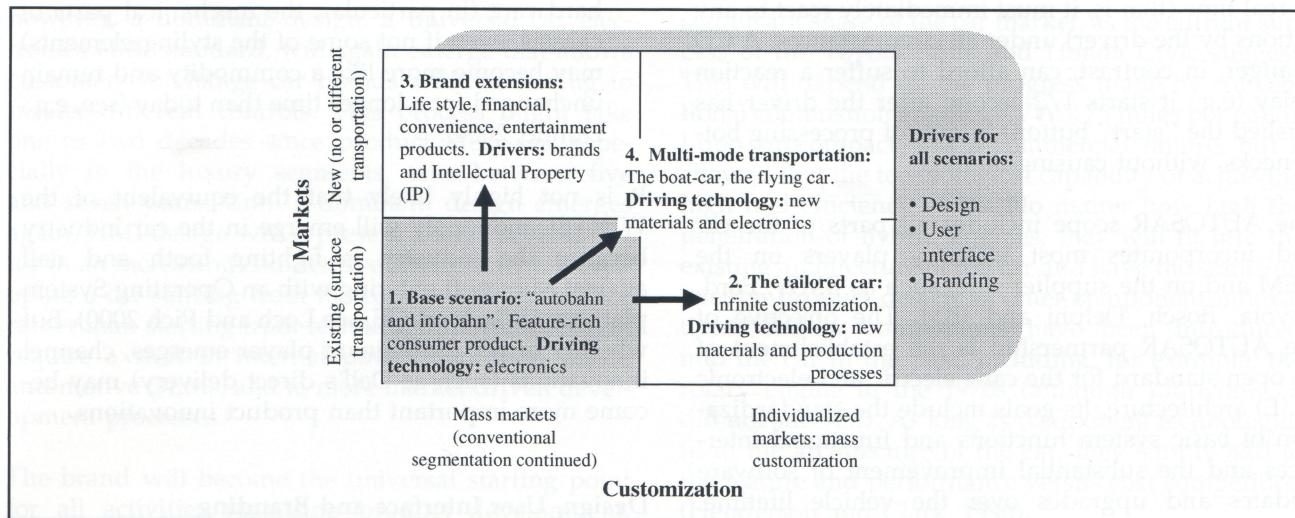


Figure 2 Continuity and Potential Discontinuities in the Car Industry

Car OEMs might be forced to look for sources of differentiation beyond running the feature rat race. There are strong signs that three competitive discontinuities may offer new business opportunities, and thus differentiation: the individualized car, hybrid transportation, and brand extension into unrelated markets. Precursors of all three are already happening. But these opportunities will come at the price of much higher industry complexity and new market entry by companies from other industries.

Base Scenario: The “Autobahn” Merges With the “Infobahn”

Complexity and System Modularity

Car technology will continue to aggressively advance to include more features (e.g., performance, comfort, safety, quality, environmental friendliness), and to reduce costs. Over the next few years, this trend will drive a further increase in product complexity. OEMs are currently seeking to preserve system modularity in the face of the explosion of market variants and the number of new component technologies. This is ongoing today – witness, for example, the problems experienced by high-end manufacturers with the complex electronic on-board networks.

Automotive OEMs will need 10 years (2 model generations) before they have accumulated sufficient experience to achieve a complexity decrease via modularization, enabled by a further increase of electronics (growing from 25% of product value in today's premium cars to 50% of value in all cars), standardized software platforms and system architectures through partnership programs such as AUTOSAR (AUTomotive Open System Architecture).

The intervening temporary complexity increase may contribute to further accelerate industry consolida-

tion. For example, several Korean, Japanese and European players may disappear, possibly even of one of the remaining US players. At the same time, new Asian players will enter the market (e.g., from China and India).

Complexity will also enforce a further increase of partnering and decentralization of the automotive supplier networks. The OEMs already purchase 70–80% of their total costs from suppliers. This is unlikely to increase further, as it would jeopardize vital product and architectural knowledge of the OEMs. Suppliers, in contrast, still have potential from outsourcing, and, with more specialized modules and deeper supplier networks appearing, are likely to decentralize more. The logic of focusing on system assembly, while delegating component knowledge and scale economies to component suppliers, will increasingly hold for large, first-tier suppliers in the same way as it holds for OEMs (see, e.g., Dyer, 2000).

Autobahn and Infobahn Merge

Standardization, modularization and outsourcing will increase the car's similarity to a complex consumer electronics product. At the same time, computer enabled guidance and assistance (steering, parking, distance control, etc.) will make the car similar to a modern “aircraft on autopilot” with enhanced comfort, intensive data exchange with specialized providers and safety based on sophisticated “X-By-Wire”-systems. For example, “drive-by-wire” will replace steering by mechanical forces with CPU-generated bus commands to electric motors at the wheels.

The car will represent a network of different domains that interact, such as in-car entertainment, engine, chassis, passenger compartment, etc. Each domain has differing safety and security standards. For example, a brake-by-wire-system must safely operate

in real time (that is, it must immediately react to any actions by the driver) under all circumstances. A CD changer, in contrast, can afford to suffer a reaction delay (e.g., it starts 1/2 second after the driver has pushed the "start" button) in case of processing bottlenecks, without causing damage.

The AUTOSAR scope includes all parts of the car and incorporates most industry players on the OEM and on the supplier side, such as BMW, Ford, Toyota, Bosch, Delphi and IBM. The objective of the AUTOSAR partnership is the establishment of an open standard for the car's electric and electronic (E/E) architecture. Its goals include the standardization of basic system functions and functional interfaces and the substantial improvement of software updates and upgrades over the vehicle lifetime. Component and feature modularity will allow executing variants in software programs (not in hardware). For example, it is already possible to upgrade the power of certain BMWs by inserting different engine control software modules (from fuel-consumption-optimized to power-optimized).

The introduction of advanced control systems has reached the capacity limit of the existing Controller Area Network (CAN) communication bus. Coming applications will demand higher data rates, perfectly predictable behavior and the support of fault-tolerance. A candidate solution for these requirements exists; it is called the FlexRay communications bus. It will be shared among the automotive OEMs that will introduce "X-by-wire"-technology. Overall, the standardization initiatives might accelerate further industry consolidation:

- ❖ Experience in the computer industry shows that the fixed costs of a platform (OS, processors) are so high that volumes far larger than those of any single car OEM are required to keep unit costs acceptable.
- ❖ The emergence of such a platform brings the danger of a new powerful player emerging, similar to the "Wintel" alliance in the computer industry. This powerful player may arise in the automotive industry itself through a cooperative initiative, or from outside the current automotive industry (and its suppliers). The car industry may indeed end up similar to the PC industry, although the OEMs are aware of this danger and determined to not let it happen. But if they cannot sufficiently quickly develop the expertise to produce the platform in a cooperative environment, their hand may be forced by a third party, perhaps a large supplier, or an external industry entrant.
- ❖ The difficulty of changing hardware (expensive tooling and restrictive safety regulations) will require the car's electronic and software components to be developed according to a shorter schedule than the mechanical parts (and, remember, these electronics components will account for the majority of the car's value). The mechanical

hardware (in particular, the mechanical parts of chassis, even if not some of the styling elements) may become more like a commodity and remain unchanged for a longer time than today (see, e.g., Dunne, 2004).

It is not highly likely that the equivalent of the WINTEL monopoly will emerge in the car industry because the industry is fighting tooth and nail against Microsoft entering with an Operating System platform (Windows CE, see Loch and Pich 2000). But whether or not a dominant player emerges, channel innovations (such as Dell's direct delivery) may become more important than product innovations.

Design, User Interface and Branding

If the electronic platform is shared, and component innovation increasingly shifts from OEMs to suppliers, the OEMs will have to focus on system design and fast incorporation of supplier technologies, similar to PC makers. This has several important implications:

- ❖ First, in an environment of ever increasing standard components, a flexible fast-follower strategy may become the most widespread choice on the technology side. For example, the quality risks from integrating new supplier-developed IT-technologies into the vehicle are very high, and may not be justified by first-mover profits (see Seidel and Stahl, 2001).
- ❖ Second, car OEMs will have to find differentiation from *creating an attractive emotional user experience in driving the car and in interacting with the carmaker*. This is an important difference to the PC industry – the car, as a complex system, still offers a rich set of possibilities for shaping the customer's interactions with it. Shaping the customer's experience will require placing more emphasis on system integration, product styling and design, and on the design of the human-machine-interface (HMI). Examples of HMI design driving product success can be found in consumer electronics, such as Palm's PDA or Apple's iPod.

As more and more features (such as adaptive cruise control, night vision, road preview or parking assistance systems) enter the car, it will be increasingly challenging to keep the current universal HMI in place. More features increase the information density that the driver has to process during driving. To avoid distraction and information overload, OEMs will carefully select those features that provide their customers with a unique HMI experience that fits their brands. Eventually, driving a LEXUS might become a different HMI experience than driving a BMW. Since car buyers do not usually accept learning curves in driving the car, the HMI might become a major brand loyalty driver, for a while. Eventually,

however, a dominant design, a universal car electronics HMI standard, will again emerge that allows customers to change car brands without having to master different controls. This process might take one or two decades since product lifecycles, especially in the luxury segments, take between five and seven years. Until a dominant design emerges again, HMI design will represent a key survival factor in an increasing competitive environment. Developing a car starting from the consumer's experience rather than starting from technical opportunities will require a shift in internal power allocation inside automotive OEMs, and to more market driven development processes.

The brand will become the universal starting point for all activities regarding product development. The sharper and clearer a brand is defined the easier it is to find the right product concept. This task sounds straight-forward but is very difficult to execute. Although the automotive customer is heavily researched, differences in product substance are sometimes minimal, and many reactions to cars are emotional and unconscious. Customers don't buy a product but a perception of it. Some OEMs will accomplish the shift to customer emphasis better than others, and the differences will contribute to further industry consolidation.

In summary, design, user interface and branding are the three core drivers that will define the competitive arena of the next decades for the automotive industry.

Fuel Cell and Hybrid Propulsion: a Side Show?

All current evidence strongly suggests that fuel cells will have a minuscule market penetration as primary propulsion source in passenger vehicles by 2030. The hurdles of achieving the cost (\$50 per KW) and system longevity targets (above 20,000 hours) required to be competitive with internal combustion engines, coupled with the lacking hydrogen infrastructure (on-board production, delivery and storage) are simply too high. Moreover, engine and drive train improvements of existing engines (for example hybrid electric/combustion engines) may potentially reach the same cleanliness and fuel efficiency as hydrogen based vehicles once the efficiency of hydrogen production is included in the calculation, without requiring a new costly gas station infrastructure (e.g., Economist, 2004). However, the use of fuel cells as an auxiliary power unit (APU) could potentially prove to be the "Killer Application" for fuel cells in the global automotive industry and cross the current chasm (see Moore, 2002).

Therefore, automotive OEMs should not view hydrogen as a sure bet, but consider alternatives, such as hybrids, electric vehicles, or other fuels. Hybrid internal combustion/electric engines may capture a

significant share of the car market, as the current success of the Toyota Prius and Honda Civic suggest. This will depend on the progress made by conventional combustion engines – VW's 75 miles per gallon Lupo subcompact was a commercial failure, but it showed that the technological capability of achieving high fuel efficiency exists. No matter how high the penetration of hybrid engines, they will fit into the existing architecture of the car and have the same impact on product design as other component innovations. Similar components have been introduced into the car in the past, including, for example, the rotary engine in the 1970s (although ultimately, it did not succeed). As long as component technologies fit in the architecture of the car, they simply add to the feature and performance versus cost competition (Henderson and Clark, 1990).

New Business Opportunities

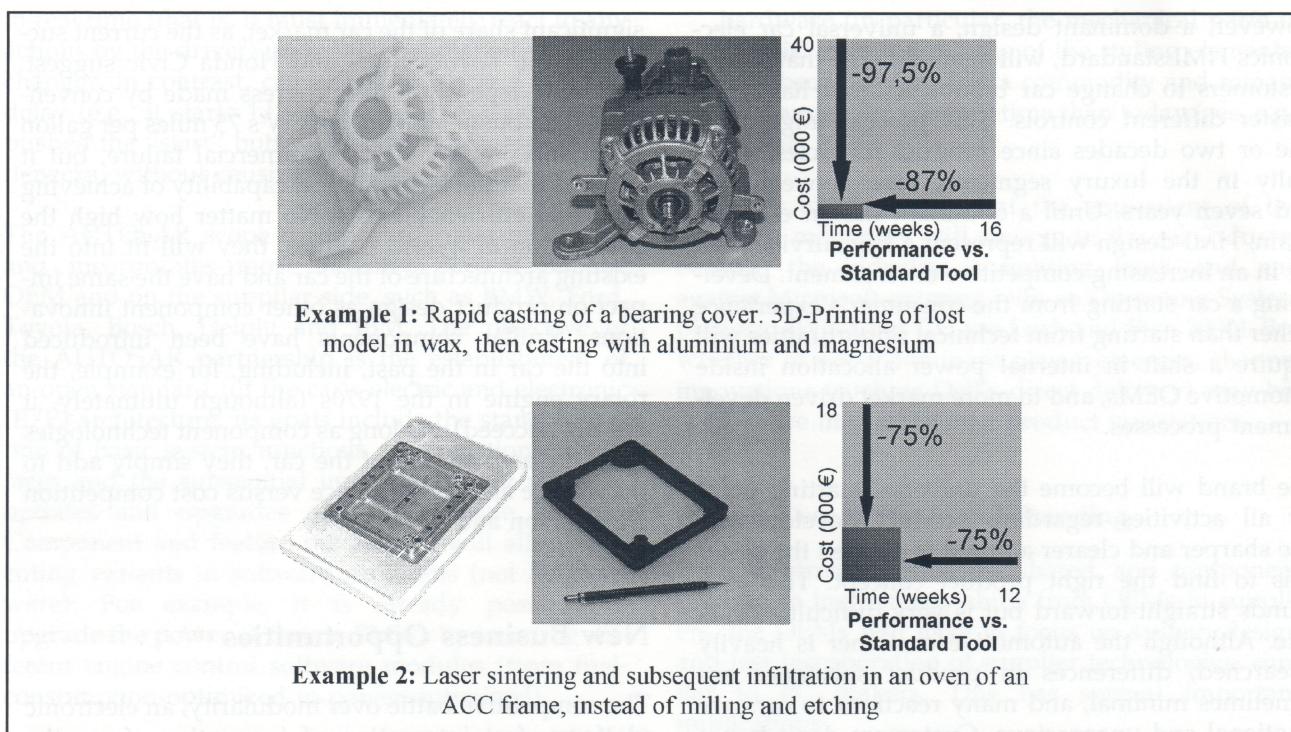
The competitive battle over modularity, an electronic platform, fast integration of innovations from the supplier network, and differentiation through the customer interface, will be brutal. Success will require the incorporation of multiple new capabilities (electronics, software, customer centric design, multiple development rhythms within the same product), while shifting away from others (e.g., mechanical design). A parallel route lies in new business development of related transportation opportunities. We see three fundamental opportunities: the tailored car, the hybrid car, and brand worlds.

The Tailored Car Opportunity

Today, OEMs offer hundreds of different options to individualize a car before final assembly (this is the most pronounced in the premium segment). In addition, many OEMs and specialized firms offer a broad spectrum of after-sales accessories to individualize or upgrade the vehicles later. Two new, but already visible, trends in production technology may accelerate this trend and change the industry trajectory from current mass marketing (simply with more and smaller segments) to truly individualized cars.

Driving Technology: Rapid Manufacturing and Platform Technology

First, there is an explosion in "rapid manufacturing technologies", and second, the car will become much more modular. Although both of these trends are still ten years from large-scale adoption, they allow the possibility of cars to be custom-made, not only by mixing and matching standard components but by actually customizing the shape and style of components. Emerging rapid manufacturing technologies promise the potential of parts made very quickly (thus, they can be made to customer specifications) at comparable costs (see Figure 3, Loch *et al.*, 2003).

**Figure 3** Two Examples of Rapid Tooling Technologies (Source: BMW)

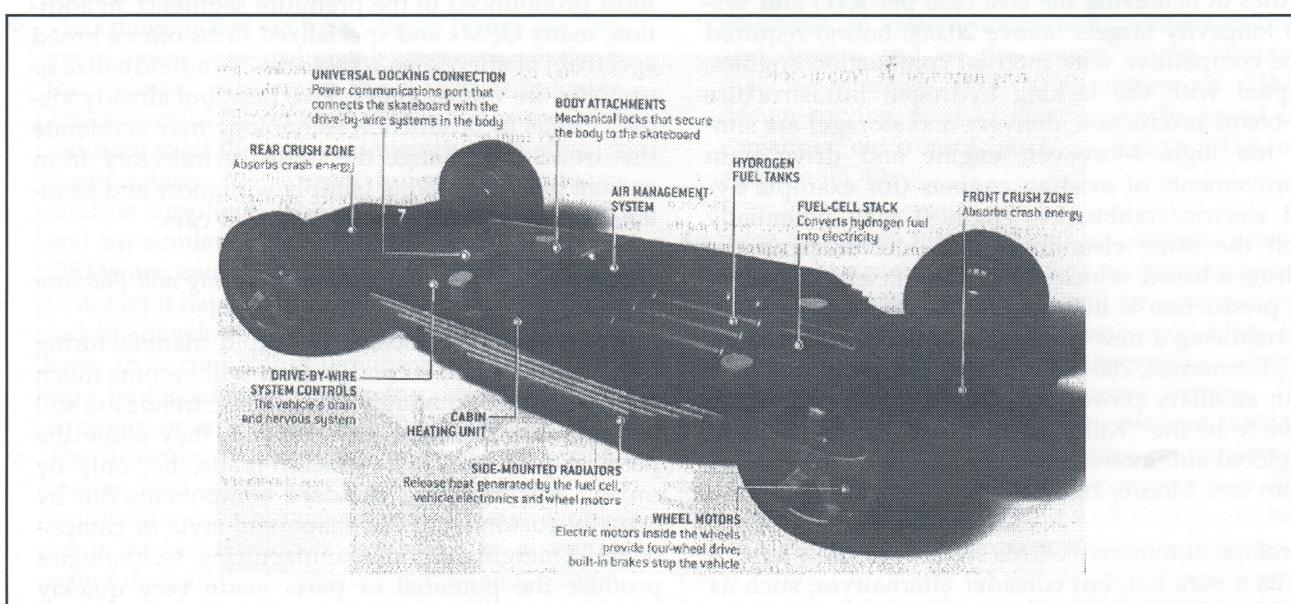
In parallel, there are proposals for new car architectures or platforms, such as GM's "skateboard" chassis (Figure 4), which would allow modular customization of the passenger compartment without changing the driving chassis.¹

New Market Segment of Customized Cars

If it arrives, the tailored car will have two fundamental effects on the shape of the industry, even if production economics remain attractive for car OEMs. First, the sales process will have to change radically, from current "mass" dealers to individual "style

advisors", similar to agents of pre-fabricated housing construction companies, who explore the product with the customer in a virtual environment and help him/her to choose the right design for his/her personal needs. This may allow market entry by new types of brokers and consultants.

Second, it will become much more difficult for the car OEMs to maintain an overarching brand identity that commands recognition and differentiation, unless they develop strong brand icons that drive the overall brand appearance. In the extreme case, indi-

**Figure 4** GM's Modular Car "Skateboard" (Source: Burns et al. 2002)

vidualized production technologies could eliminate the economies of scale that drive industry consolidation today, and allow niche providers to assemble cars to customer specifications from standard components, combined with individualized components from specialized "foundries". There already exists a niche industry of "kit cars" that can be individually put together from standard components. Some of the kit producers are able to make money from a series of 1,000 cars (Wells and Nieuwenhuis, 2000). If the customization segment increases, it will open the door for niche players on a much grander scale.

This could drive a fundamental change in industry structure in the long run, in addition to market entry. Take an example from the apparel industry (see Pich and van der Heyden 2002). Marks and Spencer was the most profitable fashion retailer as recently as 1998. They had made a big contribution to industrialization of fashion retailing by building an efficient supply chain that could manage the trade-off of cost versus quality. Then the Spanish company, Inditex, attacked M & S with its Zara brand, which was able to produce new designs (made from standardized and copied components) and manufacture them every few weeks. This avoided stockouts and always looked fresh, making M & S clothes look "old" (although they were of superior quality).

Applied to the car industry, revenues could migrate to "after-sales car modifiers" who give the car a new look every few months, or years, without the need for the customer to buy a new car. Competition would shift from quality and technological innovation to "freshness" and individuality. Daimler's Smart attempted a rudimentary version of this, which was not very successful. But the beginning is always difficult, and someone may make car modification a success, starting a market segment of "individualized cars". This is becoming more relevant as high-performance driving is less and less possible on overcrowded and increasingly regulated roads.

The Brand Worlds Opportunity

Although the number of car models is strongly increasing, and the volume per model decreasing, differentiation is becoming more difficult. Cars share an increasing number of important components across OEMs, and models are more quickly being copied than in the past. All segments of the industry are becoming more crowded, and through the network of suppliers and component specialists, innovations become quickly available to every player.

Therefore, car manufacturers have begun to extend their brands to other consumer product categories: for example, all major manufacturers already make a significant part of their profits from financial services, and the premium manufacturers have created divisions for lifestyle goods (memorabilia, clothing, watches, bicycles, etc.). Figure 5 shows data on revenues for some selected brands. In addition, allowing other designer companies to place the car company's brand logo on their products produces significant licensing fees. Already, some companies earn annual revenues above US\$100 million indirectly.

Currently, the idea is to allow the loyal customer to "immerse" himself/herself in a "total brand experience" of products that all bear the car company's logo. So far, no car manufacturer has dared to go into the pure branding business, as they have few competences outside the car industry and fear that their brand might become "hollow". It is crucial for the successful installation of brand worlds to ensure the same level of product quality and performance for all products being offered (see Seidel, 2004). Figure 5 shows an example of the efforts to extend the BMW brand into other consumer product categories. Experiments by automotive OEMs in the past have shown that they are unable to successfully compete in different industries. Therefore, brand extensions are now typically executed through licensing

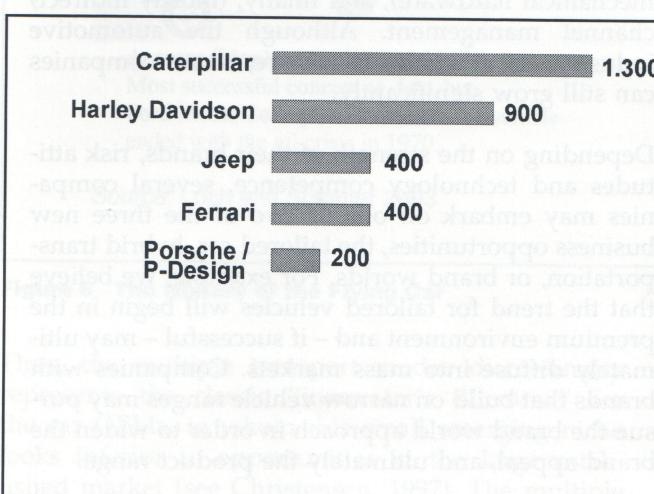


Figure 5 Lifestyle Revenues of Selected Brands in 2000 in \$ million (Source: various; own estimations) **and BMW Lifestyle Shop in China** (Source: BMW)

agreements with specialists in their specific industries. Thus, the automotive OEMs pursue the additional markets while focusing on their core competences and on competing in their core business.

Stretching the brand and licensing it to third parties, safeguarded by rigid controls of the branded products, may enable the automotive manufacturers to move to other complex product categories such as jet skis, snowmobiles, boats, mobility services etc. This offers several opportunities for further development of the brand and a much broader set of differentiation options. However, stretching the brand comes at the cost of a loss of focus and a stretching of resources and management attention. Ford learned this at the beginning of the millennium, when their core business deteriorated, partially because of excessive diversification (such as car rental, and financial services).

The Multiple Transportation Modes Opportunity

For almost a century, ideas of "hybrid" transportation modes, road-air and road-water, have been proposed (Figure 6). But no proposal has been sufficiently robust and attractive, and the entry barriers into the mass transportation system are high because the infrastructure for a hybrid vehicle has not been available. Today, three developments make a hybrid vehicle increasingly likely:

First, the increasing congestion of surface roads in virtually all urban areas is compromising the desire for individual mobility, creating a new unmet need. Second, new generations of technologies facilitate hybrid systems. Several concepts have been shown (see Figure 7). Third, regular air travel is becoming more and more inconvenient, which stimulates the search for cheaper and safer small planes for individual transport (see Fellows, 2001).

Public policy makers are thinking about the idea. NASA, for example, is working on a "highway in the sky program", and several automobile manufacturers are rumored to be working on airplanes or hybrid vehicles. In particular, ultralight airplane technologies currently offer a high potential for a "flying car": increasing robustness, a parachute for the entire plane eliminates fatal crashes, carbon fibers make construction light at acceptable costs, and new computer systems support steering and controlling the aircraft.

Any such hybrid vehicle will, initially, be introduced in a small market niche where the demand for this type of transportation is high. The first hybrid products will be inferior to cars, in terms of their driving performance, and to small planes or boats, in their alternative mode performance, and will therefore be rejected by the marketing experts.

Current OEMs, therefore, will find it difficult to pursue an amphibious or flying car all the way to market introduction – the perceived technological risk will be too high, the perceived market potential (as it is not quantifiable for this latent market) too small, and the legal issues associated with a "flying car" are an inherent barrier for an established brand (see Loch and Sommer 2003). We want to note, however, that the fundamental safety risk from crashing does not seem technically insurmountable. Ultra-light airplanes already today have individual parachutes that allow the entire plane to glide to the ground (safely if not gently). As is often the case, the uncertainties stem from market and legislative attitudes more than technical feasibility.

If the product can prove itself in the niche markets, it may succeed in conquering a part of the core automotive market (see Christensen, 1997). However, we expect one of the major car manufacturers to try the concept within the next decades, or perhaps a large player from a different industry who sees this as an opportunity to enter – if a successful product for a stable, small niche market already exists. In this case, market entry and reshuffling of product concepts will cause a wave of innovations, and may well change the set of industry players.

Implications for Management

Based on the emerging evidence discussed above, all automotive manufacturers will have to pursue the base case, the "autobahn merges with infobahn" scenario, just to be able to stay in the core business. Success in the core car business will require the enhancement and development of capabilities: a differentiated combination of branding and design, development of user interfaces starting from the customer's experience rather than from the newest technical gadgets operational efficiency, fast integration of new technologies (prominently, electronics and software on a different development cycle than mechanical hardware), and finally, (mostly indirect) channel management. Although the automotive industry, as a whole, is mature, some companies can still grow significantly.

Depending on the strength of their brands, risk attitudes and technology competence, several companies may embark on one or two of the three new business opportunities, the tailored car, hybrid transportation, or brand worlds. For example, we believe that the trend for tailored vehicles will begin in the premium environment and – if successful – may ultimately diffuse into mass markets. Companies with brands that build on narrow vehicle ranges may pursue the brand world approach in order to widen the brand appeal, and ultimately the product range.

The multiple transportation modes discontinuity is the least compatible with current OEM capabilities.



Figure 6 The History of the Flying Car

Thus, the multiple transport modes discontinuity represents the classic "innovator's dilemma" for the car OEMs, to whom this small emerging niche looks inferior to opportunities in the large established market (see Christensen, 1997). The multiple transport modes represent a typical opportunity for a radical intruder from the outside, with a new

brand. We just have to wait for the next "Red Bull" or "Apple Computer" that might create a new industry. And if hybrid cars conquer a stable niche, they may sufficiently improve their performance in the respective modes to appeal to mainstream customers, and then threaten the mainstream automotive OEMs.

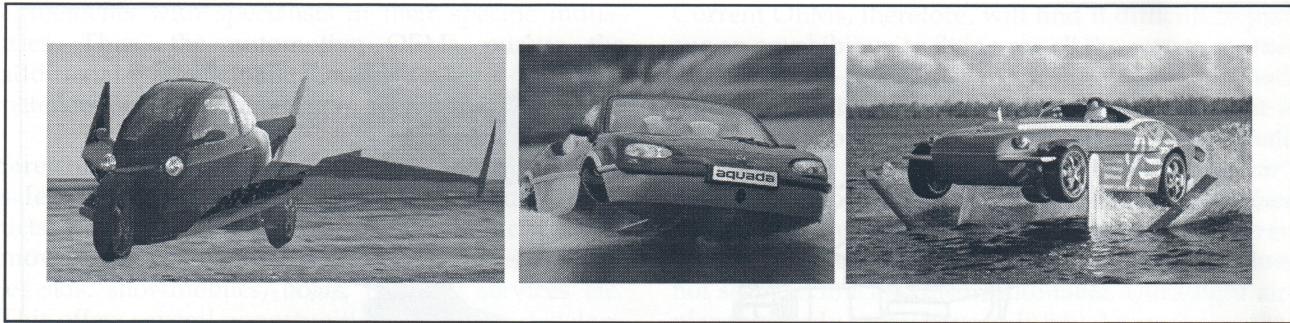


Figure 7 Recent Flying or Swimming (concept) Cars (Source: Loch and Sommer 2003, www.aquada.co.uk, www.rinspeed.ch)

Staying exclusively in the core car business will be brutal, and several more of the weakest players will disappear. Of course, this will not happen overnight – sick players may hang on for a while, especially if jobs are on the line and governments support them. Still, we believe that further consolidation, with simultaneous market entry from China and India, is inevitable. The three fundamental new business opportunities will not appear overnight, either. Each will take a decade or more to develop. Thus, there is no alternative for the automotive OEMs, other than to focus on the current challenging demands: speed to market, cost, quality, design, branding, and incorporating innovative components from suppliers.

In the long run, however, the new business opportunities may change the face of the industry. Recall that in the computer industry, many of the top 20 players changed between 1975 and 1995 (in large systems, leaders such as Univac, Wang, and Cray disappeared, and new companies, such as Apple, Sun, Digital Equipment, Compaq etc. appeared, some of which again disappeared). This argument is difficult to make to automotive executives, to whom short-term trade-offs, and the dangers of diverting any resources from the tough current business, are all too apparent. On the other hand, the longer term dangers are real, too. Although the time horizon of the discontinuities is long, the reaction times are also long, due to strategic priorities and internal systems of compatible processes (Christensen, 1997) and because of embedded cultures.

This implies that automotive OEMs need to engage in experimentation to explore which discontinuity may impact them, in what way, and what courses of action may be realistic for them to take. In other words, automotive OEMs should begin to think about the new business opportunities *now*.

Note

1. Some automotive managers, particularly in luxury car OEMs, like to say that the skateboard concept will offer less driving performance than a conventional four-door sedan. However, the skateboard concept will offer better fuel economy and lower emissions than a conventional four-door sedan.

performance. This is certainly true in the short term; however, in the light of a general trend toward tighter traffic regulations and increasing congestion, performance might become less important. Already today, most drivers of high-end cars cannot push them to their performance limits. Although it still matters to these drivers today that they could drive fast, this consideration might fade over time.

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