

Can driverless cars be the destination?



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"We are currently in an era when things that were once science fiction are quickly becoming reality. Simple things no one ever imagined – like using an app to share a ride – are becoming revolutionary. Incumbent automakers, new entrants and other industries reliant on transportation need to innovate and experiment even faster to meet the challenges of this new era and dramatically evolve their business models. We believe our large automotive clients can be in the driver's seat to command the market for mobility services."

– Randall J. Miller, EY Global Automotive & Transportation Leader

Cars have always evoked a variety of emotions – from the thrills of fast speeds and hugging tight corners, to the stress of long commutes and gridlock. Whether it's to feel as if you are driving in the lap of luxury, or to entertain your children's soccer team as you chauffeur them to their game, the interior of a vehicle plays a significant role in a consumer's driving experience.

However, in today's driving environment, there is one feature that is consistent across all vehicle interiors – the steering wheel. Although many current vehicle models have autonomous features, none offer fully autonomous, driverless capabilities.

Fast-forward to the not-too-distant future when fully autonomous vehicles become the norm rather than the exception. These vehicles will redefine urban mobility as we know it. Not only will they be autonomous, they will be shared, connected and green.

For vehicle manufacturers, this trend poses immense opportunities, but also a clear risk that mobility-as-a-service could become a commodity, effectively severing the relationship between automakers and their customers—unless manufacturers find a way to customize vehicle interiors to both delight and deliver a personalized, connected in-vehicle experience.

Car interiors will increasingly integrate entertainment elements with designs that function as communal living rooms on wheels.

Completely new interfaces will be supported as the steering wheel, gear shift and pedals may no longer be required.

Personalized interior options

Reconfigurable seating and interiors will include flexible and movable seating, voice recognition, etc.

From ...

Traditional materials

Full multimedia immersion

Seamless integration of various "brought-in" personal devices, integrated tablets, etc.

Augmented reality displays

Hand gestures and other signals to interact with virtual environments, human machine interface, etc.

 **40%**

of drivers can imagine letting an autopilot steer their car*

... to?

Self-learning and adaptive

- ▶ Gesture function
- ▶ Retractable steering wheel and controls
- ▶ Swiveling seats
- ▶ Heads-up display windshield

66%

of drivers are willing to let an autopilot steer their car if given an option*

*Source: EY, "Who's in the driving seat?", May 2015.

As vehicles become fully autonomous, the possibilities to reimagine the interior become endless. Drivers will become unburdened from the stress of having to stare at the road or watch for danger at every turn, and vehicle interiors can be transformed to become what consumers need or want for the duration of their journey – an office, an entertainment lounge, or even an oasis of calm and relaxation.

When drivers become passengers and vehicle travel transforms from product ownership to service delivery, an interesting question arises: will they need the steering wheel, rearview mirrors, gear shifts, pedals or even a traditional instrument cluster?

There are no limits. Interiors will be able to become whatever we want them to be. Companies have already demonstrated such technologies annually at the Consumer Electronics Show and at motor shows around the world. “Active” glass will enable windshields to become connected touch screens that can also be controlled with eye-tracking and gesture recognition. Augmented reality displays and dynamic sensing will give passengers the option of using hand gestures and other signals to interact with their virtual environment. Seats will swivel to facilitate interaction between passengers or recline for reading or napping. Advanced communication will recognize the occupants’ devices to provide personalized experiences.



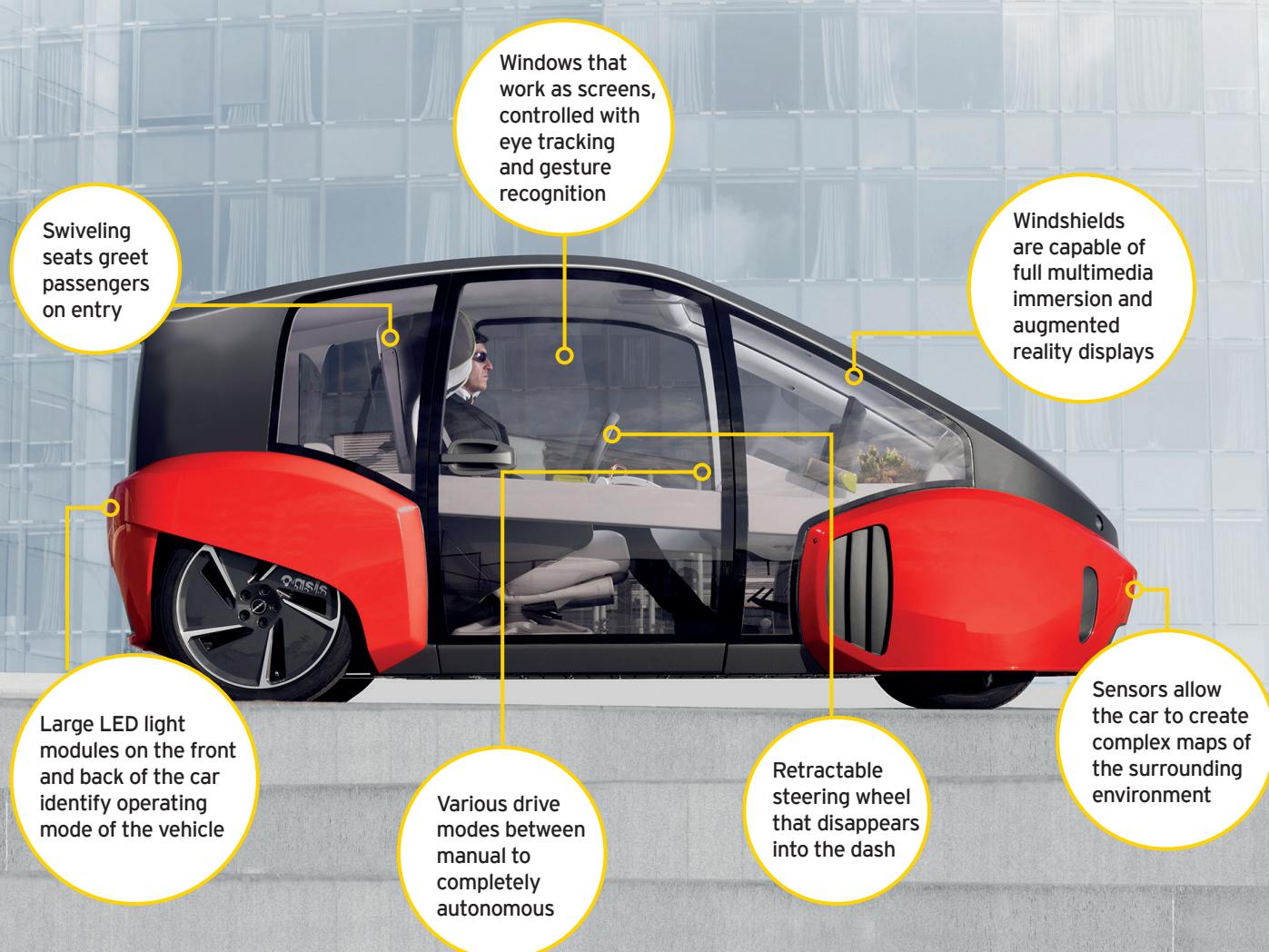
Car designers and automakers will leverage a mix of technology to create connected interiors and driverless living spaces:

- ▶ Augmented reality
- ▶ Human-machine interface
- ▶ Integrated multimedia immersion – both built in and brought in

They will also use different materials than usual to develop future car interiors:

- ▶ LED light modules and screens
- ▶ Carbon fiber reinforced plastic
- ▶ Active glass capable of image display
- ▶ Multipurpose lounge chairs

Future autonomous vehicle interiors



Sharing without compromising personalization

With new mobility concepts such as car sharing, there is a risk of depersonalization. Mobility customers will no longer own the cars they drive in and therefore have no – or only limited – means of tailoring interiors to their individual demands. While lighting technologies such as LEDs can be used to partially customize the appearance of vehicle interiors, it would be far more challenging (and expensive in terms of today's cost) to do so more extensively. Automakers and mobility companies, therefore, face a key question: to what extent and in what manner should a car be personalized?

The hospitality industry, including the shared model that is becoming increasingly popular, offers important lessons for the automotive industry. Consumers understand the tiered model where, for a price, they can choose from pure functionality to luxury. Functionality may be bare of any personalization without compromising quality, while luxury is almost entirely about comfort, personalization and experience.

Considerations like these ultimately influence new car designs, too. Similar to the ride-hailing industry that offers a choice of rides, the future mobility ecosystem of self-driving cars could also offer a selection of vehicles to consumers that caters to a wide spectrum of needs. At one end of the spectrum, consumers could choose a functional

form of mobility that balances price and efficiency for the commute, with limited personalization and the sharing of space with other occupants. At the other end, which would come at a price, consumers could opt for private transportation that picks them up at their doorstep and offers an immersive multimedia experience without compromising comfort or privacy.

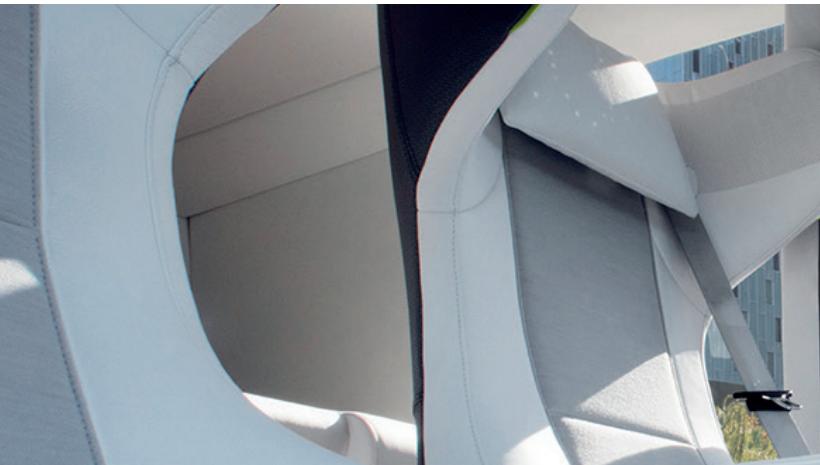
"Automakers need to be asking themselves: will the car of the future be a 'crossover artist,' as its new inner life focuses on how to transfer the living room to the car? Or will the innovative providers of new mobility services, such as car or ride sharing, become provocateurs of singular institutions such as taxi businesses?"

– Peter Fuss, Senior Automotive Advisory Partner, Germany, Switzerland and Austria

Ultimately, the answer lies in where automakers and mobility companies place their focus. Is it on the product or the people? The logical consequence is that cars, and therefore the mobility of the future, will evolve to anticipate consumers' wants and desires. For users, this will ultimately lead to the creation of vehicles that provide a formerly unknown feeling of well-being in a mobile retreat, such as the Rinspeed Oasis.

"It's all about the customer experience and how well an automaker or mobility company can leverage technology to deliver innovative new ways for personalization."

– Kristin M. Schondorf, Global Automotive & Transportation Mobility Leader





Advances in sensing, materials, displays and artificial intelligence will greatly amplify the experience – going beyond huge touch screens and gesture controls, vehicles will understand context and adapt fluidly to changing conditions.

“Active” glass, capable of displaying vibrant images and working as connected touch screens

Allows the car to adapt fluidly and naturally in response to the driver’s preferences, behaviors and intent

Responds to driver’s behavior and physiological data (gaze, position, heart rate, breathing, etc.)

Windows

Dynamic sensing

Engaged driving

Mindful comfort

Reinventing the wheel

Supports a range of features enabled by varying degrees of automation

Adapts to support a focused driving mode designed to improve the quality of the experience and the performance of the driver

Concept car offers a glimpse of the future

In its latest concept autonomous vehicle designed for urban settings, the Rinspeed Oasis has opted for a steering wheel that folds flat and turns into a keyboard or work surface – an interior inspired by a living room. The vehicle is fitted with an armchair, television and even a small garden area. Its large windshield doubles as an augmented and virtual reality screen. Even its name signals a new reality for vehicle travel. Want to know what restaurants are nearby? The Oasis will let you know what your friends on social media recommend, and with a quick “OK” signal, the personal assistant will have a table reserved for you. And there is even more: the Oasis has a “delivery area” in the back that opens itself to new business models. The vehicle can manage delivery services aligned to the route of its passengers. This improves asset utilization and reaches a new dimension of smart transportation.

At EY, we're committed to actively shaping the future of mobility. We believe our large automotive and transportation clients can be in the driver's seat to command the market for mobility services. We work with companies to help them through every element of the mobility business transformation – from experimentation to scaling.

Our collaboration with Rinspeed, the creative Swiss think tank and mobility lab that specializes in building prototypes and concept cars, demonstrates our deep understanding of new technologies and innovations. Its concept autonomous cars, such as the Oasis, bring the future to reality and showcase how automated private transport will transform the car and human machine interface.

Through our deep understanding of innovation and emerging technologies, our expansive global network of automotive and transportation professionals and alliance partners, EY is helping large companies innovate like a start-up, tap into the right talent and capture future consumers.



Who's in the driver's seat: Traditional automotive players or disruptors?

Although consumer buy-in may be a significant hurdle to adoption, automakers will be the ones undergoing the most dramatic transformation as their entire business models shift from vehicle ownership to mobility-as-a-service. There is a real risk that automakers will have no relationship with the customer in this new ecosystem if they focus entirely on the product. However, by personalizing the in-vehicle experience, automakers have a genuine opportunity to retain and strengthen the customer relationship. Further, to achieve the level of personalization that consumers will demand and the level of automation that will make fully automated vehicles feasible, automakers will have to develop an ecosystem of willing collaborators (existing and new entrants) – technology companies, interior design firms, and media and entertainment companies, to name a few.

Material suppliers and Tier 1 automotive suppliers focusing on car interiors may also be heavily impacted by the transition to fully automated vehicles. As the high-margin parts under the hood, such as combustion engines, are eliminated, automotive companies are directing their attention to other high-margin business. Given their footprint and direct connection with the consumer through sales and services, dealers also have a unique opportunity to shape the experience inside an autonomous vehicle. Just as automakers are doing, dealers should innovate and experiment with new business models to capture and maintain the customer relationship.

One of the drivers of change we expect to significantly impact the industry is disruption driven from outside the industry. Technology, media and entertainment organizations, start-ups and even mobility companies are offering their own alternative visions for what consumers can expect inside a future mobility solution – be it a self-driving road car or even a flying taxi. These opportunities are driving transactions in the supplier community as suppliers try to acquire capabilities, such as mapping, augmented-reality technologies, artificial intelligence and deep learning.

The playing field is level and open. The disruptors have thrown down the challenge to the incumbents. While the battle is to own the interior experience in an autonomous vehicle, the fundamental tug of war is about who will own the relationship with the consumer. The future of mobility will be driven by companies who embrace the consumers and technology of tomorrow – today. Those who want to take the lead need to enhance consumer experiences by designing the future, develop and sustain a collaborative ecosystem of innovators, and effectively commercialize new businesses, while leveraging their core business for competitive advantage.



Hacking paths to the future of mobility

In 2016, EY spearheaded a series of hacks where a diverse set of participants codeveloped visions and prototypes for future mobility scenarios. Through these rigorous, collaborative and provocative sessions, fundamental differences among stakeholders emerged and critical questions surfaced.

Hack [hak] (noun) rapid design of tomorrow's extraordinary solutions

Hack results: three visions of the future
The question we asked was: the future of mobility represents tremendous changes and many opportunities. How will you succeed? Here's how each stakeholder group answered.

Automakers

Transformation to a new type of OEM: "Original Experience Maker"

The vision: Delivering unique mobility experiences to customers, while extending and leveraging core business strengths.

Disrupter

"INSTINCT": an intuitive mobility platform – your co-pilot for an enriched and fulfilling life

The vision: The ultimate "mobility-as-a-platform" transforms consumers' mobility experiences. With the ability to predict and plan journeys at the moment of intent, it requires no conscious intervention by the user, becoming a seamless part of consumers' lives.

Collaborative ecosystem

"TA:DA": harnessing the power of shared data to benefit all – the perfect marriage of business, entrepreneurs, citizens and technology for social good

The vision: An open trading platform for mobility data to generate benefit for all ecosystem stakeholders, achieved by breaking down barriers to collaboration by aligning incentives, creating recognizable value that benefits all.

The EY Global Automotive & Transportation sector can help futureproof your business for today and tomorrow

The future of the \$6 trillion traditional automotive industry is in question. A new mobility ecosystem is being formed, enabled by ever-emerging digital technologies and setting the stage for immense innovation.

To keep pace, automotive players are being forced to transform their businesses and develop new business models and services, and at an unprecedented speed.

For companies to be successful, a shift in work practices and culture is required, as there is a need to be agile and fail fast to achieve a good return on innovation. Through our deep understanding of new technologies and innovation, our expansive global network of automotive and transportation professionals and alliance partners, EY is helping companies commercialize new revenue models and futureproof their businesses for tomorrow, today.

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