Editorial

DVN Interior Think Tank: A Great Start!

DVN IMAGE

The first DVN Interior Think Tank took place last week in Köln. This seminar was a successful test for intended future small working events about issues and items the interior community needs clarification and joint discussion on. The limited number of participants and casual format foster insightful dialogue and candid feedback. The seminar topic, HMI, is crucial to the future of automotive interiors, as automation; connectivity, and new technologies come onstream. Participants at this DVN event talked over platformized auto interior development; regulation; research, and common benchmarking criteria, and this week's in-depth article summarizes the event and describes the four core lectures.

The next DVN-I Workshop is scheduled and work is already under way, so save the date: **25-26 April, 2023**, in Koln. Watch for more information to come later this month.

Thanks again to everyone who came and participated in our inaugural DVN-I Think Tank seminar!

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Talking, Listening About HMI at Think Tank Seminar

DVN IMAGES

At the first DVN-Interior Think Tank seminarlast week in Köln, there was a great dea of insightful dialogue around HMI: what it is; what works well, what needs to be improved. We paved the way for an industry platform to publish guidelines and quantitative criteria. Research topics were discussed, as well. Thanks to Honda; Ansys; Ascorium; BOE Varitronix; DesignLED; Elmos; Faurecia; Grewus; Grupo Antolin; Kurz; Mocom; Osram; Weidplass; Yanfeng, and the University of Groningen for their participation and involvement.

Let's have a look at the four core lectures which help understand HMI, and the main challenges the industry has today.

Background and Future Perspective in Automotive HMI (Philippe Aumont, DVN)

DVN IMAGE

This lecture was based on content of 137 DVN Interior Newsletters published over four years' time, to summarize the main innovations and challenges within car interiors.

Context

CASE is the acronym taking over the auto industry, for **C**onnected, **A**utonomous, **S**hared, and **E**lectric. Those are the four megatrends which influence the overall interaction between driver and occupants and the vehicle. Among others, automation and connectivity are facilitating new in-vehicle activities, pushed and pulled by an eventual shift woard mobility as a service rather than private car ownership.

HMI, human-machine interface, is the point of interaction between a human and the hardware and software of a computer; by extension, to a vehicle. HMI is not (only) interaction with a screen!

HMI scope could be very broad, as broad as the driver perspective, and it may include ADAS; control access and visualization; vehicle parameters; context information, HVAC control; comfort adjustment; infotainment, phonecalling and texting; interior lighting; voice or gestural control; alerts; HUDs; driver and occupant monitoring; driver authentication; mood detection, and more.

According to McKinsey research, five driving forces can be expected to shape the cabin experience soon: new vehicle architectures including EVs; increasingly-homelike comfort; sustainability; affordability (to build and to buy), and connectivity and HMI.

HMI and infotainment are at the center of today's auto interior consciousness. Displays are becoming the centerpiece, the masterpiece! Display size positions the vehicle segment, much as a combustion engine's piston displacement once did. Automakers are using their every new-model introduction, communication event, social-media channel to release new features, more powerful software, bigger screens, faster systems, and augmented solutions.

BYTON IMAGE

MERCEDES HYPERSCREEN IN THREE PARTS; 12", 17", AND 12". (MERCEDES IMAGE)

Displays are the window to the digital world; it is the extension of Home/Office life. Displays start from a basic head unit to pillar-to-pillar solution, such as Byton's M-Byte 48" display, or the Mercedes MBUX Hyperscreen, with a 56" glass. Display can now be extended with HUD, and any functional surface to create a fully immersive driving experience.

BMW X7 COCKPIT CURVED DISPLAY: 12.3″ INSTRUMENT CLUSTER WITH 14.9″ MAIN SCREEN (BMW IMAGE)

As interior surfaces are always complex, technology is progressing to fit complexly-shaped areas with curved screens to avoid too many line collisions.

HUDs are becoming an HMI user extension in the driver's visual field; they help a driver to keep their eyes on the road, and they cut down on eye movement and close/far focus adaption.
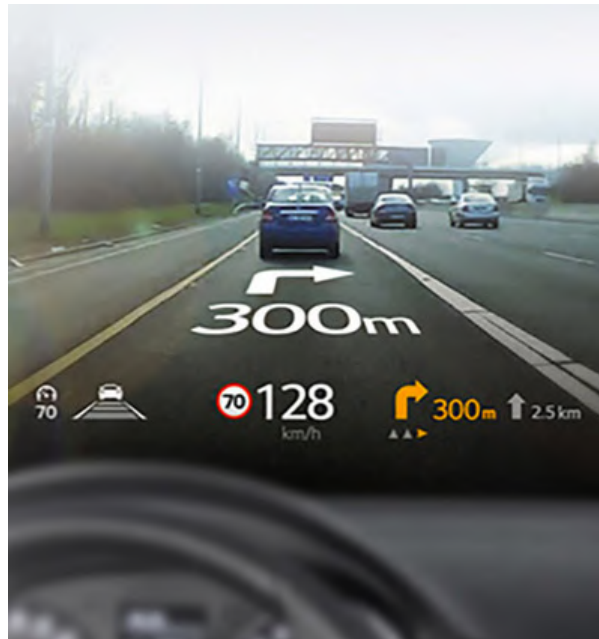

LG IMAGE

They also help manage the hierarchy of information, with the most critical information on the HUD. The next step is augmented reality to extend the practical limits of human vision.

Safety

DMS (Driver Monitoring System) is becoming mandatory in Europe, and is recommended in the US. China is probably following Europe. Visual-light cameras work well for DMS, which effectively becomes a contactless interface requiring no active participation between human and machine. The logic of DMS is to analyze driver behavior, which could also help limit driving while impaired—whether by alcohol, some other drug, or fatigue.

For health and wellbeing, it will be extended with physiological measures, such as driver's heart rate, breathing, stress, alcohol, blood sugar—any vital sign, to assess driver state. Outputs could include massage, interior lighting, sounds and smells to help relax or re-energize the driver.

Voice
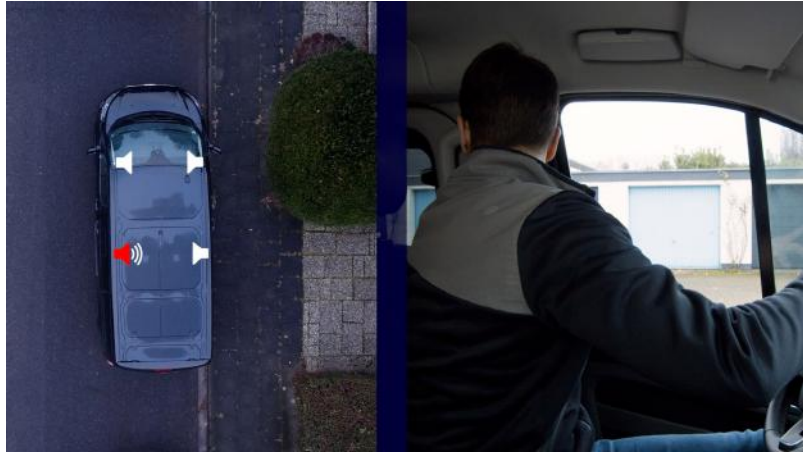
FORD IMAGE

Voice control should become a key interface, even if forecasts have consistently been overly optimistic. Voice control reduces driver distraction. Progressively with natural conversation, it is possible to manage telephone; navigation, HVAC, and services (weather; stores; restaurants, order-a-coffee, follow-that-taxi, and suchlike). Systems like Ford's Smart Alert sends warning tones to mimic the sounds made by potential hazards, from the direction where the hazard exists.

Touch

Touchscreens mean buttonless operation of functions such as HVAC, infotainment and **probably too much** more. Multifunction steering wheel hubs become control centers with the addition of touchscreens.

Feedback is needed to understand what you've done, so if the driver's to keep their eyes on the road, it'll have to be haptic feedback—the use of tactile interfaces to provide touch or force feedback to the user. This kind of feedback can also take the form of vibrating the seat to inform the driver of a pedestrian about to cross the street, or the steering wheel to alert the driver drifting from the lane.

Gesture

Still in its infancy, but gestural control will develop, leveraging what has been developed with gaming.

Interior lighting

Interior lighting becomes more than functional. It now takes central stance in the ambiance and decoration of the interior, it enhances perceived quality, it increases comfort and feelings of wellbeing and safety. And, it is a vector of communication, especially for alerts.

All in all, HMI is a complex system, as complex as humans' five senses.

Driver Mental Workload and HMIs, (Prof Dr Dick de Waard • University of Groningen)

IMAGES COURTESY OF THE SPEAKER

Professor Dr. Dick de Waard specializes in Traffic Psychology at the University of Groningen in the Netherlands. His lecture gave a scientific perspective on how HMI is influenced or limited by mental workload.

The H in HMI stands for a difficult part of the HMI, the human. This is because humans differ, and even the same person will not always perform the same way in all conditions. According to Rasmussen, human behavior can be described on three levels:

Rasmussen - Human Performance

- *Knowledge level*
  - *Bounded rationality & "thinking"*
- *Rule level*
  - *Pattern matching & recognition*
  - *IF...THEN...*
- *Skill level*
  - *Highly automated*
  - *Very little/no effort*
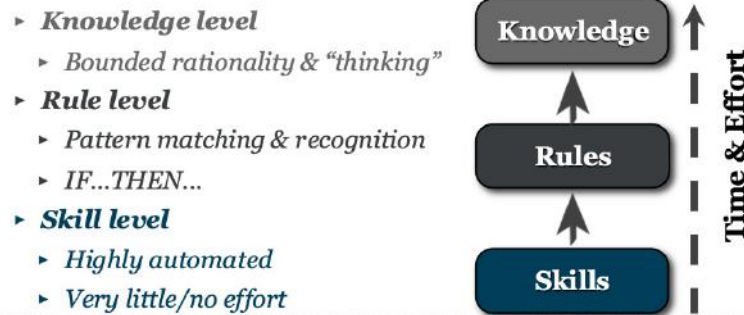
(1) the automated, mainly unconscious skill level

(2) the intermediate rule levels

(3) the highest, conscious, knowledge level

All levels are useful, and behavior can move from one level to another, but also, at all levels things can go wrong. In conditions of high demand or suboptimal driver state, mental workload is also important.

Mental workload emerges in the interaction of the driver, with their limited capacity, and the task the driver must perform. As said, a difficulty in predicting mental workload is that the driver's capacity that is required for task performance, is not constant and changes with experience and driver state, such as fatigue.

These are also important factors to consider when trying to optimize displays. Errors lurk at different levels. Errors of automation at the skill level and are a good reason to not change an interface that the driver is familiar with—do not swap clutch and accelerator in a new car model!
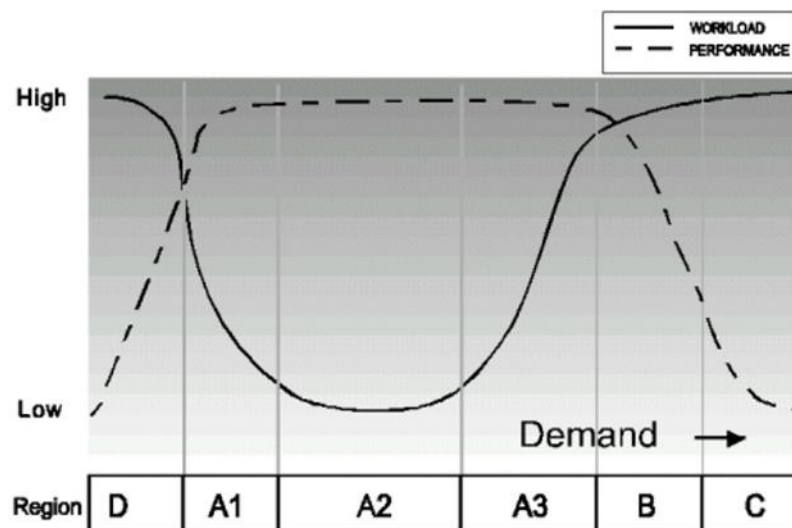
Errors of overload occur when drivers cannot deal with the situation anymore and trying hard (investing effort) or adapting performance, e.g., driving slower, no longer work. Next to this there are active and latent failures. Active failures are immediately visible. Latent failures, however, can be design errors that remain unnoticed and without consequences for a long time, until they expose themselves.

Finally, the topic of false alarms is important for acceptance and effectiveness of messages. False alarms should be avoided, even if this means that there are less "hits", as once the driver loses trust, all warnings, also correct ones, will be ignored.

Cognitive Closed-Loop (Omar Ben Abedelaziz, Forvia)

Large screens, Complex HMI, cognitive distraction, and driver disengagement are real pinpoints to solve within the Faurecia Cockpit of the Future umbrella.

These pinpoints require adaptative in-cabin systems in relation to the driver cognitive load. This is why having a system measuring the cognitive load of the driver will be key in the future to tackle the above pinpoints and to enable future use-case such as:

• Adapt dynamically the HMI to make it safer and more convenient depending the driver cognitive load;

• Decide on the driver readiness to take back the control after an autonomous mode ($L^{2+,3}$)

• Alert the driver when his cognitive distraction exceeds the permitted threshold.

Identified approaches to detect cognitive distraction

Useful Field Of View	Detection Response Task	Eyes and head movements	Vital-signs data
Useful Field Of View (UFOV) contains everything that a person can see in his visual field in one eye fixation, without moving eyes or head.	Reaction time is how long it takes for the driver to respond to a stimulus (Visual or Haptic)	Eyes and head movements detection is based on eye gaze and head pitch, yaw and roll	Heart rate and Heart rate variability are correlated with the cognitive load

FORVIA
faurecia

This first approach has been patented by Forvia to protect the combination of the Useful Field of View and the Detection Response Task (DRT) using DMS camera to monitor the driver reaction and existing visual features to stimulate the driver gaze

This system allows drive cognitive load estimation with the driver as active part of the monitoring system (driver-in-the-loop).

This approach has been also patented by Forvia where an all-in-one monitoring system is used to track driver movements and the Vibe system is used to stimulate with a specific vibration the driver reaction.

Faurecia All-in-One is a seat-based monitoring system capable to offer a full awareness of what is happening on the seat. It is compliant with safety regulations; it is more sensitive and accurate compared to any other seat-based technology. It is durable in a harsh seat environment, easy to integrate, and scalable to multiple use cases.

All-in-one is used by Faurecia to offer a catalogues of use cases covering safety, postural comfort, thermal conditioning, and health.

Vibe is Faurecia's haptic experience through the seat to offer new occupant experience across four packs: wellness; safety alerts; music, and entertainment.

Faurecia combined their expertise with Paris-based sound startup Aurasens as well as with academic partners in an innovation co-development partnership to position Vibe as best-in-class in-cabin alert system with cognitive load, reaction time and UX taken into account.

HMI through a Design Journey (Athanasios Tubidis, Spike88)
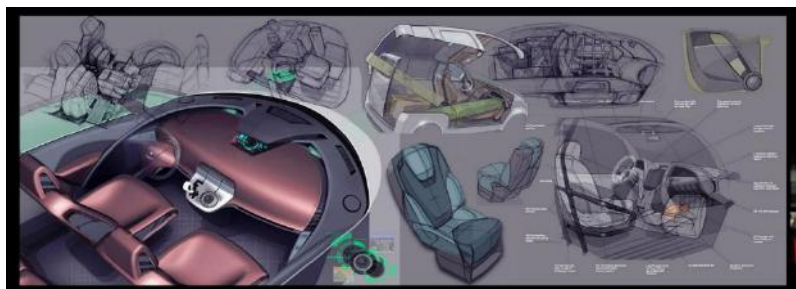
IMAGES COURTESY SPIKE88

Paris-based design consultancy Spike88 addressed HMI as a design journey. The presentation referred to the long passage and creative struggle all along the late 1980s up to now given through the celebrated and ingenious adventure from the pencil-and-marker drawings all the way to the most sophisticated 2D, 3D and VR design practices of today. In this occasion, the story did not refer directly to the final product, the automobile, but was told from the inside and all along the process of its making.

In one of the most synthetic yet subjective processes, automotive design, the operator seems to have the most crucial role in the HMI context, leading over the years into highly specialized profiles labeled as the top-guns of the automotive industry. Skills that are required to accomplish the most complex product ever made, the automobile. Besides its 30,000 unique parts, its complexity -unlike space shuttles or nuclear submarines- comes from the fact that is a widely available product to vast pools of populations of very diverse social profiles, requiring yet very basic skills to operate.

HMI is another way to see this amazing design process established all along tech episodes and technique evolutions in a relentless and constant friction with the craft. The result is creatively stunning and evermore evolving to a better and more expressive practice, giving products with strong identity, increasingly in relation to surrounding context.

'Paintings out of the form and forms out of paint' was the label of the specific chapter treating creative process as a never-ending cognitive comparison of the designer and its technical means of expression. In the particular case of VR, for instance, that designers operate without a visual frame, the images merge, dimensions and perspectives mix with unreal immaterial proportions, creating in times a unique chance to capture feelings of reality way beforehand.

Car interiors have evolved from self-contained units to interconnected itinerant habitats. The passage from the traditional-dashboard-mechanical-gauges to tactile screens and to symbols has revolutionized our relation to cars and equally the design process of car interiors. Symbols do not relate anymore to the vehicle itself but to a greater interconnected system.

From the analog dashboard to today's UX and from designing products to designing symbols, new challenges emerged. Merging text to illustration (Emoji), a new language of sorts, is a way to transmit what lies beyond writing, cut through the web polyphony and label an instant feeling. With computers, besides the language simplification, we have accomplished something amazingly great: we have reunited symbols and letters and as frivolous as it sounds—indeed more primitive than we think—we entered an era of interactive language, to communicate, enable, activate, affect. A new practice assigned to extract and augment values of everything previously acquired. Thus, UX constitutes an 'intellectual control of the object' a kind of media management connecting the product with its reason to exist. Usage interface is coupling digital economy.

The experience we create digitally defines the type of data that we are going to collect. Any data we collect, codes the following generation of products. Digital interface graphics become the universal connection from our car to our house and to any place through a screen. Car Interiors are far more data intense than smartphones, signaling a 'Vocabulary Inflation' or commonly described as driver's distraction and mental overload.

We cannot be implementing this immense digital superpower just to regenerate proven models, instead it is time to prioritize the human aspect. Dyslexia does not occur to society without alphabet. Equally, UX does not come without a price.

Citing a previous DVN article from the Interiors Unplugged series:

 '*Design, a discipline that combines both rational and artistic skills, is called to resolve the conundrum on mainstream vehicles. The assignment is to make sense out of a vast set of parameters that cognitively developed over very long time. Designing an experience into the digital world, as a way to create meaning in a vast universe of new parameters, is difficult to comprehend with analog means. Languages, symbols, cultures merge into one and only sign that has to be significant and convey the exact same meaning for everyone.*

Unlike physical objects, designs of digital experiences scale as big as inconceivable, from a low-key graphic telltale to the violation of a community's standards. Design process itself diverts between designing for a specific market, segment or region and designing for the entire human race.'

Harvesting car interiors is an idea not an illustration. From cave paintings, pictographs, and printed press to computer-mediated communications, we have always said a story. It might be that UX is the language to tell 'the story of the most complex object ever made'. Unlike computer screens, automotive interiors are carriers of emotions and an everlasting muscle-memory of mobility. Can we remain in touch through a digital interface?

Workshops

Participants worked in two sub-groups by pairs, to evaluate most important HMI topics, with evaluation and justification, and to identify how to maximize UX.

The following charts reflect both teams' findings.

Most important HMI topics:

Topic	Remarks	Evaluation (10 = important)
AI, machine learning	Self-learning, intelligent adaptive functions	7
Alerts	Safety, fatigue warner	9
Assistant Systems	reliable, not irritating	9
Battery Management	elementary for EVs	8
Connectivity	to external world (Apps), increasing issue	8
Design	Ergonomic, integration, customer appealing	8
DMS	Driver Monitoring System, mandatory	10
Driver support	no distraction, multimodality, status, redundancy	7 – 10
Driver -> Car	eyes on the road, ease of use	8
Car -> Driver	Feedback: unambiguous and relevant	8
Driving Experience	UX, evaluation depending AV level	3 – 10
Flexible HMI	for use space in different use cases	8
Intuitive design	Self-explanatory functionalities, simple	5 – 10
Fun, reward	Amazon, play games,	9
Haptic Feedback	evaluation depending function	4 – 10
Personalization	Functions, features, automatic, by you own	4 – 9
Post purchase functions	Updating new functions (e.g. OTA), integration	8
Sales Driver	USP, brand etc., profitable functions and features	10
Safety / Confidence	Reliability, AV challenge, robust, intuitive	8 – 10
Value perceived	R.O.I., attractive UX	9
Voice control	digital assistant, increasing better understanding	5 – 8
Wellbeing	Comfort functions, interior light, materials etc,	6 – 10

How to maximize UX:

Topic	Remarks	Evaluation (10 = important)
Alerts	Secure signaling, no false alarm	9
Attractive UX	New functions, features and experiences	10
Connectivity	Increased to all important existing and new sources	8
Black is the new light	Safety signals, simple, no distraction, unnoticed	8
Flexible HMI	adaptive to multi functionality	8
Multi modal interaction	Connectivity, multi-tasking, human senses	9
Personalization	Individual functions and features, user preferences	9
Pro-active functions	Proposals, support	9
Simplicity	Intuitive and simple understanding of applications	9
Standardization	Shared cars, communication AV	10

This perspective should benefit all DVN Interior members, and help the community to work through today's challenges and hurdles.

Interior News

Yanfeng's Optimized Airbag Module

YANFENG IMAGE

Yanfeng has presented a new solution for integrating the passenger airbag into the instrument panel. The new airbag module requires less installation space and reduces weight and costs. It's the result of collaboration between Yanfeng's Interior and Safety business units. Instead of individual parts, the new solution combines the airbag shaft with the module housing and combines both in a single part. This has reduced the weight, required installation space, and system costs. Since one component is eliminated, this also leads to lower energy requirements in the production of the passenger airbag system.

The airbag module can be adapted to any instrument panel design, leading to greater design freedom. The space requirement is reduced by about 10 to 12 mm around the airbag module, according to the manufacturer. With the new design of the airbag shaft and housing, the airbag can also already be integrated into the production line of the instrument panel and assembled with it. Yanfeng's new instrument panel including integrated passenger airbag is ready for mass production.

TomTom in Stellantis SmartCockpit

Stellantis' partnership with map experts TomTom complements that announced earlier this year with Amazon. Both will bring their skills to the operation of the new SmartCockpit interface, planned to equip the group's vehicles from 2024.

According to Stellantis, it will allow users to interact with their vehicle by touch, voice, look or gestures. In other words, an interface whose activation does not necessarily require a touch action on the screen. The services provided by TomTom complement those of Amazon, also a partner of Stellantis. This other partnership, revealed this past January, will thus allow passengers and drivers to access e-commerce and payment services for voice assistance functionalities. "Thanks to artificial intelligence and cloud computing, we will improve the overall experience of our customers and transform the vehicle into a customizable living space, both for passengers and for the driver", said Stellantis CEO Carlos Tavares.

Harman Kardon Tunes for Renault Austral

A partnership between Harman Kardon and Renault is continuing with the launch of the new Austral compact SUV. A premium sound system from Harman Kardon will feature in the top trim lines of Renault's latest vehicle and will combine high-performance loudspeakers with advanced technologies to create a special sound experience for interior occupants.

The system benefits from Harman Kardon's patented shared motor coaxial speaker (midrange and tweeter) located in the dashboard to create a stable soundstage and deliver excellent music reproduction. Completing the system are 12 high-performance speakers, high-power dual voice coil woofers with an external coupled subwoofer for dynamic and low-distortion bass reproduction, and a 485W amplifier which can deliver full frequency range at all volume levels.

To improve audio quality, the Harman Kardon sound system has been tuned to match the Austral's interior. The Virtual Centre technology processes audio signals from each speaker to ensure an unbiased stereo stage for each of the vehicle's occupants.

To further increase sound quality, Harman Kardon's patented QuantumLogic Surround sound algorithm delivers each passenger with an individual sound stage and surrounding content for an immersive audio experience. Integrated surround midrange speakers further enhance the interior audio for front and rear passengers. Integrated by Harman Kardon, the stainless-steel speaker grilles feature a matte black coating and highlighted pattern elements on the front doors.

Continental HUD Wins CES Innovation Award

CONTINENTAL IMAGE

Continental's Scenic View Head-Up Display (HUD) has been named a CES Innovation Award Honoree under the product category Vehicle Tech & Advanced Mobility. The Scenic View HUD hides a vehicle's display inside the dashboard and reflects information onto the lower black-band area of the windshield. The state-of-the-art solution reduces driver look-down angle. Drivers get all the critical safety information they need while keeping their eyes on the road.

The Scenic View HUD displays the information of the instrument cluster, center display and passenger display. It reflects an extremely wide virtual image spanning the entire cockpit. With these expanded viewing areas, the virtual image is visible to everyone in the vehicle, all passengers have the ability to see what the vehicle "sees," including essential safety information.

To achieve this effect, display modules are hidden inside the dashboard and reflected in the lower black-print area of the windshield. A Continental propriety algorithm optimizes the power consumption. The visible brightness allows for safe usage in all environmental lighting conditions.

The structure of the system also unlocks new opportunities for innovative dashboard designs for vehicle manufacturers. By hiding the displays inside, a significant amount of new space is available on the dashboard. One standardized module can be reused across different vehicle lines in different configurations, from one to four displays. This flexibility reduces costs, as well as research and development and integration efforts.

Advanced Interior in Toyota's bZ

TOYOTA IMAGE

Toyota just revealed their bZ electric compact SUV Concept at the recent LA Auto Show—the second Toyota full-EV after the bZ4X crossover, after 25 years of hybrid vehicles such as the Prius—still an important part of Toyota strategy, as they introduced the new Prius and Prius Prime hybrids just before the auto show.

The concept is designed from the ground up as a BEV, using what Toyota calls a 'clean-vital' design approach, saying it "represents a vehicle with zero emissions, utilizing eco-friendly, sustainable materials, that also brings dynamic performance, leading technology, and a stylish appearance".

The interior looks very advanced with a steering yoke, floating center console and curved display screens, which indicates that the concept might still be far from production ready. Seating is made from plant-based and recycled materials to follow Toyota's Beyond Zero (as in *bZ*) theme.

"We've only just begun to scratch the surface of the Beyond Zero moniker," said Toyota Group Vice President and General Manager David Christ, who spoke at the concept's unveiling. "With an aerodynamic design coupled with intuitive tech features never before seen in a Toyota model, the bZ Concept showcases another possible vision of the very near future with our battery-electric vehicles."

As for connectivity, the concept has an in-car personal agent named "Yui," which connects the driver and passengers with the vehicle.

By contrast, the interior of the new Prius is much more developed as a continuity from previous versions.

TOYOTA IMAGE

Mercedes B-Class Interior Upgrade

MERCEDES-BENZ IMAGE

For their latest B-Class, Mercedes has fitted the driver-side of the interior with a dual-screen display consisting of a 7" instrument cluster and a 10.25" head unit as standard. Available as an optional extra, a pair of 10.25" displays can be chosen for a widescreen look.

A redesigned center console and a new steering wheel upholstered in nappa leather feature on the basic model and, for the first time, a heated steering wheel can be selected in the AMG variant.

A wide range of colors and materials can be selected for the car's interior, with even the basic trim level benefitting from seats with a 3D-embossed Artico cover and ergonomically shaped seats for driver and passenger comfort.

The B-Class's Progressive equipment variant features seats in black, black and macchiato, and the automaker's new black and sage gray. The seats for this trim level can also be upgraded to black or brown leather. A newly developed trim with a star pattern delivers highlights within the interior.

By 2030, Mercedes-Benz aims to have at least halved the CO_2 emissions per passenger car in their new vehicle fleet over the entire lifecycle compared with 2020. In line with this, it has used recycled materials in the B-Class. The center section of the comfort seat benefits from fabrics made from 100-per-cent recycled material, while the Artico/Microcut seats use 65-per-cent recycled material for the seat surface and 85 per cent for the materials underneath.

Even the base version of the B-Class benefits from a reversing camera, multimedia displays and a USB package for charging devices. Scheduled to be available in the first quarter of 2023, a fingerprint sensor will enable the identification and authorization of the driver. Connectivity with smartphones is delivered via Apple CarPlay or Android Auto Wireless.

The Design Lounge

Peugeot to Debut Inception Concept at CES

PEUGEOT'S PREVIOUS MAJOR CONCEPT CAR, THE 2019 E-LEGEND

Peugeot will reveal their Inception concept vehicle at CES in Las Vegas on 5 January. The concept "will give a taste of the next generation of models," Peugeot said in a news release. The brand's future models will be headlined by the next-generation 3008 compact SUV, which will be revealed next year.

Peugeot did not offer any images of the Inception. It said the concept would show how Peugeot is "taking advantage of 'BEV-by-design' next-generation electric platforms." Those platforms include STLA Small, STLA Medium and STLA Large, with the first vehicles on the architecture expected to debut in early 2024. Peugeot announced earlier they will sell only fully-electric vehicles in Europe by 2030.

The Inception will be presented in Las Vegas by CEO Linda Jackson and design chief Matthias Hossann, former head of Peugeot's concept cars. It was not displayed at the Paris auto show in October, where Peugeot's offerings were led by the new 408 compact fastback, whose interior we've **previously reported** on.

Peugeot's last major concept vehicle was the E-Legend, a full-electric coupe shown in 2018 that evoked the 504 Coupe from the 1970s.

Even though the Inception will be revealed in the U.S., Peugeot has not said they will re-enter the North American market, which they left in the early 1990s.

Under PSA Group, which merged with Fiat Chrysler in 2021 to form Stellantis, the brand was to return to the U.S. by the mid-2020s to expand PSA's reach beyond Europe. But that plan was superseded by the merger, which brought the U.S.-based Chrysler, Dodge, Jeep, and Ram brands to the combined group.

Next meeting…

DVN INTERIOR THINK TANK NOV 29, 2022 KÖLN - WORKING GROUP - IMAGE DVN

Meetings are an integral part of our work load and, as a widely known, up to 40 per cent of employee time is spent on meetings from which at least four out of ten, are considered excessive. Meetings are surrounded by a lot of negative press and seen as one of the most common problems in all businesses. Harvard Business Review discovered that even just one executive meeting every week can pile up to 300,000 hours a year; which is enough time to watch the entire Netflix about 8 times over!and still have plenty of time to watch, Friends, the Simpsons and the Sopranos. Meetings have always been about the right place, hanging out in a common area, forging a partnership that otherwise never would have come about; they are part of who we are. A group of unknown Neanderthals in today's France engraved on cave walls to eternity their think-tank session towards a specific mission, while in early sixth century and unlike to all up-to-date rectangular meeting tables, the Knights of the Round Table, were the first to use a round table allowing meeting planners to save time and money by…cutting corners!

During the pandemic, partially occupied corporate offices, felt like hotels that did not quite capture the imagination and the magic that were previously trying to sell. Likewise, our surprised, inadequate household that absorbed the virtual part of our business looked overwhelmingly busy while several meeting apps were becoming the fastest growing practice of distant communication. In addition, with the tremendous ability of smartphones to enable remote contact, face-to-face meetings lost their supremacy, while the online ones multiplied in number and frequency.

It is difficult to find a verbal form to precisely address at this stage the status of meetings through technology. However, a curious realization occurred in post pandemic era. In front of a camera, we are relatively static, seated or standing, even if within a vehicle that moves, and any design, or surrounding architecture become obsolete or often replaced by a default app background. To the contrary, for all moments that matter, successful meetings bring up the art of creating memorable experiences that are potentially transformative. This is the 'sense of place'. In addition, the most important advancement in

restoring social intimacy is referring to the emotional aspect of communication such as intonation, facial expression or body language that any remote form of communication can hardly represent.

Often, the most important information is not communicated through words. Meeting face to face allows to interpret micro-behaviors such as facial expressions and gestures that can help gauging how interested other people are in the conversation and giving insight into how they may feel. Like running into someone in the hall or the elevator after a breakout session and having a conversation, or following-up with a speaker to an actual face-to-face right after session; ideas advance, and relationships are created. The most important part of a meeting are people. Meetings are the science of being there. It is about the people; it is about the place.

News Mobility

## TU-Delft: Navigation System Accurate Within 10cm

TU DELFT IMAGE

Researchers at Delft University of Technology, Vrije Universiteit Amsterdam and the Nationaal Metrologisch Instituut (VSL) have developed an alternative positioning system that is supposed to be more robust and accurate than GPS, especially in urban areas. What makes the system special is that it does not require satellites.

The researchers demonstrated a prototype that is said to achieve an accuracy of ten centimeters. They said this new technology is important for a range of location-based applications, including automated vehicles, quantum communications and next-generation cellular systems. The findings were published in Nature.

The goal of the project, called "SuperGPS," was to develop an alternative to GPS and Galileo that uses the cellular network instead of satellites and that could be more robust and accurate than GPS. To achieve this, the researchers connected the cellular network to a very accurate atomic clock. Using cellular communications, perfectly timed messages could thus be sent to determine position, just as GPS satellites do using onboard atomic clocks. These connections are made via the existing fiber-optic network.

In addition, the system uses radio signals with a much wider bandwidth than usual. "Buildings reflect radio signals, which can confuse navigation devices. The large bandwidth of our system helps to sort out these confusing signal reflections and enables higher position accuracy," explains Gerard Janssen of Delft University of Technology. "At the same time, bandwidth in the radio spectrum is scarce and therefore expensive." The researchers get around this by using a series of contiguous low-bandwidth radio signals spread over a large virtual bandwidth. "This has the advantage that only a small part of the virtual bandwidth is actually used and the signals can be very similar to those of cell phones."
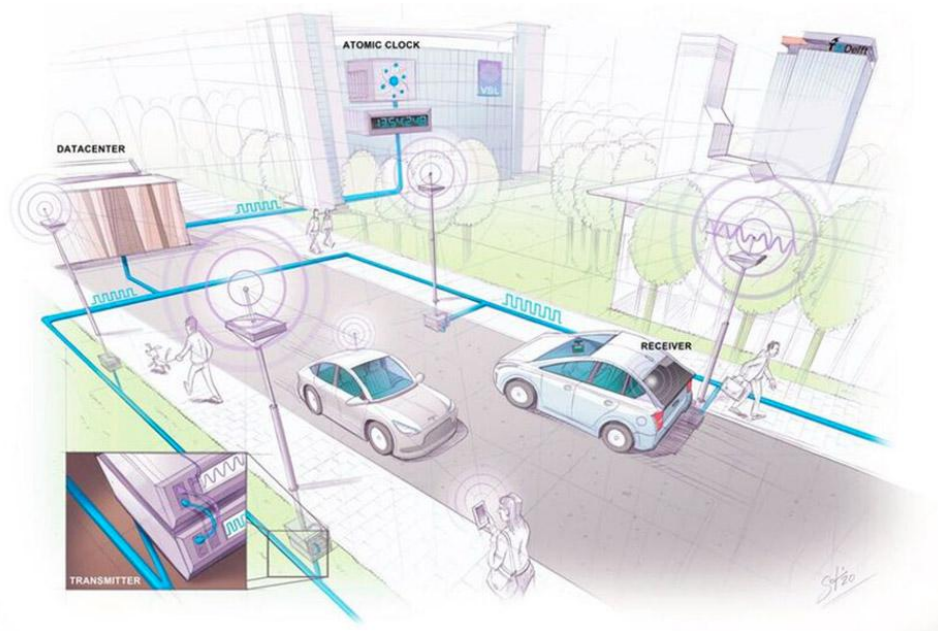
TU-DELFT IMAGE: ESTABLISHMENT OF THE NETWORK FOR DECIMETER-LEVEL LOCALIZATION IN URBAN ENVIRONMENTS

Upstream: A Mobility Cybersecurity Startup

AN UPSTREAM SECURITY CENTER (IMAGE COURTESY UPSTREAM)

Israeli startup Upstream wants to set up several Vehicle Security Operation Centers (VSOC) in the U.S., Germany, and Japan. The company wants to combine virtual and physically existing security centers to improve cybersecurity for automakers and mobility providers.

The need is high, they state, as the number of cyberattacks has increased greatly in the past two years. Upstream sees the rapid rollout of electric cars and charging apps as key reasons for the attacks— increasingly including over-the-air updates.

The first VSOC is located in Michigan, USA, and can respond in real time. The site is expected to be fully operational by the end of the year. Other safety centers so far are in Israel. Upstream says they currently monitor 15 million vehicles worldwide. "Infotainment and user experience applications for connected mobility are one of the fastest growing attack surfaces, accounting for six per cent of total attacks so far in 2022, compared to 2 per cent in 2021," said Yaniv Maimon, director of VSOC at Upstream.

Founded in 2017, the Israeli startup offers a cloud-based automotive cybersecurity and data analytics platform specifically designed for connected cars and smart mobility services.

General News

Liability in Automated Driving: Are We Ready?

MERCEDES-BENZ IMAGE

From the end of the year, the first cars will probably be on the road in Germany in normal highway traffic, where the driver can hand over his or her responsibility completely to a computer in the meantime. But even then, some insurance issues will still be unresolved.

Since this year, the Autonomous Driving Act has provided a regulatory framework for this in Germany; no other country in the world is as far advanced in this respect. Therefore Klaus-Peter Röhler, the CEO of Allianz Germany, demands that "our roads and rules become fit for autonomous driving across Europe." After all, when crossing a border, self-driving cars not only have to recognize signage and markings without error and comply with traffic rules. "It must also be clear who is liable if an accident occurs," Röhler said at the Allianz Auto Day.

That can have tricky consequences if it rumbles. In principle, one thing is clear: If the driver is asleep because his vehicle is driving autonomously, he cannot be held liable in the event of an accident - unless the system has given him sufficient advance warning of the hazardous situation and prompted him to take the wheel.

But the insurer's safety experts expect that even with supercomputers, there will be accidents in the future, especially in mixed traffic with other vehicles. That's because "more and more computer drivers with limited driving experience will soon be hitting our roads," says Röhler. The insurer calls them "autonomous novice drivers." Röhler therefore demands: "In the future, sensor data such as radar, lidar and camera recordings will also be needed to clarify accidents." This is the only way to record and evaluate accidents involving pedestrians, for example. However, data protection laws in many countries do not allow this.

How Global is Car Production?

Where were produced the cars sold in 2021?
OEMs global units sold by production origin

	Africa	China	Europe	India	Japan	Korea	NAFTA	Russia-CIS	SE Asia-Pacific	South America
BMW	1%	27%	48%	0%			23%	0%	1%	0%
Ford	2%	10%	25%	1%			56%	1%	4%	2%
GEELY		73%	24%	0%			1%	1%	0%	
general motors	0%	31%		1%		6%	49%	6%	0%	7%
HONDA		35%	3%	3%	15%		36%		7%	2%
HYUNDAI	0%	8%	11%	12%		43%	15%	6%	2%	3%
ISUZU	12%	4%	0%	0%	18%				65%	0%
mazda	0%	15%			66%		9%	2%	9%	
Mercedes-Benz	0%	25%	54%	0%			18%	1%	0%	0%
MITSUBISHI		9%	0%		36%			2%	49%	2%
NISSAN	1%	29%	10%	1%	16%		36%	2%	3%	2%
Renault	12%	1%	60%	5%		5%		6%	0%	11%
STELLANTIS	0%	1%	55%	0%	0%		31%	0%	0%	12%
SUBARU					65%		34%		1%	
SUZUKI		0%	5%	60%	29%				5%	0%
TATA		6%	39%	55%					0%	
TESLA		47%					53%			0%
TOYOTA	1%	17%	7%	2%	35%		21%	1%	12%	3%
VOLKSWAGEN	1%	38%	46%	1%			8%	2%	0%	5%

A recent study on where automotive final assembly is produced around the world shows most automakers still have a big chunk of their industrial operation in their home region. Toyota, Ford, Hyundai, Honda, Nissan are notably global, as they have production in all regions.

The figures didn't account for recent announcements or SOPs, such as Tesla in Europe and Stellantis in Africa. This study also excludes the majority of the Chinese makers.