MediaCom helps brands unlock growth through media. We do this by applying our unique Systems Thinking approach to data, technology and creativity to design communication strategies that build brands and generate sales.

As part of WPP, the world's largest marketing communications services group, and part of GroupM, WPP’s consolidated media investment management arm, we have access to the richest data sets and most robust benchmarks in the business, enabling us to identify the best avenues for growth and unlock the potential in every brand.

MediaCom is one of the world's leading media communications specialists, with billings of US$13.5 billion (Source: COMvergence, March 2019), employing 8,000 people in 125 offices across 100 countries. Its global client roster includes adidas, Alibaba Group, Dell, Mars, P&G, Bose, AkzoNobel, Richemont, and Shell.

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Autonomous vehicles will revolutionize personal mobility and usher in an era of highly visual, immersive, intelligent and commerce-enabled in-vehicle passenger experiences. To create – and capture – outsized value in the future, media companies and marketers need to take an active role in developing this new experience ecosystem today.

China is poised to become the first and largest market for autonomous vehicles, with widespread adoption predicted over the next decade. The resulting shift from horsepower to brain power, i.e. from engine specs to intelligent experiences, as the key consideration in mobility choices will create vast and largely untapped in-vehicle media opportunities: McKinsey estimates $5.5 billion in new global digital media revenues per year for every additional minute people spend on the mobile internet while in a car.

In our analysis of this space, we explored seven key areas for media innovation: AI assistance, video, audio, gaming, productivity, advertising and commerce. In the following pages, we will take a deep dive into these areas, culminating in an expanded innovation toolkit for brands to capitalize on new media developments. We are privileged to include the authority of Baidu, Audi and Bose, who share their unique perspectives and advances in this space in in-depth interviews that we have published in full.

Enjoy the ride.

Howard Thompson
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Meha Verghese
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During the 2018 CCTV Spring Festival Gala, over one hundred BYD electric vehicles powered by Baidu Apollo autonomous driving software piloted themselves in perfect figures-of-eight along the Hong Kong-Zhuhai-Macau bridge. This spectacle was meant to not only celebrate the strength of Chinese industry, but to herald the impending radical transformation of mobility and society over the next few decades – a global transformation which China is poised to lead.

Multiple technological advances are rapidly reshaping mobility, and the acronym CASE has emerged to characterize the vehicles of the future: Connected, Autonomous, Shared and Electric. Innovations in all these areas are already making travel more efficient and enjoyable. However, the advent of fully autonomous (driverless) vehicles will cause a step change in their combined ability to change our lives for the better.

CASE vehicles and smart city infrastructure will transform public, shared and private transportation into a seamless, optimized mobility ecosystem – a major boon to residents of mega cities like Beijing who spend an average of 1.3 hours on their daily commute. Furthermore, the time we do spend in transit will be put to better use as the head- and hands-free nature of full autonomy will convert vehicles into a ‘third space’ where people can relax, study, work, and even sleep in total comfort.

China will likely be the first country to adopt autonomous vehicles over the next decade, and experts estimate that driverless vehicles will comprise forty percent of all new sales in the world’s largest automotive market by 2040. Eyeing this massive opportunity, a constellation of companies across the automotive, internet, software and hardware industries are already developing competing in-vehicle experience ecosystems and revenue models.

Media companies and marketers need to actively engage in the process at this stage or risk missing out on an outsize share of new digital media revenues that McKinsey estimates could be worth a further $5.5 billion per year globally for every additional minute people spend on the mobile Internet while in a car.
To understand how advances in mobility will transform the in-car experience and create new opportunities for media and brands, let’s peer into the life of Meng Li, a 38-year-old Shanghai resident, in 2035:

A PEEK INTO THE LIFE OF MENG LI

To understand how advances in mobility will transform the in-car experience and create new opportunities for media and brands, let’s peer into the life of Meng Li, a 38-year-old Shanghai resident, in 2035:

On the subway platform, a digital billboard shows Li an ad for her son’s favorite hotpot restaurant with a personalized offer: “Make us a Friday ritual: treat your family to a large hotpot at home with free soft drinks” and she places an order with a nod of her head.

As Li settles into her seat in the subway car, her mobility app recommends a twenty-minute episode of a popular reality show. It’s the perfect guilty pleasure to unwind over on her way home, and the perfect episode length to watch during her subway ride.

The shared robotaxi pulls up just as Li steps off the escalator at the subway station exit. She activates her seat’s ‘productivity’ mode before joining a call with a colleague in the UK. Li uses the built-in screen to securely access her project notes in the cloud and she uses the headrest’s built-in speakers for clearer sound and privacy from the robotaxi’s other passengers.

Li reaches her house just as the family’s autonomous car brings her children home from after-school gymnastics. To ensure the kids are with an approved guardian before unlocking the doors, the car requires Li to scan her face. Once outside, Li’s son and daughter cheer when they see the temperature-controlled autonomous delivery pod arrive with the surprise hotpot order.
Li, her husband Wei, and their son and daughter pile into the family car for the drive to Suzhou to visit Wei’s mother. Li faces forward and watches funny short videos projected onto the windshield screen, while Wei selects ‘sleep’ mode in order to recline his seat, dim the nearby lights and play soft white noise from his headrest speakers as he takes a nap. Their teenage daughter is watching a livestreamed 3D fashion show and swipes to buy a head-to-toe look after much consultation on a call with her best friend. Li and Wei’s son has his seat in ‘study’ mode as he finishes his homework while video conferencing with his tutor.

The family disembarks at grandma’s house and the car drives off to a nearby parking space.

As the car enters the family’s neighborhood, its digital assistant suggests stopping at a nearby grocery store to pick up ingredients for dinner. Based on the current content of Li’s fridge and their past grocery orders, it recommends a food blogger’s unconventional twist on Chairman Mao’s Pork (红烧肉). Intrigued, Wei watches the video and then instructs the car to reroute via the grocery store. The required additional items are already paid for and packed, so they are quickly loaded into the car trunk.

After a delicious home-cooked lunch, it’s time to head home. Reconfiguring their seats to face one another, the Li family picks up where they left off with the movie they started at grandma’s house before starting a raucous KTV session complete with AR lyric projection and disco lighting to match the beat of the pop songs!

Family Li is back home and ready to cook!
WHERE ARE WE GOING? ARE WE THERE YET?

FROM MASS TO MaaS TRANSPORTATION

The first fully autonomous passenger vehicles will most likely be deployed as shared and public transportation in urban environments. Enabled by vast swaths of vehicle and user data, urban transportation will evolve further away from personal vehicle ownership towards a Mobility-as-a-Service (MaaS) model that integrates public transportation (e.g. bus, subway) and shared private transportation (e.g. ride hailing, car sharing, bike sharing) into a single, digital mobility platform that offers passengers a seamless, efficient transit experience.

THE ROAD TO FULL AUTONOMY

While automotive firms are launching increasingly intelligent models, we are still some distance away from truly driverless vehicles, i.e. level 4 and level 5 autonomy as defined by the Society of Automotive Engineers (SAE) International, that will unlock the full potential of CASE vehicles to transform mobility and the in-vehicle experience.

Are we there yet? Understanding the different levels of autonomy

McKinsey foresees China becoming the world’s largest market for autonomous vehicles aided by the continued growth of the MaaS market. In total, autonomous vehicles are forecasted to comprise over forty percent of new vehicle sales and twelve percent of the vehicle installed base in 2040, creating a total of $1.1 trillion revenue from mobility services and $0.9 trillion from autonomous vehicle sales by that year.

The consensus view from many established automotive firms, automotive vehicle technology startups like AutoX and Pony.ai and consulting experts is that SAE level 4 vehicles will see mass adoption in China over the next decade. Furthermore, the Chinese government’s recent Strategy for Innovation and Development of Intelligent Vehicles lays out similar timing: the technology and infrastructure crucial to autonomous driving should be available in some regional, highway and urban areas by 2025 and fully complete sometime during 2030-2050.

FROM HORSEPOWER TO BRAINPOWER

Source: SAE, Qvartz
Baidu is a Chinese internet giant and a leader in self-driving technology. The Baidu Apollo open-source autonomous driving platform includes DuerOS for Apollo, an AI-based in-vehicle experience OS with a broad array of content and service partners. We interviewed autonomous vehicle experts at Baidu to understand how they plan to shape the future of mobility.

**Advances in autonomous vehicles and smart cities are predicted to transform urban mobility into a seamless, efficient transportation experience between train, subway, bus, and taxi/rideshare. How do you think these advances will transform urban mobility in China?**

Once autonomous vehicles comprise a certain proportion of passenger journeys, people will become accustomed to traveling in autonomous vehicles and the development of self-driving technology will speed up, transforming the entire transportation ecosystem.

Today, many people in China have a very small radius of daily life because they cannot drive. In the future, people who can’t drive themselves, including children, the elderly and the disabled, will be able to use autonomous cars to get around. Thanks to self-driving technology, more and more people will expand the radius of their daily lives and experience the convenience and joy of car travel.

Ten years from now, many people may prefer to use shared driverless vehicles instead of purchasing their own car. What’s more, once driverless cars become popular, driving cars may become a luxury sport instead of a travel necessity, similar to the past evolution of horseriding.

**What role will Baidu play in the future public-private mobility ecosystem?**

Baidu’s core technologies including human-computer interaction, intelligent cockpit, autonomous driving technology and automotive ‘brain’ will be leading the industry. We will also play an important role in redefining automotive products and reshaping the entire transportation system.

Baidu is committed to being a leader in AI to realize China’s potential as a transportation superpower. Focusing on “creating a new-generation, open and innovative AI platform for autonomous driving” and “making the complex world simpler through technology” in order to achieve our mission of providing the “AI transportation engine,” Baidu strives to lead the development of high-quality intelligent transportation while making transportation services more modern, precise, and convenient.
How do you see the in-vehicle configuration, in-vehicle passenger activities and therefore in-vehicle media experiences changing with connectivity and full autonomy?

The difference between intelligent connected cars of the future and today’s cars will be as great as the difference between smartphones and feature phones. The scenarios that people can think about now and functions that meet passenger needs will change tremendously. People will sit in a car while watching movies and ordering food through the car itself instead of using mobile phones. Also, people will be able to access work, entertainment and life services via vehicle-mounted information terminals. In the future, people may own or hail a car not only to travel from A to B, but also to have an in-car space to work, entertain and relax while on the move. For example, the car interior will be designed for better in-car sound quality and passengers will be able to easily find their favorite songs as the intelligent cockpit turns the interior into a KTV (karaoke) room.

As we move towards autonomous vehicles, do you think the ‘infotainment stack’ that powers in-car experiences will become a more important differentiator for auto OEMs vs. current considerations like mileage, horsepower, etc.?

Yes. Automobiles are essentially mobile spaces. Beyond addressing mobility needs, the ability to meet the personalized needs of consumers in this mobile space is an important opportunity for brand differentiation.

Moreover, in the autonomous driving era, software will become more and more important in the automotive industry, which requires companies to shift their attention to software. If OEMs and component suppliers are unwilling to invest significant resources into software development, their long-term competitiveness will surely decline.
Experts believe that China could be the first country to deploy autonomous vehicles at scale. While Chinese companies are newer to the autonomous vehicle space and still an estimated two to three years behind their U.S. counterparts, they are quickly catching up and are expected to take a leading position, especially within software and services. This success is largely due to a uniquely Chinese strategy to solve for the computational, infrastructural and regulatory challenges that caused U.S.-headquartered firms such as GM, Waymo (Alphabet), Tesla and Ford to recently temper expectations around their plans to launch fully autonomous vehicles.

The main drivers of China’s progress and expected leadership in autonomous vehicles:

### Smart Cities
- Local governments and internet giants already adopting smart city solutions
- External sensors are more accurate and reduce in-car hardware costs

### Top-Down Government Support
- Government-appointed ‘national team’ of Chinese companies to advance AI development under ‘Made in China 2025’ 10-year plan
- $120 billion investment in intelligent connected car development between 2018 and 2021
- National AV standards since 2018 (vs. patchwork of local laws)

### Rapid Innovation Rate
- Access to large datasets for algorithm training
- On-road testing in complex megacities, e.g. Shanghai, Beijing, Guangzhou
- Fierce competition amongst many players

### Integrated Ecosystem Development
- Internet giants experienced in building and commercializing ecosystem businesses
- Already leading in related areas, e.g. AI, smart cities, cloud computing
- Significant investments and partnerships with multiple other players

### Consumers Interested in Adoption
- Chinese consumers amongst the most open to adopting new technology, e.g. facial recognition, mobile payments
- Used to sharing personal data to access services, e.g. WeChat mini programs
- Much more likely to try autonomous driving (75%) compared to American (52%) or German (44%) counterparts

### High-Coverage, Advanced Network Infrastructure:
- First country with national 5G coverage for faster data transfer and processing
- 4G LTE V2X (vehicle-to-infrastructure) and 5G V2X coverage in select areas by 2025
- Completed intelligent vehicle ecosystem by 2050

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"At CES Asia last year, I looked at one Chinese company’s timeline of recent autonomous driving milestones - it was a decade’s worth of development achieved in the past 18 months"

- John Pelliccio, Head of Product Communications, Bose Automotive Systems
THE RACE IS ON TO BE THE PASSENGER EXPERIENCE OPERATING SYSTEM

“The car will now become the most expensive Tmall Genie” – Alibaba

The in-vehicle media, communications and commerce opportunities enabled by CASE vehicles represent an enormous and largely untapped revenue pool of an estimated further $5.5 billion per year globally for every additional minute that people spend on the mobile Internet while in a car. What’s more, with the advent of autonomous driving, in-vehicle experience will become the critical factor in determining which car to buy, which mode of transport to travel and which mobility operator to choose.

This shift from horsepower to brainpower, i.e. from engine specs to intelligent passenger experiences, as the key consideration in mobility choices will completely upend the existing automotive value chain and reduce barriers to entry. Established automotive companies are well aware of this harsh reality, which was underscored when Sony launched its Vision-S concept car packed with features such as immersive audio, a panoramic screen and always-on connectivity at CES 2020.

Many automotive firms are seeking out software and hardware partnerships to differentiate their in-car experience, and they are even co-branding their vehicles to effectively market them to consumers. The Nissan Micra BOSE Personal Edition, first launched at the Geneva Motor Show in 2017, features a state-of-the-art Bose sound system as well as the Bose logo and custom trim on the inside and outside of the car. More recently, Alibaba and Renault announced the Renault City K-ZE Tmall Genie Edition, which features the Tmall Genie Auto voice assistant inside the car and the Tmall cat logo on the vehicle’s exterior.

In fact, a constellation of companies across the automotive, internet, software and hardware industries are both competing and collaborating to develop new in-vehicle experience ecosystems and revenue models.
**INTERNET GIANTS**

For internet giants like Baidu, Alibaba and Tencent, an in-vehicle operating system turn shared and private vehicles alike into yet more interfaces through which they can reach consumers and grow revenue for its existing businesses, e.g. Tmall, Youku, AliPay and Ele.me in the case of Alibaba. Furthermore, access to an abundance of in-vehicle data could enrich the performance and power of its entire ecosystem.

- **Alibaba** has developed AliOS, an in-car operating system used in some vehicles by partners such as Roewe, MG, Citroen, and Ford, as well as an auto version of its Tmall Genie voice assistant. It recently announced that Tmall Genie Auto will feature in Chinese editions of cars from Volvo, BMW, Honda, Audi and Renault.

- **Tencent** is developing an in-car OS, Tencent Auto Intelligence in partnership with 21 automakers including BMW, Mercedes, Dongfeng and Chang’an, who is the first company to incorporate the voice-controlled version of Tencent’s platform app, WeChat, into its cars.

- **Baidu** has developed DuerOS, a conversational AI system that can be used across smart devices including connected vehicles. As of June 2019, the in-vehicle operating system was available in more than 300 vehicle models across 60 automotive brands including Ford, Great Wall Motors and Chery, and the DuerOS partnership ecosystem comprised over 300 members including leading telecom China Unicom and streaming video service iQIYI.

**AUTOMOTIVE COMPANIES**

Some automotive companies such as Bentley, Audi and XPeng are seeking to develop their own in-car operating systems and partnering with media and service providers to future-proof their brand and potentially earn revenue via in-vehicle data, amenities and advertisements.

- In April 2020, **Audi** launched the A4L model in China with its voice-enabled Audi Connect operating system enabling access to more than 53 in-car connected services as well as an open platform 3rd-party app store.

- Chinese electric vehicle startup, **XPeng**, will equip the G3 2020 SUV with its Xmart OS controlled via its XiaoP voice assistant, pre-loaded with over 100,000 songs and several million audio books, and featuring an app store with in-car gaming, entertainment, smart mobility and lifestyle apps.

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Lifestyle Shifts Impacting Media Consumption And Behaviour
What are they doing post 9pm?

The night consumer is already a staple in the tourism market with sightseeing cruises, lantern events and cultural experiences taking place at night. 2018 saw a 9% increase year-on-year of the number of orders for “Night Tours” on Ctrip and other travel platforms (Source: China

Whether we find ourselves in a winner-takes-all situation, an OS duopoly à la Apple and Android in the smartphone world, or a further proliferation of the Chinese internet’s multiple walled gardens remains to be seen.

Also unanswered at this stage is the crucial question of who owns the data in the in-vehicle experience ecosystem? Intel Corporation estimates that the hundreds of sensors in driverless vehicles alone will generate four terabytes (4000 GB) of data per hour. All players will stake their claims on this potential goldmine, but regulatory frameworks and consumer attitudes about personal data collection and usage in-vehicle are still to be determined.

Given the vast opportunity and current ambiguity, industry players are hedging their bets by forming multiple partnerships and pursuing multiple business models – media companies and marketers would be wise to do the same.

- **Huawei** will launch HiCar, a solution similar to Apple CarPlay that pairs Huawei phones to the car’s infotainment system, with 30 automotive manufacturers including **Audi**, **GAC** and **FAW** in 2020.

- **Xiaomi**, a Chinese leader in smart devices, just announced a partnership with electric vehicle manufacturer NIO to develop a Mi Watch NIO app through which **NIO** owners can remotely check the vehicle’s battery level, open and unlock doors and windows, and turn on the air conditioning system.

Further crowding the experience ecosystem playing field are traditionally hardware-led players who see the potential to turn the connected car into a node of their IoT ecosystems.

**Source:** 36kr, Nio

Xiaomi Mi watch will be a smart remote control for Nio vehicles

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You: Autonomous vehicles and smart cities infrastructure could vastly improve the mobility experience of people living in mega cities like Shanghai and Beijing which have high population density, bad traffic congestion, and limited parking availability. Therefore, I believe we will definitely see more and more consumers opting for shared mobility services. However, the speed and scale of adoption will likely vary from city to city as well as between urban and rural areas due to differing levels of infrastructure development and other challenges. People’s individual preferences will also impact adoption – even though there are many ridesharing services available today, there are still a lot of people who prefer to own a car and drive themselves.

That being said, Audi is one of the leading automotive companies trialing new business models in response to this trend. Together with our joint venture in China, we have started an Audi car sharing program called Audi on Demand in Beijing, Shanghai and Sanya. From our experience thus far, we see that customers appreciate this business model and we will continue to explore new mobility offerings.

Q: How do you think consumers will view shared mobility services vs. personal car ownership in the autonomous age? What could these changes mean for Audi’s future sources of revenue and business models?

You: Autonomous vehicles and smart cities infrastructure could vastly improve the mobility experience of people living in mega cities like Shanghai and Beijing which have high population density, bad traffic congestion, and limited parking availability. Therefore, I believe we will definitely see more and more consumers opting for shared mobility services. However, the speed and scale of adoption will likely vary from city to city as well as between urban and rural areas due to differing levels of infrastructure development and other challenges. People’s individual preferences will also impact adoption – even though there are many ridesharing services available today, there are still a lot of people who prefer to own a car and drive themselves.

How will greater connectivity change the in-car experience for consumers?

You: Connected services will make mobility more efficient and enjoyable. For example, the new generation of Audi Connect in the A4L reminds drivers when the car needs to be refueled and guides them to the nearest gas station. What’s more, drivers don’t need to get out of the car; they can even make payment through Audi Connect before driving away. We also have built-in and third-party online radio and music streaming apps for a seamless listening experience. Our digital assistant not only enables voice commands to play music, provide GPS instructions, etc., but can also make recommendations. For example, if it’s near lunchtime, the display screen could pop up a reminder and suggest some interesting restaurants nearby. With the click of a button or a voice command, the car can guide the driver to lunch.
What do you see as the opportunity for the connected car in the autonomous era?

You: Our parent company, Volkswagen Group, conducted a consumer research study which showed that connectivity is an increasingly important consideration to car buyers and, therefore, a key differentiator between car brands, especially in the premium space. What’s more, the number and type of connected services and apps integrated into a car’s platform influence consumers’ perception of premium brand image.

At Audi China, we see that connectivity is highly valued by Chinese consumers and many of the newer local brands are launching models with innovative connectivity services. Audi, too, is a leader in providing connectivity services to meet consumers’ needs - by 2020, we will provide more than 53 in-car connected services through our Audi Connect operating system including connection to Tmall Genie products to enable the remote control of smart home appliances from the car. The new generation of Audi Connect, launched with our new A4L model on April 10th, 2020, features a voice-enabled digital assistant through which consumers can access pre-installed apps or download third-party apps from our in-car app store. Audi will be the first to launch an in-car app store based on the open Android platform so that any interested developer can apply to list their app for use in our cars. We want to provide our consumers with more and more opportunities for entertainment, navigation, parking, fueling, etc.

Do you foresee opportunities for marketers to reach consumers with targeted communications via Audi Connect? Could data-enabled advertising be a new business for Audi?

You: Yes, we are currently exploring opportunities to generate revenue from our digital services. For example, if a driver goes to a shopping mall like the Yin Tai Center in Beijing and enables our pre-installed parking services, luxury brands with a store presence at the mall could recognize that this is a potential customer and send targeted information about their latest collection or promotions to be displayed on the Audi Connect digital display. The ability to communicate with premium car owners/riders in their cars and based on their real-time location could be an interesting new opportunity for marketers and agencies.

How do you see the in-vehicle configuration evolving to suit new in-vehicle passenger activities?

You: Karaoke is very popular in China and we realized that many families would enjoy the opportunity to sing together while driving around. Therefore, we are exploring software and hardware solutions to create an enjoyable in-car karaoke experience. At Audi, we are always working on innovative ways to improve the consumer experience in the car.
The vehicle as a 'third space' will transform media consumption

At first, our earlier peek into the Yang family’s weekend might seem like a scene from a science-fiction movie. In fact, barring fully autonomous cars and buses, all the technology involved – voice assistants and smart home devices, real-time navigation, content recommendation, augmented reality and facial recognition – already exists!

The head- and hands-free nature of self-driving vehicles will finally realize the full potential of 5G connectivity, big data, artificial intelligence, augmented and virtual reality to create highly visual, immersive, intelligent and commerce-enabled in-vehicle passenger experience across different modes of personal transportation.

In this section, we explore what’s in store for different media sectors and the implications for media companies.
Improved artificial intelligence algorithms, access to more data including eye movements and health tracking, and greater connectivity to other smart devices in the Internet of Things will hasten the ‘pivot to passive’ as algorithms are in increasing in-control of decision-making. In the near future, it’s likely that your smart fridge will inform your vehicle’s digital assistant that you are out of eggs, and the vehicle will either place an order for home delivery or reroute your journey for collection from a nearby store without any human intervention. Understanding and optimizing against these algorithms early on will be crucial for media and marketers seeking to ensure their content, service or product is the number one ‘choice.’

With the advent of autonomous vehicles and 5G connectivity, listening-only formats such as radio, streaming music and podcast media will no longer be the media of choice for drivers and many passengers. To stay relevant, audio content platforms should create multi-sensory experiences by incorporating visual imagery like music videos, leveraging AR technology for karaoke, and dynamically adjusting the lighting and background sound to create a better in-vehicle listening experience. Additionally, they must take advantage of the same data and device opportunities as video providers to ensure a personalized and seamless consumption experience.

In a driverless vehicle, every interior surface has potential to become a screen. Furthermore, 5G connectivity will enable technologies such as augmented and virtual reality, 3D and 4D viewing and shoppable video to transform the on-the-go media consumption experience whether in public or private transportation. Content creators and providers must customize their offerings to new, more immersive formats while using big data to tailor content topic, tone and duration to increasingly specific scenarios, e.g. a 45-minute journey home from university in the rain on a Monday by an 18 year-old anime fan. Additionally, content providers need to ensure seamless viewing across vehicles and devices (whether public or shared) and explore new business models and partnerships to reach consumers on the move, e.g. pay-as-you go or advertiser-subsidized content available via mobility platform apps.
Autonomy and connectivity could turn transportation to and from work or school into an extension of those environments, ideally making the workday or school day shorter. In addition to developing technology for in-vehicle video conferencing and cloud-based collaboration, media and mobility companies could collaborate to create mobile co-working spaces with the in-cabin experience optimized for productivity. Educational content providers should seek partnerships with local governments, schools and corporations to create customized, snackable content that furthers children’s education and adults’ professional development while they are on the go.

Online gaming, already a favorite on-the-go pastime in China, will be transformed by greater connectivity and immersive visual technologies such as AR and VR. Game creators can use the passenger’s route, current environment (e.g. subway, robotaxi) and surrounding landscape to blend fantasy and reality within the gaming experience. Soon, any vehicle surface could be used as the console as gamers play against each other in dedicated gaming robotaxis or, likely to the relief of fellow passengers on public transport, activate a cabin configuration that limits the disturbance to others.

Media companies can shorten the consumer purchase journey and create a closed-loop from awareness to purchase by partnering with O2O retailers. In-car purchases will be prompted and placed via AI assistant, shoppable video, social media and out of home with faster fulfillment directly to the moving vehicle by autonomous drone / pod or by automatically rerouting to a multitude of fulfillment hubs that will likely emerge across the cityscape.
More data, more touchpoints and more formats will enable an unprecedented level of micro-targeted marketing communications:

**OOH:** Out of home displays will transform from static mass media into a programmatic channel for targeted recommendations and offers. Vehicle sensors, eye tracking, facial recognition and AR technologies could work together to deliver personalized messages to consumers looking out of the window, while subway and bus shelter screens could dynamically display ads based on the aggregate ‘audience’ attributes of nearby commuters.

**Display:** Whether via individually operated DSPs by each experience OS owner or via an aggregated ad-serving platform, in-vehicle display represents an exciting opportunity for highly-targeted and contextually-relevant reach media that can help brands build awareness and stay top of mind. Automotive companies like Bentley and Audi are already exploring the monetization potential of in-vehicle programmatic advertising.

**Content:** Brands can take advantage of media advancements by not only partnering with media companies to deeply embed their brand and products into the immersive in-vehicle viewing and gaming experiences, but also developing their own highly engaging, personalized content. Flexible cabin configurations and AR, VR and improved audio technologies will expand the possibilities for brand storytelling as well as for ensuring the optimal consumption experience, e.g. drinking baijiu – no longer taboo while in a vehicle – could trigger regional folk music and landscape scenery as well as a comfortably reclined seat and appropriate temperature control.

**Location-Based Recommendation:** Highly accurate location data combined with consumer preferences and AR technology could make journeys around town vastly more informative and enjoyable. Your vehicle, wearable device or phone mobility app could inform you of a sale at a nearby favorite store, suggest purchasing tickets to an upcoming play as you drive by the theater, and pull up the menu and reviews for a new restaurant in the neighborhood before enabling you to place a reservation.
Bose Corporation is globally renowned for its cutting edge audio technology across wearable, in-home and in-vehicle sound systems. At CES 2020, Bose presented “Sound with Vision” to demonstrate how its future products and technologies could enhance the in-vehicle experience. We interviewed John Pelliccio to learn more about how Bose is developing products to enhance passenger experience in the future of mobility.

**How is Bose innovating to capitalize on the changes in mobility today?**

John: We’ve found opportunities to use sound to ease the transition between human driving and low-level autonomous driving. Our proprietary technology, Bose Aware Signal Steering, together with our UltraNearField speakers, which are mounted right in the vehicle headrest, can render sounds from different directions to help drivers make better sense of signals while driving. We can make the blind spot detector warning come from the direction the driver needs to look in to react to the threat and we can render GPS navigation prompts from different places, left or right, near or far depending on direction and urgency.

Although we initially developed this system for human driving, we’ve gotten a lot of calls from OEMs interested in using this technology for autonomous driving. For example, they want to be able to effectively warn drivers whose cars are in semi-autonomous mode on the highway that there is an exit coming up in a mile and the driver will have to reengage to get the car off the exit ramp. There is a lot of mistrust from end users as they get used to autonomous driving systems – a lot of people are reluctant to give that level of control to the car. So, some OEMs also want to use Aware Signal Steering technology to dynamically apply audio tags to obstacles and render directional sounds to reassure people that the car is aware of its environment, e.g. a bicycle on its right or a stopped car in front of it.

**How do you see the in-vehicle experience evolving with greater autonomy? And how is Bose adapting to these changes?**

John: When we reach level 4 and level 5 autonomy, we will no longer need to have a driver’s seat. In fact, we’ll see new seating configurations like Volvo’s concept of seats that turn into beds or Mercedes’ concept of seats that spin around to face each other. These seating configurations pose challenges for us because riders’ position relative to the speakers in the car can change overtime, unlike today where there is limited adjustability and we can put speakers in the standardized locations that we have learned provide the best audio experience. We are investing heavily in our in-headrest UltraNearField speakers and algorithms since the location of the driver’s ears relative to the headrest of the seat should remain constant even as seating configurations change, giving us more control over the acoustic environment.
The audio system will no longer be just for listening to music as the car becomes a place for productivity. At CES this year, we demonstrated the ability to listen to a teleconference in which each of the far end participants were virtually rendered in a different location relative to the driver. You could hear people speaking from your left or from in front of you as if you were all seated around a conference table, so if two people are speaking at the same time, it’s easier for your brain to separate and process those sounds. We can make virtual meetings sound more realistic to enhance productivity.

**Is Bose exploring in-vehicle innovations beyond the audio system?**

John: Bose Automotive is one division of a company that makes headphones, home speakers, portable Bluetooth speakers and is expanding into health with smart wearables. So, we are looking at opportunities to create a seamless Bose listening experience and to bring other corporate competencies into the vehicle.

For example, in the area of health: we’re researching, investing and developing products to help people hear better and sleep better. Both of these research areas have potential extensions into automotive as a lot of car companies are looking at ways to improve people’s health, e.g. seats that track biometrics and stimuli to keep drivers awake or passengers asleep.

We have an exciting opportunity to knit seemingly different aspects of the company together to provide some really neat in-vehicle experiences for people.

**Do you see the opportunity for Bose, not just in private cars, but also say in robotaxis, robobuses and even subways?**

John: Absolutely. If you’re in more situations where you don’t know the other people in the car with you, e.g. a shared ride in a robotaxi, you’ll increasingly desire what we call ‘seat-centric experiences’ or the ability to hear different sounds in different seats at the same time. At CES 2020, we had a concept for how phone calls could be audible in one seat of a vehicle but inaudible in the rest of them. We also demonstrated that you could have an immersive audio experience but at a different volume in the front row vs. the back row, so the driver could enjoy listening to music while backseat passengers watched shows on their tablets or phones. As ridesharing becomes more prevalent, individualized experiences will become more important.

**Do you see major differences in how mobility and the in-car experience may evolve in China vs. the rest of the world?**

John: I think the biggest difference is ‘China Speed’ – it’s really impressive what some of the domestic companies have been able to do in a very short time. When I was at CES Asia last year, one company had a timeline of recent autonomous driving milestones, e.g. first patent, first partnership with a major chip supplier, and it was a decade’s worth of development achieved in the past 18 months. In the automotive industry, China has been able to leapfrog and catch up to the stage that took the U.S. a century to accomplish. Looking ahead, the willingness of Chinese companies to try cool new things and put them into the market quickly will be a huge advantage.
MEDIA IN THE FUTURE OF MOBILITY
AN EXPANDED INNOVATION TOOLKIT FOR BRANDS

In the future in-vehicle experience ecosystem, the boundaries between media, service, content, commerce and advertising will likely dissolve to create seamless experiences enabled by data and technology. Brands will have an abundance of new opportunities to communicate at scale and one-on-one with potential and current consumers. However, when selecting from this innovation toolkit, marketers should carefully consider which of these potential activations will enhance the in-vehicle media experience and thereby build their brands, and which might feel invasive and annoying to passengers.

In 2018, BMW announced its decision not to serve ads on its cars’ digital display as the luxury automotive company felt in-car display advertising was not in keeping with the BMW brand image. Looking ahead, if bombarding passengers with in-vehicle advertising becomes the norm, we may see more in-vehicle operating systems following suit, or, more likely, creating ‘VIP’ models, similar to those offered by China’s streaming video platforms, which enable consumers to hire an ad-free robotaxi or purchase an ad-free car at a premium. To avoid potential pitfalls, brands’ primary goal should be to create truly valuable consumer experiences vs. to achieve efficiency metrics.
As consumers increasingly delegate routine decisions to AI, FMCG brands must take a three-pronged approach:

1- Find ways to understand and optimize for algorithms today to ensure your brand is the #1 in the category;

2- Stay top of mind by leveraging data signals and triggers, e.g. the evening commute is the perfect occasion for an FMCG brand to serve inspirational recipe content using its sauces;

3- Find new ways to drive trial in-vehicle, e.g. as part of a content co-op with a video game, limited edition candy bars could be ordered to the moving vehicle to unlock special powers or the next level in the game.

Premium cars’ in-vehicle displays will become an on-target advertising network for luxury brands, similar to placing ads in a high-fashion magazine, but with far greater targeting and dynamic messaging capabilities. Additionally, luxury brands should seek out immersive brand storytelling opportunities, e.g. co-branding car interiors, creating VR documentaries, offering virtual personal styling services, and livestreaming fashion shows with white-glove delivery service to car to communicate the luxury brand’s values and heritage.
Real-time location-based targeting through vehicles and mobility apps could become an extension of retailers’ CRM communications with custom recommendations and offers. Other in-vehicle technologies offer the opportunity for shoppable video, livestreamed fashion shows, greater use of influencer and social WoM content to trigger interest, and virtual try-on before rapid, curbside fulfillment.

The autonomous, connected car represents the ultimate ‘showrooming’ opportunity for technology brands. We have already seen examples of brands who are not (yet) fighting to own the experience operating system integrating their products into cars for a seamless user experience, e.g. Apple CarPlay. Pre-installed technology in private vehicles, robotaxis and even public transportation represent a major opportunity to drive discovery, trial and conversion.

Brands in this sector have a huge opportunity to use inspirational content, e.g. a branded travel documentary about an upcoming destination served to a passenger en route to the airport or influencer-curated travel guides available in robotaxis at popular tourist destinations, together with location data to drive conversion, e.g. LBS-based restaurant and hotel recommendation and reservation.
As China speeds towards the rollout of fully autonomous cars, the race is on to develop in-vehicle experience ecosystems and new revenue models that embrace the transformative power of CASE vehicles, abundant data and new technologies. The opportunities for media companies and marketers hold huge revenue potential, but success requires comfort with navigating ambiguity, and discipline to focus on developing truly valuable branded consumer experiences.

Starting today, media and marketers should further research the opportunities and challenges that the future of mobility poses to their category as well as to their specific company’s organization, product portfolio and marketing strategy. Next, they need to define a clear and selective passenger experience strategy. Brands and media companies must then move forward with pursuing non-traditional partnerships with multiple players, testing different activation and revenue opportunities as the landscape continues to take shape.

The in-vehicle media opportunities in autonomous vehicles are vast and exciting, and they are taking shape now. Media companies and marketers alike need to actively engage in the process at this stage or risk being left on the starting line.

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