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Introduction
Introduction **Infotainment systems today**

The choice of car has long been defined by design, performance and technical specifications, but since customers now expect to access and interact with their digital lives from anywhere, this is changing. There is an increasing focus on in-car entertainment and connectivity among almost all car manufacturers.

The car industry has a long tradition of producing techy and feature-rich interfaces, with strong focus on creating cool animations and include as many features as possible. What is communicated towards customers nowadays is rather soft values, like how the gesture-controlled, connected infotainment system will increase your in-car safety or how easy it is to pair up the system with your mobile devices.

Car makers understand the value of modern infotainment systems and that they can be the tipping point for customers when selecting which car to buy. The process of integrating modern screens and UIs to the in-car environment is slow, but is happening.

**COMMON KEYWORDS IN INFOTAINMENT MARKETING:**
- Comfort
- Eco-friendly
- Safety
- Apps
- Concierge
- Cloud
- Simple
- Intuitive
- Media
- Voice
- Gestures
- Connected
- Convenience
- Entertainment
- Control
- Networked mobility
Introduction Chasing the smartphone evolution

Most in-car entertainment systems have long been struggling with slow, non-responsive screens, complicated UIs and limited functionality. Since users are used to smooth mobile interfaces with Internet access at all time, they also expect this from in-car systems. With these systems not living up to user requirements and expectations, mobile devices have many times been the better choice.

Embedded systems can be tailored to fit the rather unique context that a driver is in, and that they can make use of information gathered from the car’s sensors and systems. This allows for safer interaction and driving, which is a strong sales argument for customers when comparing with portable systems.

The design of infotainment systems has looked almost the same for a very long time. Top-down menu structures, high focus on features and technical specifications and low focus on usability and user experience. Car makers are now realising the importance of the two latter, and that they can be the differentiator between good and bad systems. The car industry is ready for a change similar to how Apple changed the mobile industry when introducing their iPhone.
The typical target user who would add an extra ~€ 3,000 for an embedded state-of-the-art infotainment system when purchasing a car is a high-income, middle-aged business man. He is commonly a tech evangelists in a sub-urban family who likes the feeling of luxury and to have ‘the latest’.

Is this the only group with buying power? By adding characteristics like simplicity and usability to the design equation, infotainment systems might be able to reach an even broader audience. Also, since more screens are added to the infotainment environment for passenger entertainment, the needs of these users will also have to be taken into consideration.
Introduction Solve REAL pain points

For the first time in 26 years, car owners report more problems related to infotainment systems than in any other vehicle area, and it exists a high level of dissatisfaction with the latest in-car technology being complicated and not meeting expectations.* The market is longing for a well-designed infotainment UX.

Drivers are in quite an extraordinary context while behind the wheel. Hundreds of factors demand their attention when they should be focusing on the road and traffic. All of them should be taken into consideration when designing the UX. Today, many systems are developed as separate products without proper integration with the overall in-car user experience.

“It's not the technology that's the issue, it's the execution.”

* J.D. Power - U.S. Initial Quality Study (2012)
Trends
What has long been seen as futuristic sci-fi technology is now becoming standard in the car industry. Many car brands already offer projections of information relevant to the driving within the driver's eyesight, limiting the need to take the eyes off the road.

**Crucial information where it belongs**
Information related to driving can be shown in its right context and with the aid of augmented reality it can also be placed on objects related to it.

Navigation or lane assistance are indicated with graphics on the road, visual warnings are shown on cars that are too close, selected points-of-interests are shown in the landscape as they are passed etc.

**Who is doing it?**
Almost all big car manufacturers have ongoing projects where they place information in its right context, whether it is in the heads-up display, in the cluster display, in the centre console or in the rearview mirror.

Pioneer has taken it a step further with their CyberNavi, released on the Japanese market in July 2012. The system comes with special glasses mounted in the roof in front of the driver, projecting information above the traffic. CyberNavi contains many interesting features but has a very busy, game-like interface that is very intrusive and disturbing to the driver.
The introduction of gestures completely changed the mobile market. Now the same thing is happening in the car industry. With bigger and more responsive built-in screens, drivers can interact with their systems as they are used to from their mobile devices.

**Full touch with haptic feedback**
New systems have high-quality, capacitive screens with a responsiveness comparable to any modern tablet. Haptic feedback is also used to provide tactile information about button-presses.

**Proximity sensors**
Some systems can reveal certain command/menu buttons when the driver moves her hand a few inches of the display. Once the hand is moved away, the buttons become hidden again. This is one way to gain real estate on smaller screens. The menu can be visible only when the driver’s hand is close, otherwise the screen gives a full view of the navigation map.

**Gestures and hand signals**
BMW, Harman, Microsoft and Mercedes-Benz are experimenting with technologies to recognise facial and hand gestures, such as nods, winks and hand-waving. This would allow the driver to activate the stereo with a wink, or adjust the volume by tilting their head left or right. The technology is at least two to three years away from implementation.
Trends Environmental awareness

Cars are becoming more and more aware of their surrounding environment. Modern cars are full of sensors that register what goes on around the car. By combining information from all these sensors, the car can detect, and aid the driver to avoid, many dangers on the road.

**Cameras and sensors**
Lane change detection, blind spot warning, brake assistance when too close to the car in front, pedestrian detection, parking assistance, blind spot alert... the list of features that use cameras and sensors is endless. The amount of safety features that rely on contextual information from the environment is growing by the day.

**Location**
Cars with a built-in navigation system knows exactly where they are at all time. They know how far it is to the closest gas station and they can warn the driver when approaching a speed camera. It can also send the position to emergency services for a quicker assistance if an accident should occur or help finding back to where it's been parked.

**Interpret natural body language**
Many automakers offer systems that can observe the driver's behaviour. They can sense values like the driver's heart beat, drowsiness level or if the eyes are open. If any dangerous values are registered it can send an audible and visual alert to the driver or stop the car automatically.
Trends *Flexible systems*

Another big trend entering the car industry from the mobile market is apps. People have become so used to having their favourite services with them at all time, and of course they want to access them while driving. Most car makers are trying to make their own app solutions.

**To embed or not to embed?**
Where some car makers aim to integrate third-party apps into their systems, others focus on making the integration with already existing apps on mobile devices as smooth as possible. There is an ongoing debate on whether apps should be embedded or not, with high focus on safety matters. Many stakeholders wish for an industry standard but by the looks of all individual solutions brought forth by car makers, this does not seem to be happening within any near future.

**Future-proof systems**
The quality of infotainment systems has long been haunted by the long product cycles in the car industry (that is why most of them look really bad and are slow to operate). To make sure that the system will feel modern once released to the market, the systems need to be expandable and also update automatically when they have an active Internet connection.
Trends **New map landscapes**

Car makers partner with technology companies to increase their system performances so that more advanced graphics on the infotainment screens can be shown. New map landscapes can now be introduced to the in-car environment and used as alternative means of navigation.

**Rich 3D maps**
When navigating in cities, realistic 3D maps with high detail and precision in the building models are increasing in popularity. Some car makers, such as Audi and Tesla, even have Google Earth integrated to their navigation systems powered by NVIDIA Tegra graphic chips.

**Digital and social landscapes**
With social media services, new digital landscapes appear. By collecting data from various networks, the system can map out current social events or photos to location data. This information can be presented as alternative navigable landscapes.

For example, as the driver is cruising along the city, the map can be replaced by a stream of photos uploaded to Flickr that updates depending on the car’s location.

Although not many services like this are available in systems available on the market today, most manufacturers have them under development.
Trends **New types of entertainment**

A new array of entertainment becomes available alongside infotainment upgrades such as built-in Internet connection, location and improved screens. Some of these entertainments should of course not be accessible by the driver while driving.

**Apps**
With an app-based system, almost any service can be made available. The user could order tickets, make restaurant reservations, call someone through Skype or stream online audio or video.

**Location-based entertainment**
The car’s location can be used in many entertainments. The map can for example include information from Wikipedia and run an audible Wikipedia-quiz on places that are passed, or the driver could be fed with location-based deals.

**3D holograms for back-seat passengers**
Researchers at the Royal Melbourne Institute of Technology are working on a system that projects 3D images into the back seat to entertain passengers, who control the action with gestures similar to the ones used in Microsoft’s Kinect.

The system can teach kids about their surroundings as they drive along. It can also become a mobile tour guide or provide a virtual office-like environment. The researchers believe that holograms could appear in passenger cars within four years.
Trends **Voice control**

Most systems on the market can be controlled by voice, although not many of them succeed very well. Most of the times the driver can only control parts of the system, and with a high error rate. It will be interesting to see if, and how, new actors like Apple and Google can change the market.

**Voice recognition and control**

Controlling the system by using voice commands, or have information read to you by text-to-speech, is by far the safest way to interact with in-car systems, since it does not require the user to remove her eyes from the road. Unfortunately, many systems does not succeed in their execution. With high error rates, drivers do not feel confident enough to rely on voice control and will still look at the screen. It is probable that these services will improve in the future.

**Apple Siri**

Apple have announced that their voice recognition platform Siri will be integrated with several in-car systems in the following 12 months. BMW, GM, Mercedes, Land Rover, Jaguar, Audi, Toyota, Chrysler and Honda are all said to be on board.
One of the most important aspects for car buyers is the fuel or energy consumption. Since consumables are getting more and more expensive, drivers show big interest for fuel-efficiency and how features in the car can assist them to drive more eco-friendly.

**Real-time data and advice**
It has long been possible to see the current fuel consumption when driving. What can be seen in new models is that the system feed the driver with live data from many different aspects, and then give suggestions on how to drive more eco-efficient.

**Statistics, compare and compete**
Some car makers offer statistics tools to their drivers, where they can analyse how they did or compare it with other drivers on certain routes. New features within this area will probably be launched during the following years since it exist such a big interest among car owners.
**Trends Simple and intuitive?**

One of the most prominent sales arguments used by navigation and infotainment system manufacturers is that the systems are very easy to use, with intuitive interfaces, no hassle when pairing devices, easy access to favourite services etc. Unfortunately, few succeed. With some exceptions, the overall feeling of existing systems is that they feel old and slow (even if they technically support Facebook wall posts).

**The REAL challenge**
Drivers are used to fast and responsive screens from the mobile industry, and expect all interactive screens to be as good. The big challenge for the car industry is to meet these expectations. Many car makers produce great concepts of how they see their future infotainment systems, but the integration pace is slow. The intention is there but it takes time to transform it into real products.

**User-centred design**
The car industry has always been driven by technical specifications and performance values. For many of today’s infotainment systems, it looks like they have been developed in the same way. When looking at the mobile industry, Apple made people aware of the importance of user-friendly interfaces and has changed the way mobile makers design their UIs completely. The car industry needs someone to come in with a completely new and different approach to how in-car UIs are made, and offer a system that makes the user fall in love with it.
Trends The autonomous car

With all information gathered from different sensors and systems, modern cars can take decisions and execute subsequent actions without any prior consulting with the driver.

Self and remote diagnosis and service
If an error occurs, the car can upload any error data to an online database and receive instructions on how to solve it. If it cannot be solved, the driver can get in touch with a mechanic who will have full knowledge about the error, and if possible the mechanic can repair it by taking control of the car’s digital system. If an accident would take place, emergency personnel can receive information on the severity of the accident before getting to the site.

Driver assistance
The car can assist the driver to take correct decisions in stressful situations. One example is to activate haptic resistance on pedals and steering wheel if the car is about to collide. It does not take away control from the driver, but it will be harder to steer one way than the other. The car can also reduce the speed if it is getting too close to the car in front and brake automatically if it senses that a collision is imminent.

Parental surveillance
Many car makers are now introducing parental surveillance features to their cars, which allows parents to keep track of their teens by using the built-in location features. Parents can set up curfews, geo-fences and speed limits, and if the teen breaks any limits, the car will not stop but keep track of them and report to the parents.
**Trends Screens everywhere**

Screens are becoming more and more integrated to all environments in our daily lives, and the same is happening in our cars. With new innovations on materials we will see flexible and ultra-thin screens that can be placed almost anywhere. It brings in a new dimension to the digital in-car user experience. Real implementations of such features are a few years away. It is doable today, but not at a large scale to an affordable price.

**Holistic digital environment**

Devices and screens will be able to speak with each other and share information seamlessly. The car itself is moving from being merely a means of transportation (with some emotional connections to the car owner of course) towards becoming a completely integrated part of our digital lives. Since we will spend more time in our car we also expect it to give us access to all content and services without interfering with the car safety.

**Transparent screens**

At CES 2012 in Las Vegas, Samsung showed off their new transparent 46" touch screen. By integrating such screens to the car environment, the in-car user experience can look very different than how it looks today, with new implementations for passenger entertainment or new ways to present information on the wind shield.

- Formed, thin, durable glass, Corning (Concept 2012)
- Transparent screen, Samsung (CES 2012)
- Interactive passenger windows, Corning (Concept 2012)
- A day made of glass (Corning 2012)
- Samsung transparent screen (CES 2012)
Cases
The new system from Tesla is the cutting edge of infotainment systems. With a 17” capacitive screen and no physical buttons, they have taken a big step towards a complete integration of digital interface and hardware design. The system feels modern and will probably be followed by similar solutions from other car makers.

The system also comes with an iPhone app that can control the climate (even when the car is parked), locate the car or open the charge door.
Clarion has recently released a set of apps for the Japanese market, called Cardgets. The user can order an app from a PC or mobile phone and it will download straight to their system (internet connection required). All apps in this first set are available for free, but when more apps are added there is a possibility that Clarion might charge for some of them.

Available cardgets as of today
1. Drive fee split app. Split driving costs (fuel, road tolls etc) between passengers.
2. Parking app. Search for parking spots and see if they are vacant/occupied.
3. Information and souvenir app. Search for special Japanese souvenir shops and sightseeing information around current location.
4. Bijin-tokei app. 1440 photos, one per minute, of girls showing the time.
5. Taxi skin app. Choose between several taxi companies from different cities.
6. Toilet search app with more than 30,000 toilets.
7. Traffic sharing app. Gathers information from other drivers and lets the driver share her current situation to others.
8. Eco gas station search app with parameters such as price/nearest/recommended first. Connected with the bigger “Eco Service” from Clarion.
There is nothing more frustrating for a user than to feel lost in an interface. Most infotainment systems in the car industry use the same interaction model; information organised in hierarchical top-down menu structures. The problem with this model is that the user is not focused on the system at all time and can easily forget where in the system she is.

Volvo has taken a new approach in their Concept You. They have organised everything on one big flat surface of screens. The user navigates by swiping left or right. The user can enter different sub-sections or open apps, but will never leave the background surface.

This model is easily apprehended by even the most novice users, demands less from the user’s spatial memory and improves the in-car safety.
The BMW Vision ConnectedDrive concept study extrapolates the principle of intelligent networking of driver, vehicle and the outside world into the future. In this concept, the vehicle is seen as a natural and fully integrated part of the networked world.

The vision focuses on three areas.
- Convenience. The vehicle is your own personal concierge.
- Infotainment. The world of infotainment in the vehicle.
- Safety. Looking ahead, staying safe.

In the concept, BMW highlight some interesting features, such as an interactive dashboard controlled by gestures, communication between cars to prevent accidents and the car being aware of its physical and digital surrounding environments.

Concept presentation
Promotion video: 10 steps. How to steal jewellery.

The car is aware of both physical and digital surrounding environments.
Thank You!

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