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The Future Vehicle Computer System in a Five Screen World

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Five Screen and Five Platform World

The Platforms Differ By Location, Content Creation Capability, Product Lifetime, Screen Size, and Apps

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HDTV

Apple TV, Google TV, Roku, Xbox, Nintendo, Wii keyboard, clicker

Computer

Windows, Macintosh, Linux keyboard, mouse,

Vehicle

Android, IOS, Blackberry Connectivity keyboard, mouse with Safety

Cellphone

Android, IOS keypad, touch

Tablet

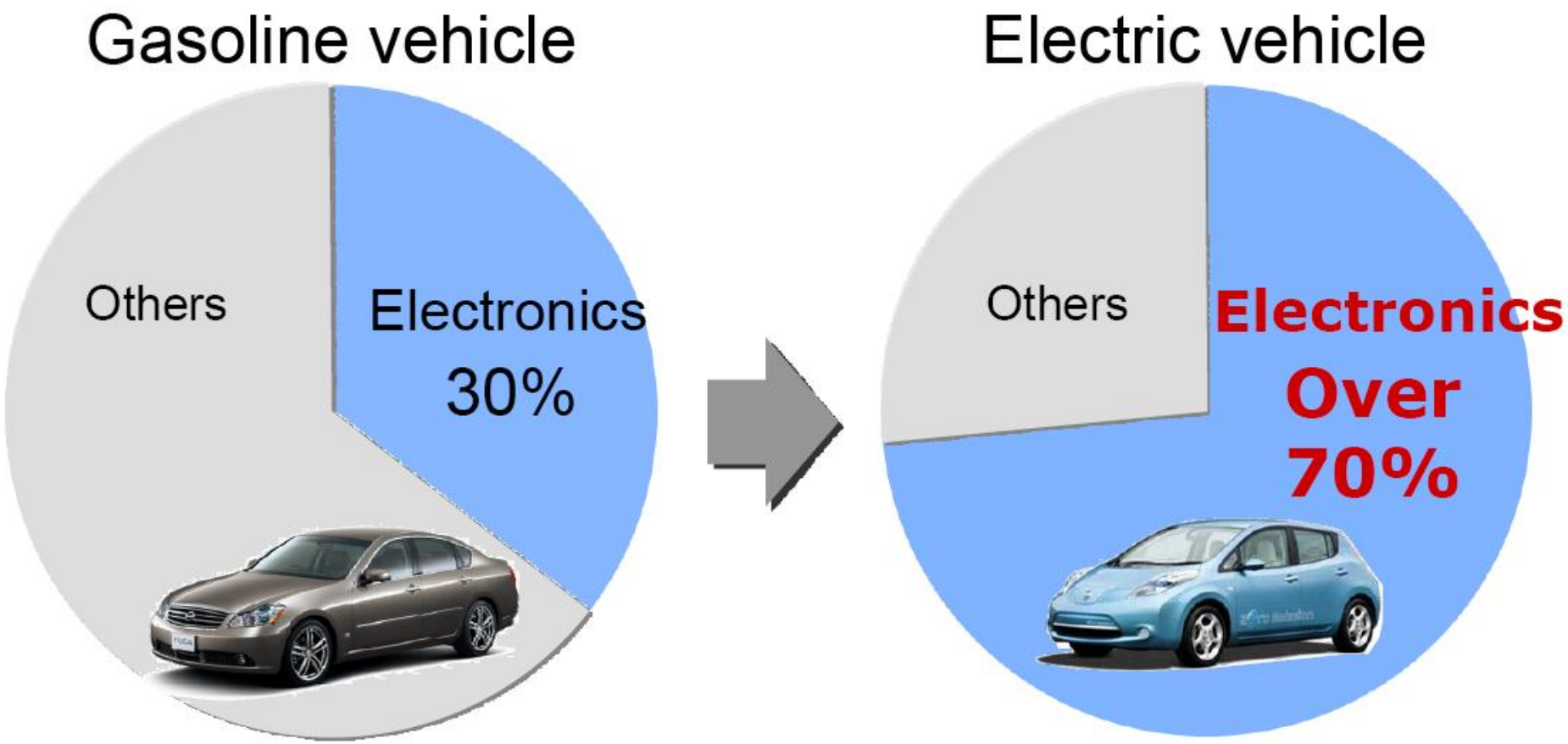
IOS, Android, keypad, touch

Five Platforms, Many Consumer User Groups and Even Many More Applications

Across These Platforms There Will Be Similarities and In Some Cases Great Differences

The Emerging Future New Computer-Centric Cars Will Have More Electronic Components in the Bill of Material

Cost ratio of car electronics



Kishi, Norimasa "Electronics in Automotive Applications" May 16-19, 2010 ,Loews Lake Las Vegas Resort , The ConFab

There Are Many New Ideas For Electronic Systems From New Competitors and Suppliers

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Emerging Computer-Centric System Competition Is Being Accelerated By The Many Innovative New Electric Vehicle Suppliers Worldwide.

The Zap

Think

Fiskar

BYD

Miles

Zenn

Tata

Safety is A Major Long Term Concern of the Entire Auto Industry

Safety concerns in the design of human machine interfaces will result in the future "Automotive Computer Screens" being different than for Laptops and the other consumer computer screens

The Long 15-25 Year Product Lifetime Of Vehicle Computers Results in Unique Design Upgradability And Durability Requirements

Ambitious Future Safety Goals

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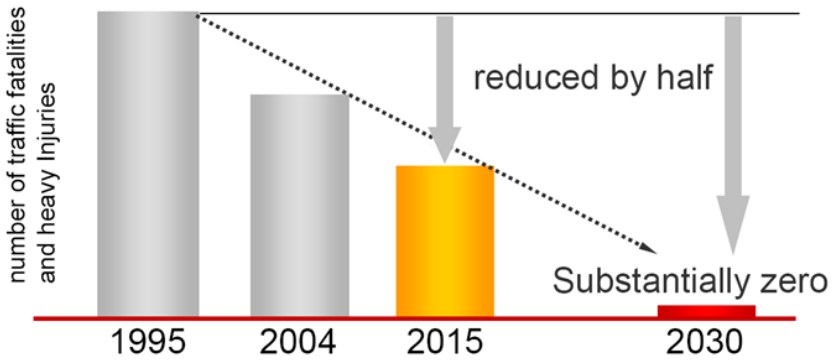
- **Reduce traffic fatalities and heavy Injuries by half by 2015**
- **Substantially zero by 2030**



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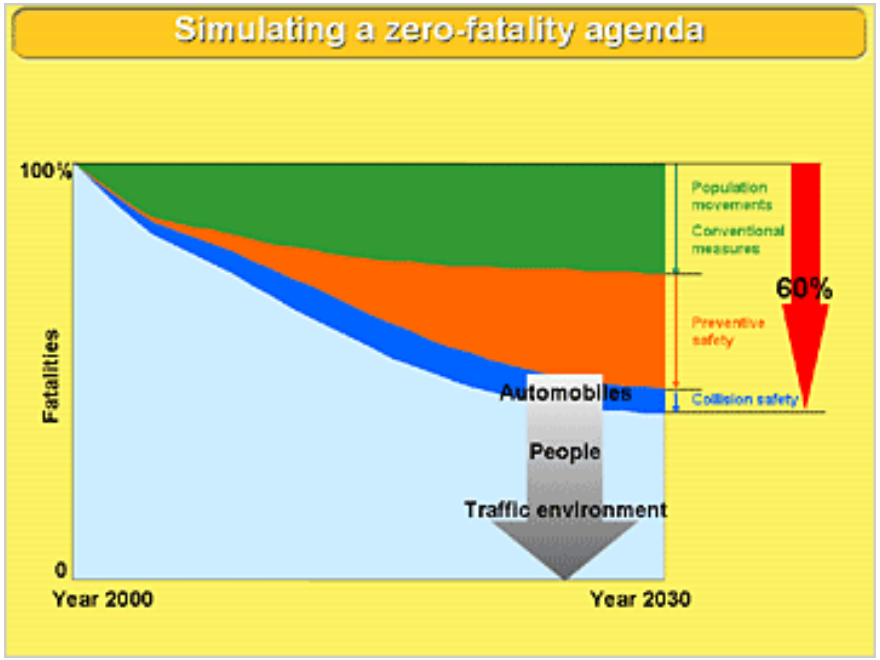

http://www.toyota.co.jp/en/safety_presen/safety/14.html

There are many carefully designed automotive technologies and systems associated with the Integrated Safety Management Concept which provide Active Safety, Pre-crash Safety, & Rescue

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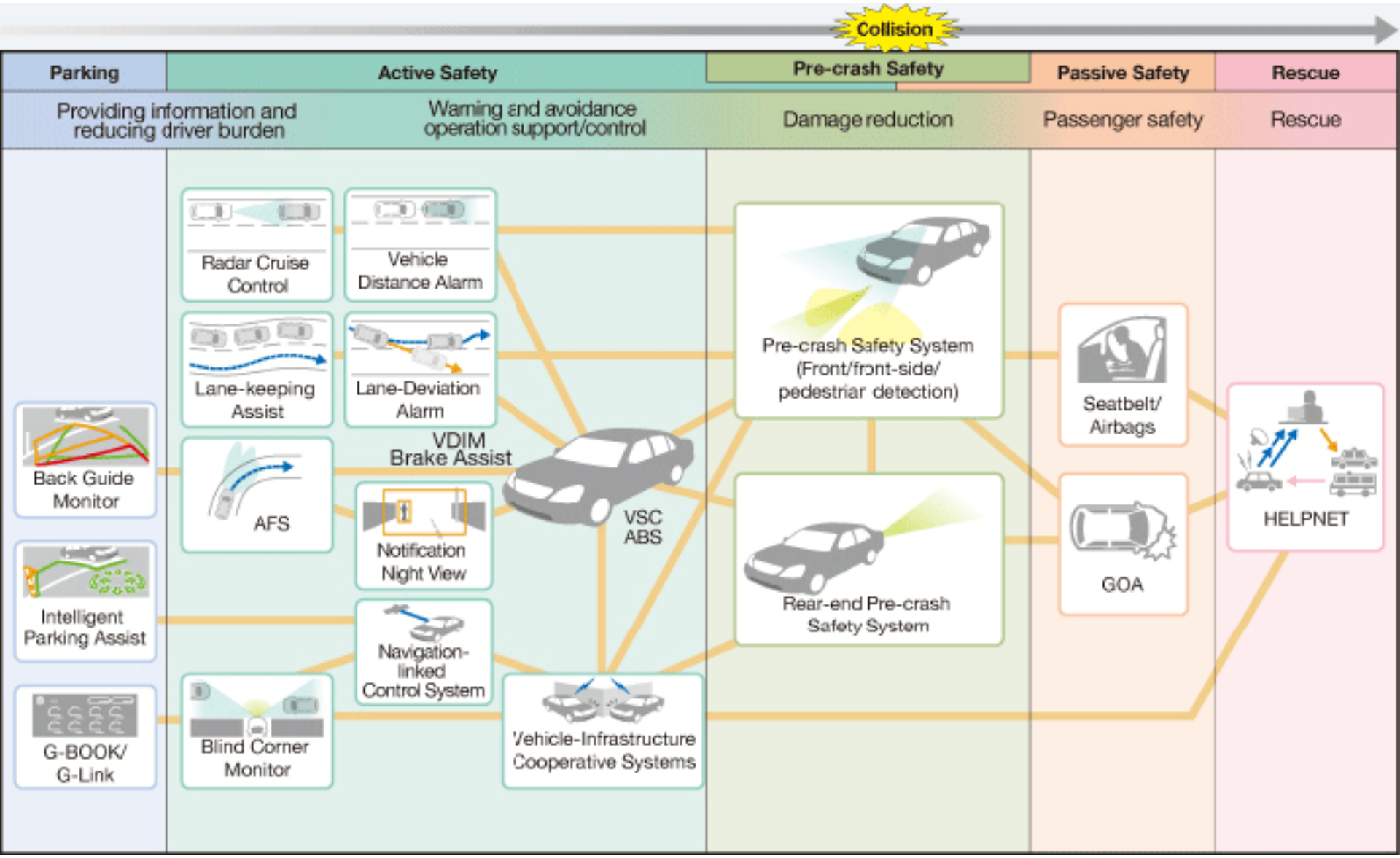

http://www.toyota-global.com/innovation/safety_technology_quality/safety_technology/safety_philosophy/

The Network Is Highly Important and There Is Plenty of Time for Using It In The Vehicle At the Times When It Can Done Safely

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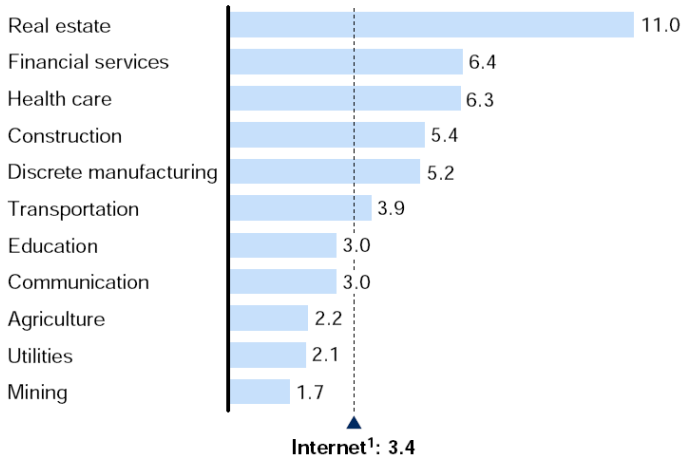
3.4% of GDP Attributed to the Internet

If Internet were a sector, it would have a greater weight in GDP than agriculture or utilities

Sector contribution to GDP
% of total GDP, 2009



1 Internet share includes parts of other sectors (e.g., communication).
SOURCE: Organisation for Economic Cooperation and Development; McKinsey analysis

Americans Spend 51 Minutes Commuting Daily Which May In The Future Be Enriched By Safe Network Access

TABLE ES-5 Average Travel Times by Broad Geographic Areas

Area	Average Travel Time (Minutes)	Less Than 20 Minutes (%)	More Than 60 Minutes (%)
United States	25.54	47.01	7.98
Northeast region	27.31	44.49	11.08
Midwest region	22.38	53.46	5.79
South region	24.93	47.20	7.11
West region	24.62	49.12	7.86
In metro area	26.14	44.48	8.13
In central city of metro area	24.82	48.70	7.67
In suburb of metro area	26.89	42.07	8.39
In nonmetro area	22.90	58.09	7.29

2006 Report : "Commuting in America", Transportation Research Board of the National Academies

Expectations by Future Car Owners Of Digital Technology

Future Car Owners May Seek Many Functional and Emotional Attributes From Using their Networked Automotive Computers

Driver

Wisdom

- Strategies
- Smart Behavior
- Effective Plans
- Tactics
- Money Saving Help
- Recommendations
- POI Assistance
- Refueling Assistance
- Navigation Directions

Technology: Thoughts using the Wireless Network

Happiness

- Friends
- Joy
- Behavior Modification
- Fun
- Communications
- Social Networks
- Professional Networks
- Fashion Shopping Recommendations
- Music and Book Selection
- Individual Preference Assistance

Feelings using the Wireless Network

Transportation

- Safe Efficient Travel
- Multi-Tasking Awareness
- Distraction Avoidance
- Pre-collision Assistance
- Collision Avoidance
- Lane Warning
- Cruise Control

Motion using the Wireless Network

Driver Observation Limitations

Digital Design Efforts may be modified by driver false beliefs which have been created from memories and conclusions generated entirely within our brains

Relevant Human Psychological Effects Described in the Published Academic Literature

	Frailty Effect	Researcher	Experimental Effect	Conclusion
1.	**Barnum Effect**	Forer, 1940	Personality descriptions do not need to be accurate in order to seem accurate	brains have a tendency to perceive meaning in random input
2.	**Ventriloquist After Effect**	Canon, 1970 Wozny and Shams, 2011	Perception of direction of sounds may be rapidly altered by visual clues and prior experiences	Perception of direction can be inaccurate band based upon listener thoughts.
3.	**Out of Body Effect**	Matthew Botvinick and Jonathan Cohen	A subject thinks a rubber hand must be theirs based on image data and constructs a sense of self that is consistent with this idea.	brain constantly using information from your senses to come up with a best guess - even if it does mean you think you are floating above your body
4.	**False Agency Formation False Memories**	Justin Barrett at the University of Oxford	False images and sensations are create when frightened	a stimulus such as a creaking floorboard is caused by some hidden and possibly dangerous entity - is so important for survival that the part of the brain responsible for detecting it can crease false illusions
5.	**Strong Beliefs Can Create Erroneous Conclusions**	Leon Festinger University of Minnesota	Dorothy Martin, prophesied that there would be a great flood on 21 December and that a flying saucer would rescue her and her followers just before disaster occurred.	members concluded that they must have averted the cataclysm by spreading the word of the danger. People find it uncomfortable to hold two conflicting beliefs in their head at the same time, and will perform attempt to reconcile the two (cognitive dissonance)
6.	**Suggestion of Not thinking**	Dan Wegner Harvard University	eye-tracking experiments have revealed that telling footballers to avoid aiming a penalty into a particular part of the goal resulted in them not being able to keep their eyes off it.	asking people not to think of something causes them to do the exact opposite
7.	**Major Eyewitness Errors in Observation**	S. J. Davey	small groups gathered around a table and witnessed various "supernatural" appearing illusions such as chalk messages magically appearing on slates and spirits materializing in front of their eyes. Davey asked his guests to send him a written account of their evening, and was stunned to discover that people frequently misremembered what had happened. Many recalled events in the wrong order, and some even omitted the important ones altogether.	The act of perception is cognitively demanding, so your eyes and brain focus a fairly small spotlight of attention on what appears to be the most important thing at that moment. In addition, it creates the illusion that you are constantly seeing far more than this small area, which fools observer into believing that the observations are accurate observer while they are not.
8.	**Automatic Writing**	Dan Wegner Harvard	Ouija boards to apparently spell out messages	unconscious part of the brain makes the decision to act and sends the right messages to the appropriate muscles - but fails to send the signals responsible for creating the conscious experience of you making the decision.

1. Richard Wiseman , ***Paranormality: Why we see what isn't there*** , Macmillan, University of Hertfordshire, UK.
2. David R. Wozny and Ladan Shams, ***Recalibration of Auditory Space following Milliseconds of Cross-Modal Discrepancy,*** The Journal of Neuroscience, March 23, 2011 • 31(12):4607– 4612

Future Computer Designs May Include Applications Specifically For Young Digital Natives

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Cell, text, MP3, XBOX, Ringtone, Video Children

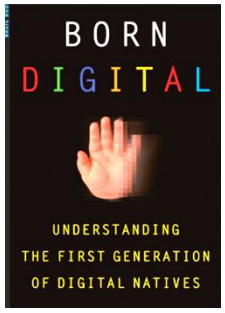
Digital Native s Will Have New Standards of Definitions of the Virtual Property Lines, Privacy, Data Sharing, Sexual images, and Violence

There will be New Styles of Innovation, Learning, Creativity, Collaboration and Political Change

Digital Friendship, Jewelry, Toys, Hobbies, Health and Experiences

A **digital native** is a person for whom digital technologies already existed when they were born, and hence has grown up with digital technology such as computers, the Internet, mobile phones and MP3s.

Digital immigrants are not digital natives and are said to have a "thick accent" when operating in the digital world in distinctly pre-digital ways, when, for instance, he might "dial" someone on the telephone to ask if his e-mail was received.



The Future Young Computer User May Multi-task Differently which will impact future automotive computer designs

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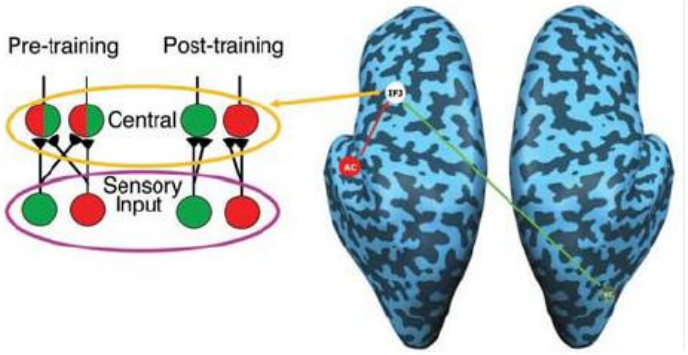
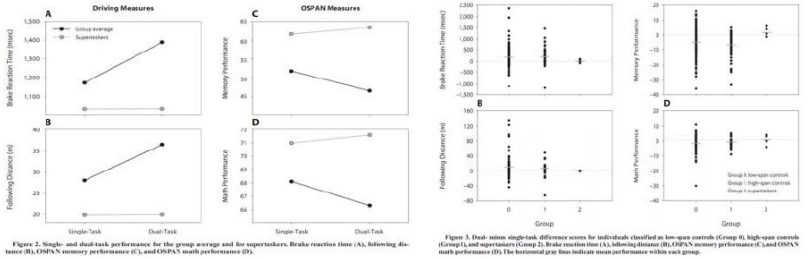
Multi-tasking, the Brain, Physiology and Educational Development

- Different kinds of experiences lead to different brain structures. Information overload phenomenon, and we can still only keep at best seven items in our working memories.
- Multitasking appears to be one of areas of changing in family interaction which has implications also for driving.





In Recent Research 2.5% of the Young Subjects Were Outstanding in Their Ability to Multitask

Multitasking is more difficult when more than one task requires deep thinking. Interior Frontal Junction Plays an Important Limiting Role In Multitasking

Future young drivers may improve their math skills and their abilities at multitasking from training in video game and computer usage as earlier generations did by practicing for music recitals

Mirsky, Steve, "Rare Drivers May Multitask Safely", Scientific American, April 5, 2010.

Seegmiller, Janelle K.; Watson, Jason M.; Strayer, David L. "Individual differences in susceptibility to inattentional blindness. " Journal of Experimental Psychology: Learning, Memory, and Cognition, Vol 37(3), May 2011, 785-791. doi: 10.1037/a0022474

Dux, Paul E.; Tombu, Michael; Harrison, Stephenie; Rogers, Baxter P.; Tong, Frank; Marois, Rene, "Training Improves Multitasking Performance by Increasing the Speed of Information Processing in Human Prefrontal Cortex" Neuron *63*, pp 127-138, July 16, 2009,

Unique Digital Fun in Future Vehicles

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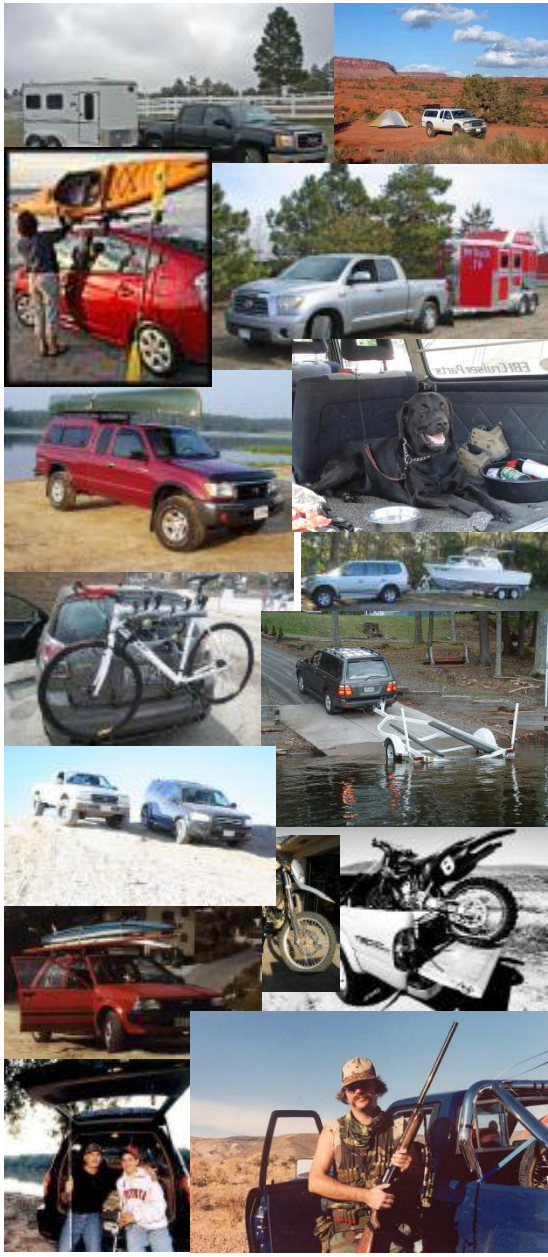
Fun may involve recreational pursuits enriched by the presence of novel vehicle computer applications

Recreation	Special Issue for Vehicle	Digital Computer Impact	Network Impact
Horse Riding	Pulling Trailers	Map Links	Google maps
Camping	Carrying gear	Extreme Weather	Satellite Updates
Canoeing	Roof Racks	Laptop data links, Rental locations, emergency contact, forest ranger sites.	Tripadvisor.com, Lonelyplanet.com, YahooTravel
Wind Sailing	Small trailer	Tides, Asian storms, surf watch, wave buoy data	Context aware information delivery
Pet shows	Large open area, kennels	Help with finding pet friendly locations	www.loveyourpetexpo.com
Bicycling	hitch racks	Elevation routes, vehicle group ware communications	Bike ride planning and ride sharing
Boating	Boat Trailers	Parks, boat launch area information, coast guard reports.	www.discoverboating.com
Off Roading	High Clearance	Nature & off road trails, elevations	Mapmyride.com
Car Camping	Shelter	Capsite Vacancy information, food store, drugstore and toilet location data	www.squidoo.com/carcamping
Beachside holidays	Hauling gear, food, water, suntan lotion, weather, fog, beach occupancy	Help in locating beach fun	www.daytrippen.com
Surfing	Carrying surfboard	Tides, Asian storms, surf watch, wave bouy data	www.surfline.com
Dirt Bikes	Small trailer, bike hauling	Finding maps and locations to ride	www.just-add-dirt.com
Hunting	Carrying gear, off road driving, shelter	Find hunting times and rules	www.huntinghotspots.com
Fishing	Pulling boats	Finding the good fishing spots and times.	www.takemefishing.org
Football//Basketball/Tennis	Hauling Teams & Gear, tailgating party platform	Map Links/Traffic	www.tailgating.com



Summary

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- Future vehicle computer systems will be commonplace which share applications with Laptops, Smartphones, Tablets, and smart TVs.

- Unique important vehicle safety and product lifetime factors will greatly influence automotive design differences

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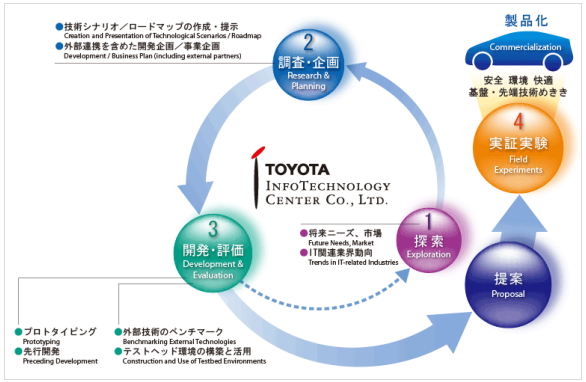

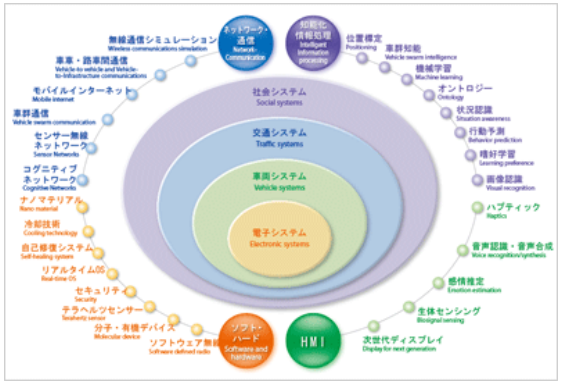

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The End