Six Trends Transforming Transportation

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ITS Program Manager
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In the future, transport networks will think for themselves.

Tomorrow will be nothing like today.

HSBC

www.hsbc.com/inthefuture

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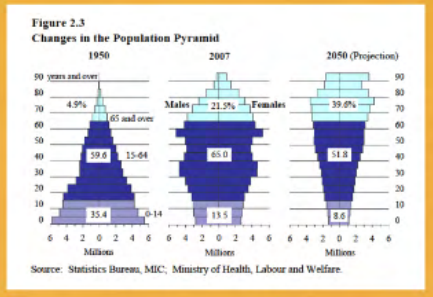
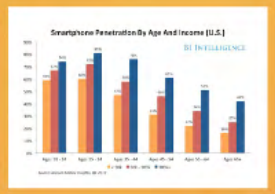
The coming change in transportation automation will be as significant as the transition from horses to horsepower

Everything will change:

- How we drive
- What we drive
- If we drive
- Who "drives"
- What we own
- What we share

Demographic Trends





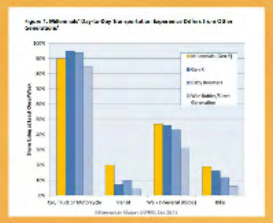
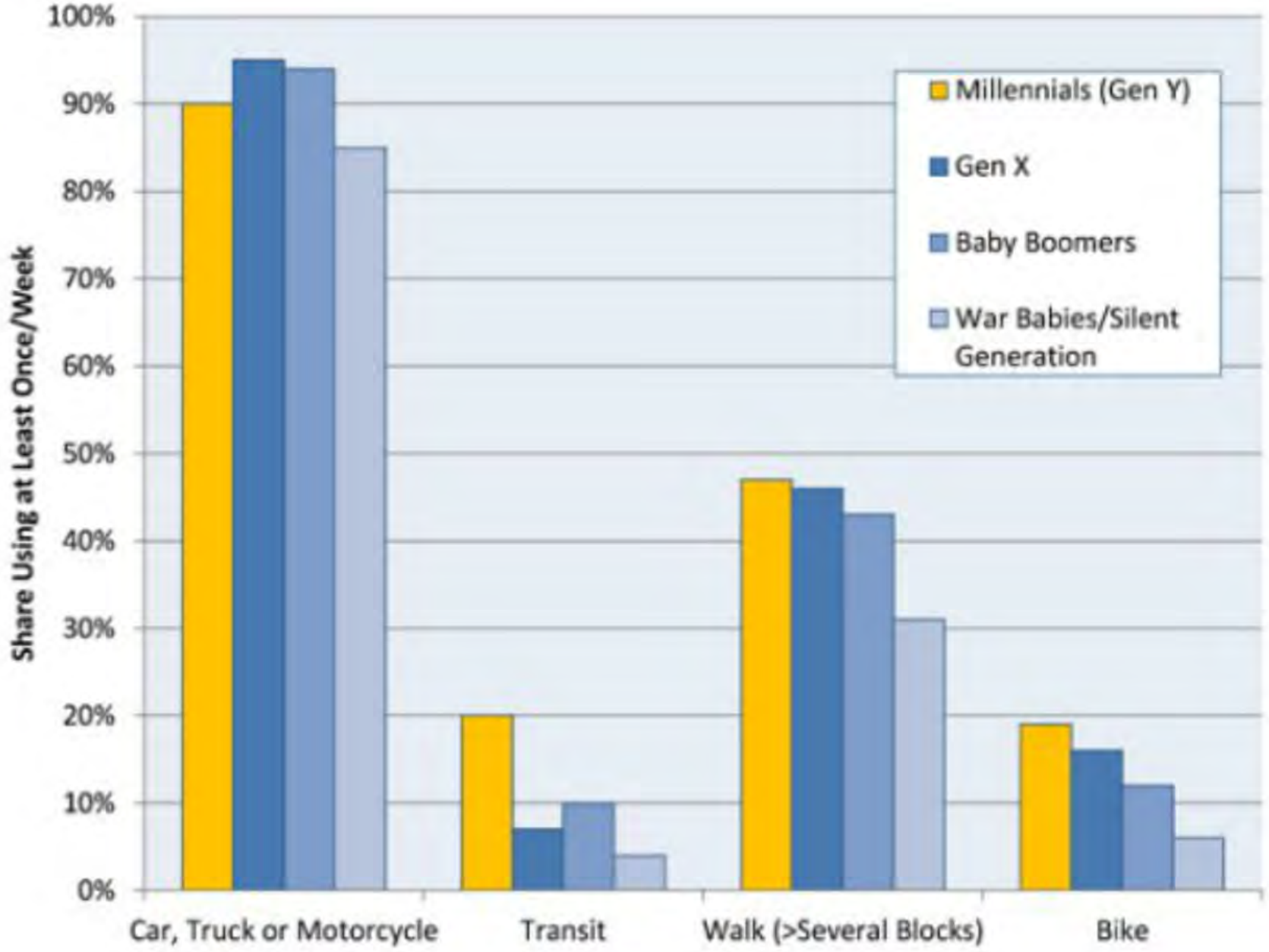


Figure 2.3

Changes in the Population Pyramid

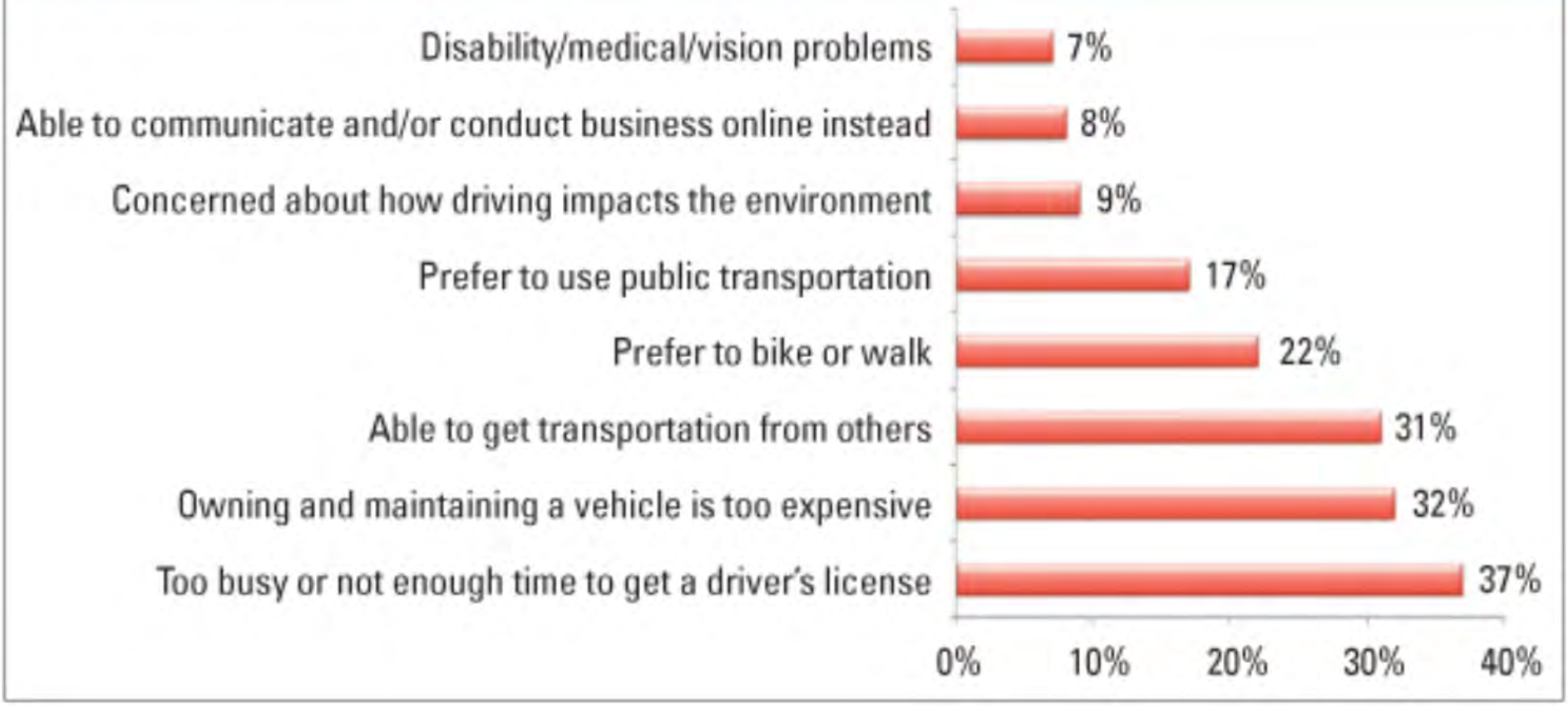
Source: Statistics Bureau, MIC; Ministry of Health, Labour and Welfare.

Figure 1. Millennials' Day-to-Day Transportation Experience Differs from Other Generations[7]



Millennials in Motion, USPIRG, Oct 2014

Top Eight Reasons Given by Survey Respondents as to Why Young Adults Do Not Have Driver's License



Big Data

INRIX here waze BlueMAC BlueTOAD


INRIX


here


waze
OUTSMARTING TRAFFIC, TOGETHER


BlueMAC


BlueTOAD

Autonomous (Self Driving) Vehicles

Driving factors:
- safety
- reduced energy use

Issues with autonomous vehicles:
- security
- reliability
- liability / insurance
- extreme light and dark
- nuances of the law
- application of artificial intelligence

Existing Automated Applications:
- Parallel Parking Assist
- Lane Departure Warnings
- Adaptive Cruise Control ("Traffic Jam" Driving)
- Collision Warning

"By the time we get to the autonomous vehicle, it won't be that big of a deal"
- Bill Ford, Executive Chairman, Ford Motor Co

Incremental vs. Disruptive Technology

Vehicles

Driving factors:
- safety

Existing Automated
- Parallel Parkin

Driving factors:
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NO
STOPPING
ANY
TIME
6CRA518
ODYSSEY

Existing Automated Applications:

- Parallel Parking Assist
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- Adaptive Cruise Control
  ("Traffic Jam" Driving)
- Collision Warning

"Connected"

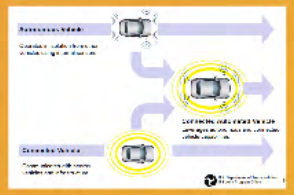
Connected Vehicles

Vehicles communicate with:

- other vehicles
- infrastructure
- pedestrians / bicyclists, etc.

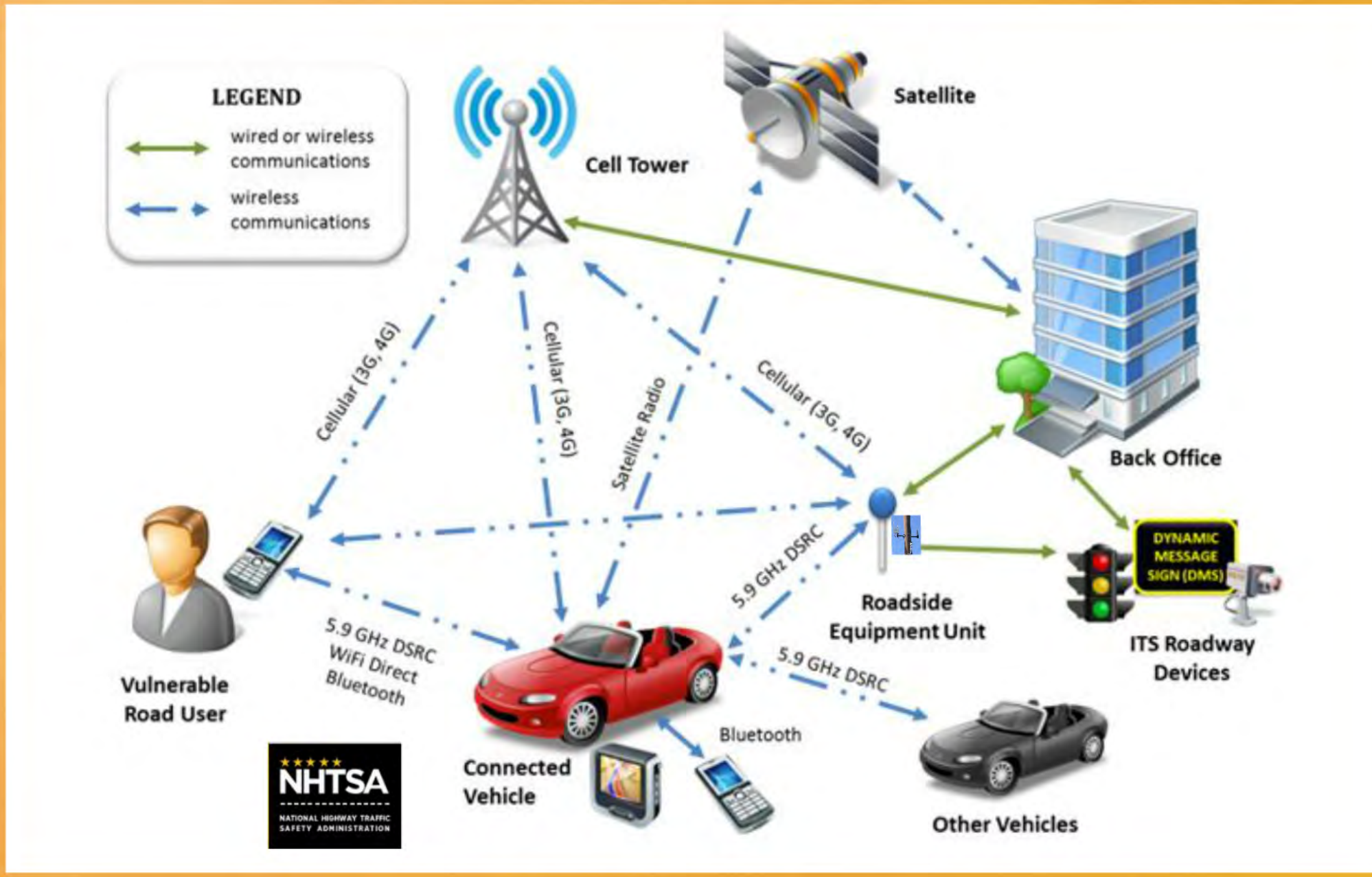
Automated vehicles "see"

Connected vehicles "learn"

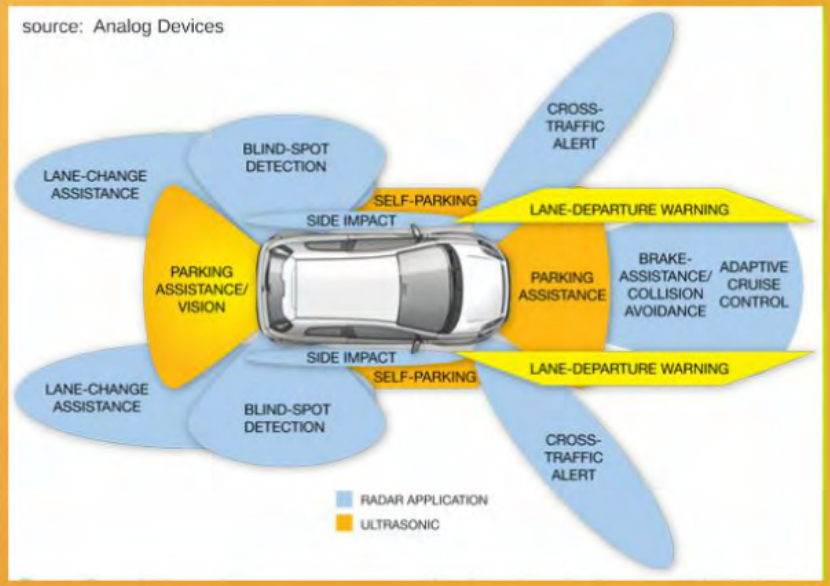


"Connected"

www.jabil.com


LEGEND
wired or wireless communications
wireless communications
Cell Tower
Satellite
Back Office
Cellular (3G, 4G)
Cellular (3G, 4G)
Satellite Radio
Cellular (3G, 4G)
5.9 GHz DSRC
Roadside Equipment Unit
DYNAMIC MESSAGE SIGN (DMS)
ITS Roadway Devices
5.9 GHz DSRC
WiFi Direct
Bluetooth
Vulnerable Road User
5.9 GHz DSRC
Bluetooth
Connected Vehicle
Other Vehicles
NHTSA
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Automated vehicles "see"



Connected vehicles "learn"

Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors

Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities

Connected Vehicle

Communicates with nearby vehicles and infrastructure

Mobility

UBER

lyft

where can I drive?

zipcar

wheels when you want them

waze

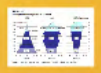
OUTSMARTING TRAFFIC, TOGETHER

Vehicle Propulsion


HYDROGEN RE
with DUAL-FUEL SYSTEM
RX-8
HYDROGEN RE

Six T

Demographic Trends



Big Data

Vehicle Propulsion

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Autonomous (Self Driving) Vehicles

Mobility

Connected Vehicles

"Connected"

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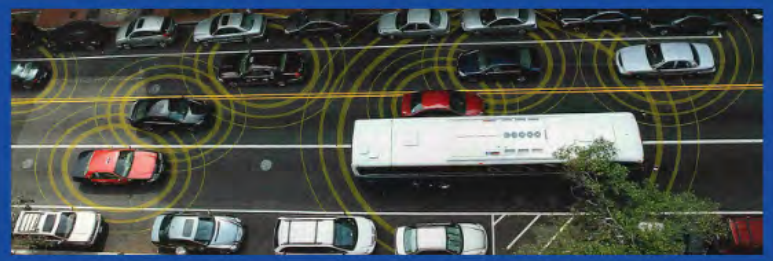
UDOT

Keeping Utah Moving



Six Trends Transforming Transportation

Planning in Times of Rapid Change

Jeff Harris
Planning Director

UDOT
Keeping Utah Moving

Disruptive Change

- Rapid and disruptive change causes uncertainty
- Uncertainty leads to greater risk and, yes, potential opportunity
- With high uncertainty, traditional methods of strategy development fail

UDOT Keeping Utah Moving

Traditional Transport Planning Framework

- Fact-based approach
- Assumes a deep analytical understanding of today is the key to understanding the future
  - Past trends
    - Population and employment
    - Travel demand
    - Mode split
    - Capacity, or supply
    - Land-use
  - Results in a single point forecast of future condition

UDOT Keeping Utah Moving

A New Transportation Planning Framework

- Avoid binary approach
  - Do nothing
  - Continue with traditional approach
- Must understand the uncertainty we are facing
  - Not burying it in meaningless base forecasts, or avoiding analysis
  - Embrace it, slice it, dice it, explore it, and get to know it
  - Separate the unknown from the unknowable - residual uncertainty
- New tools - an adaptive approach
  - Pick the tool(s) that matches the level of uncertainty
  - Scenario planning
    - We do know certain things
    - Bounding range of possibilities

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