Mapping the Road to Connected Transportation

October 19, 2016 | GENIVI All-Members Meeting

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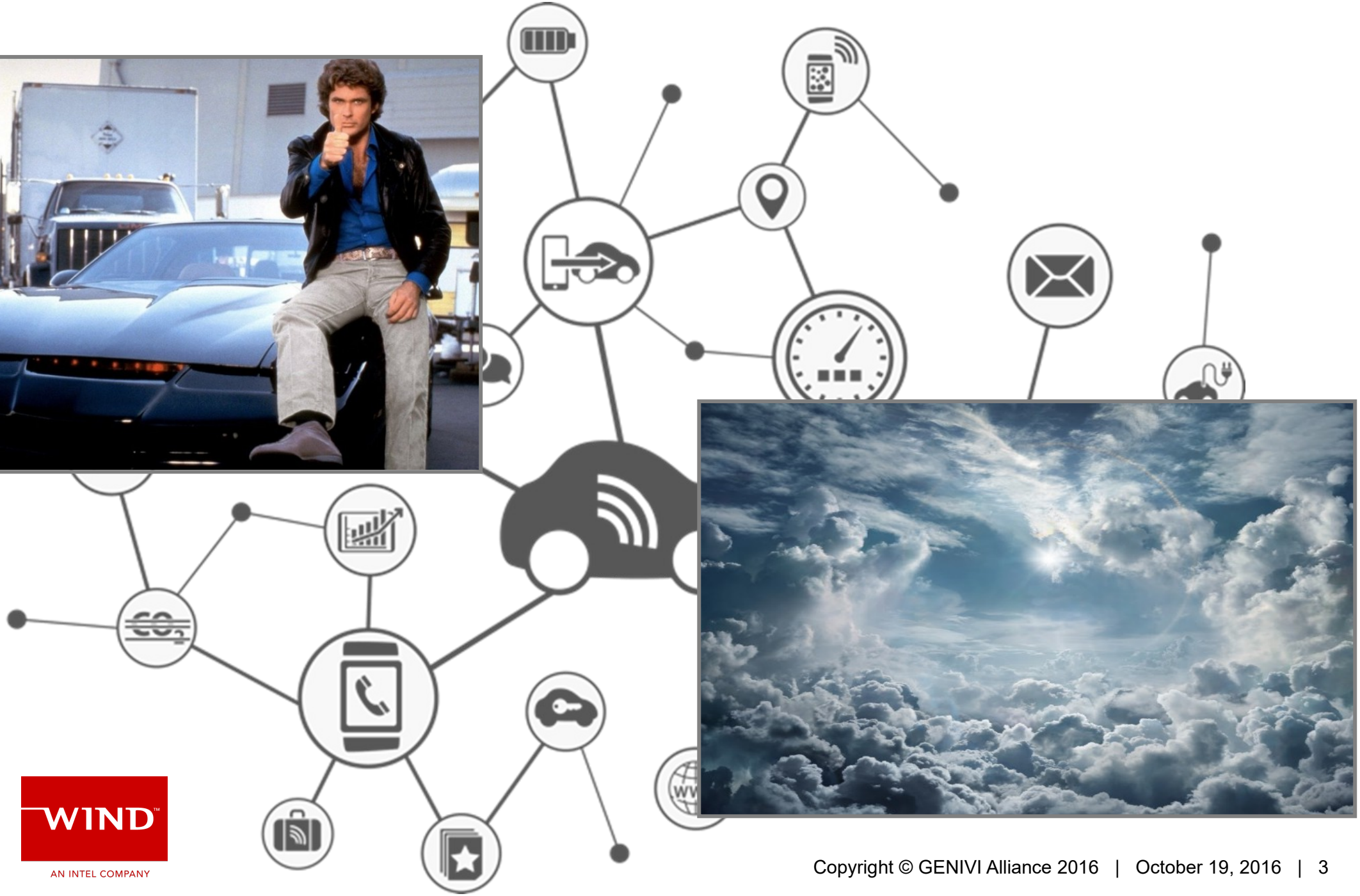

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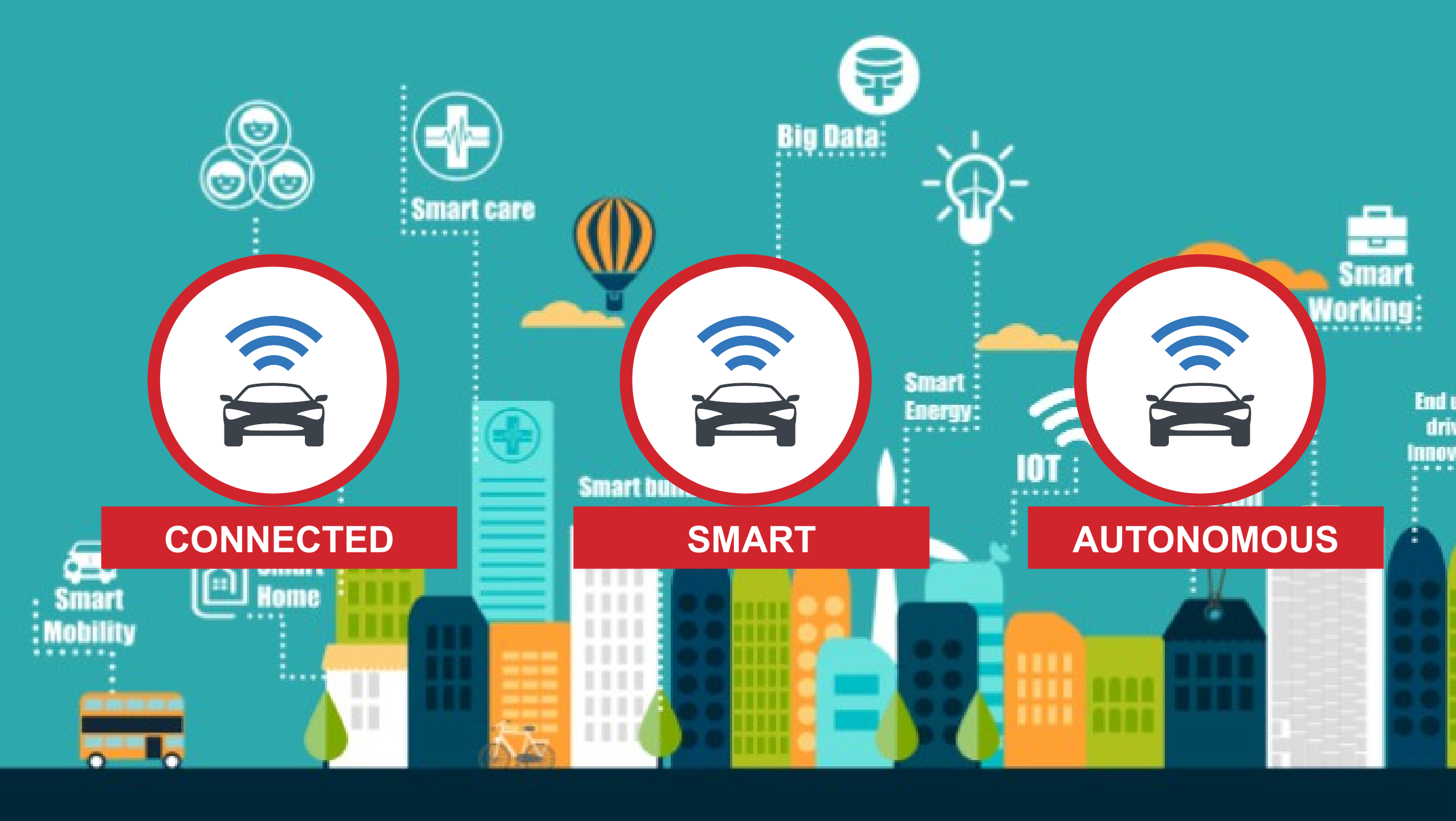
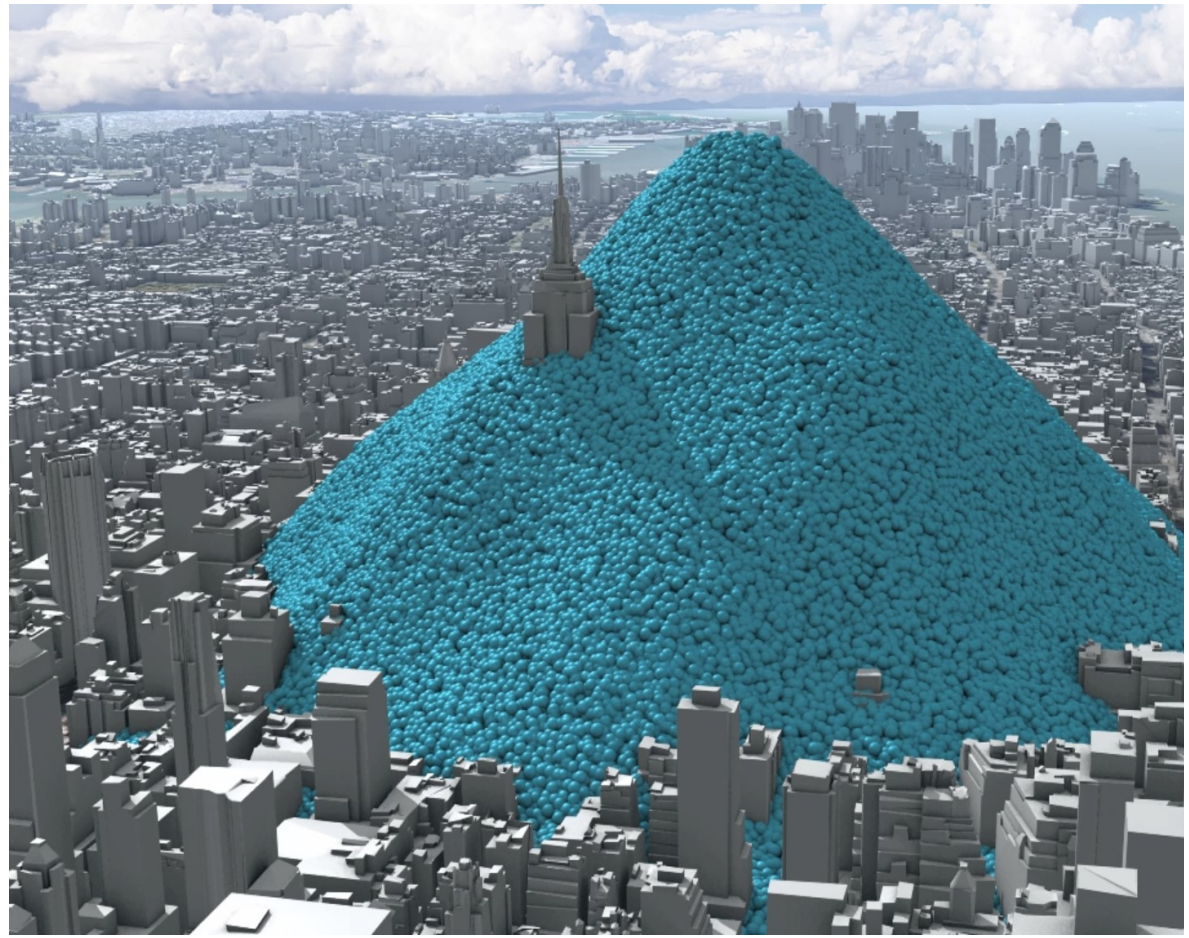

Smart care
Big Data:
Smart Working:
Smart Energy:
IOT
Smart Mobility
Home
CONNECTED
SMART
AUTONOMOUS

TRAFFIC PER DAY By 2020

AVG INTERNET USER	~1.5 GB
SMART HOSPITAL	3,000 GB
AUTONOMOUS AUTOMOBILE	4,000 GB
AIRPLANE DATA	40,000 GB
SMART FACTORY	1,000,000 GB



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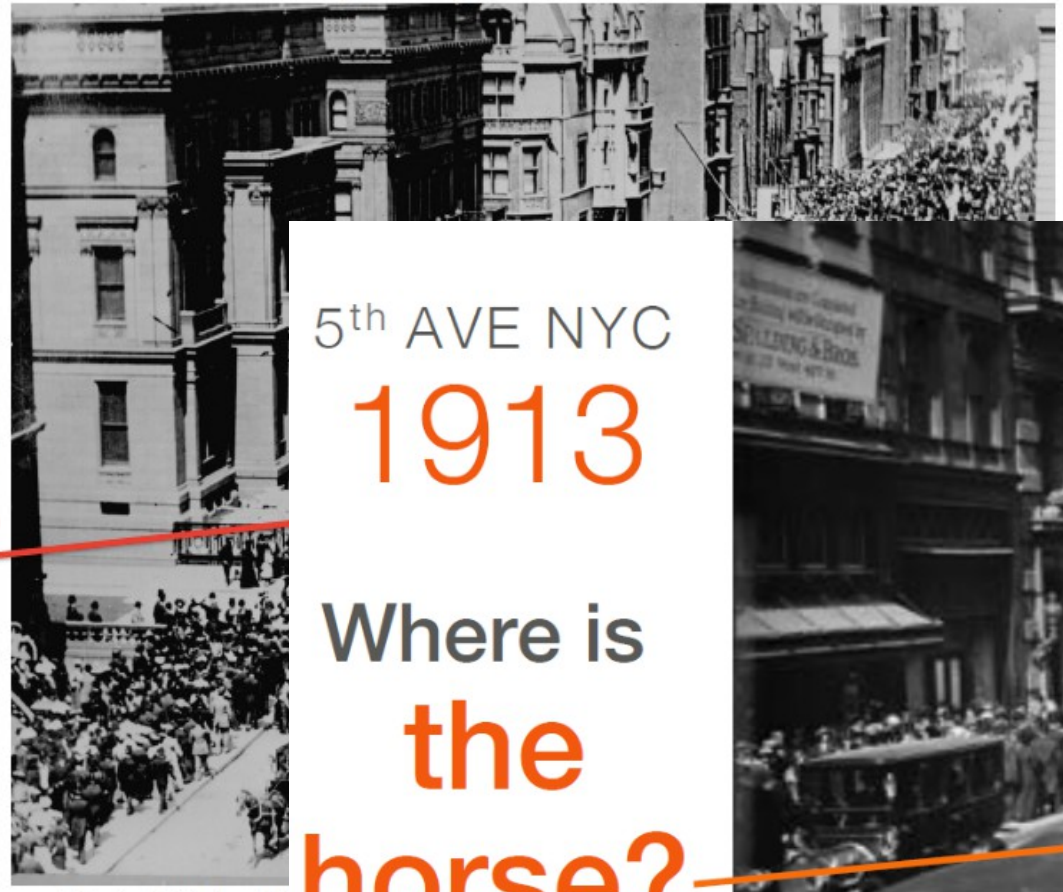
5th Ave New York City, April 15, 1900



1900: Where is THE CAR?

Photo: Fifth Ave N

Leading Market Disruption- Copyright © 2001-2014 by Tony Seba

5th AVE NYC

1913

Where is **the horse?**

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BENEFITS

$488 billion — Total savings from accident avoidance

Fuel savings — $158 billion

Autonomous cars total savings: **$1.3 trillion**

$507 billion — Increased productivity from autonomous cars

Fuel savings from avoiding congestion — $11 billion

$138 billion — Increased productivity from congestion avoidance

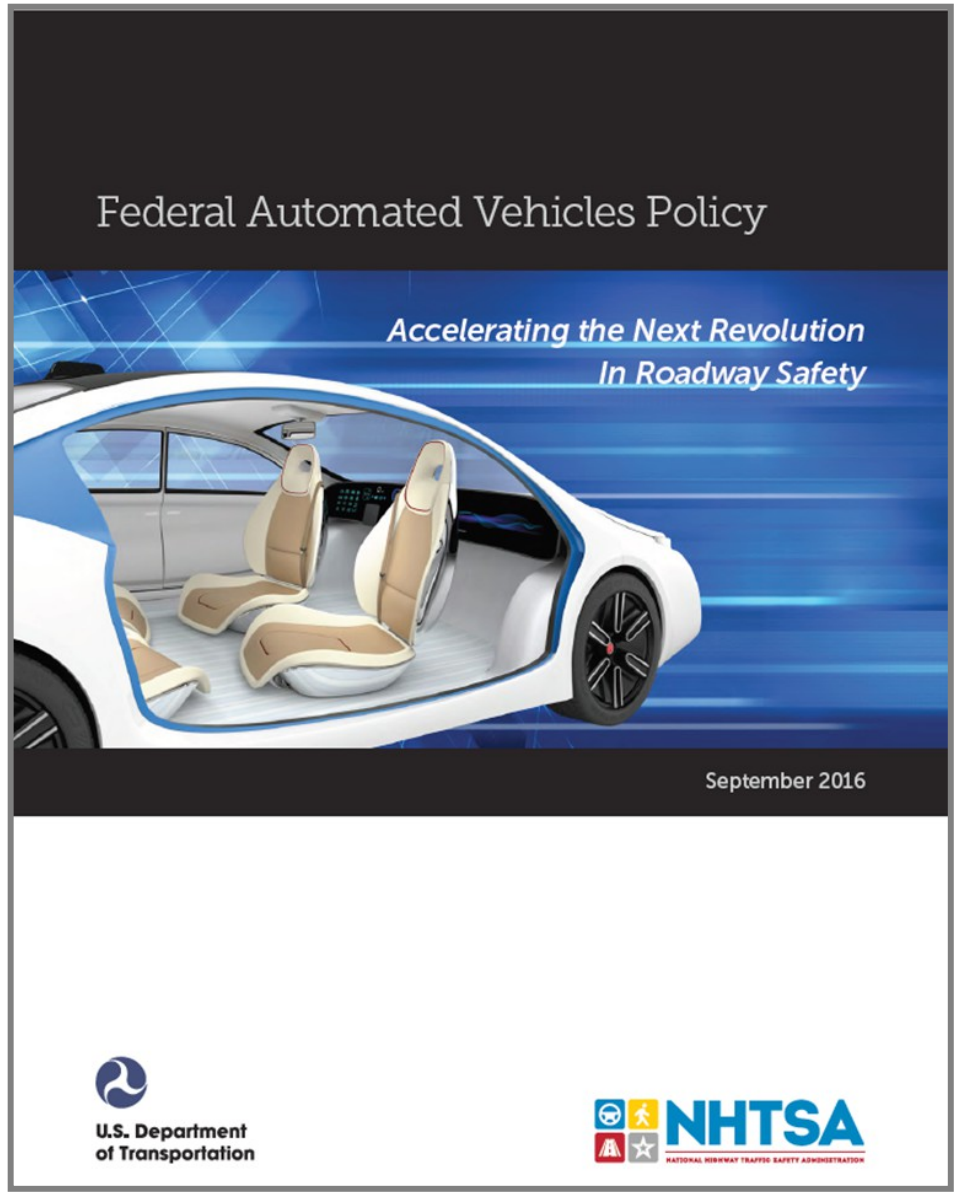
Source: Predictions for U.S. market, Morgan Stanley research, 2014

Regulations: Friend or Foe?

- Standardize on signs and signals
- Speed limits - and speeding tickets may disappear
- Some old tech remains useful
- Regulation spurring Innovation?

Uber's First Self-Driving Fleet Arrives in Pittsburgh This Month

The autonomous cars, launching this summer, are custom Volvo XC90s, supervised by humans in the driver's seat.



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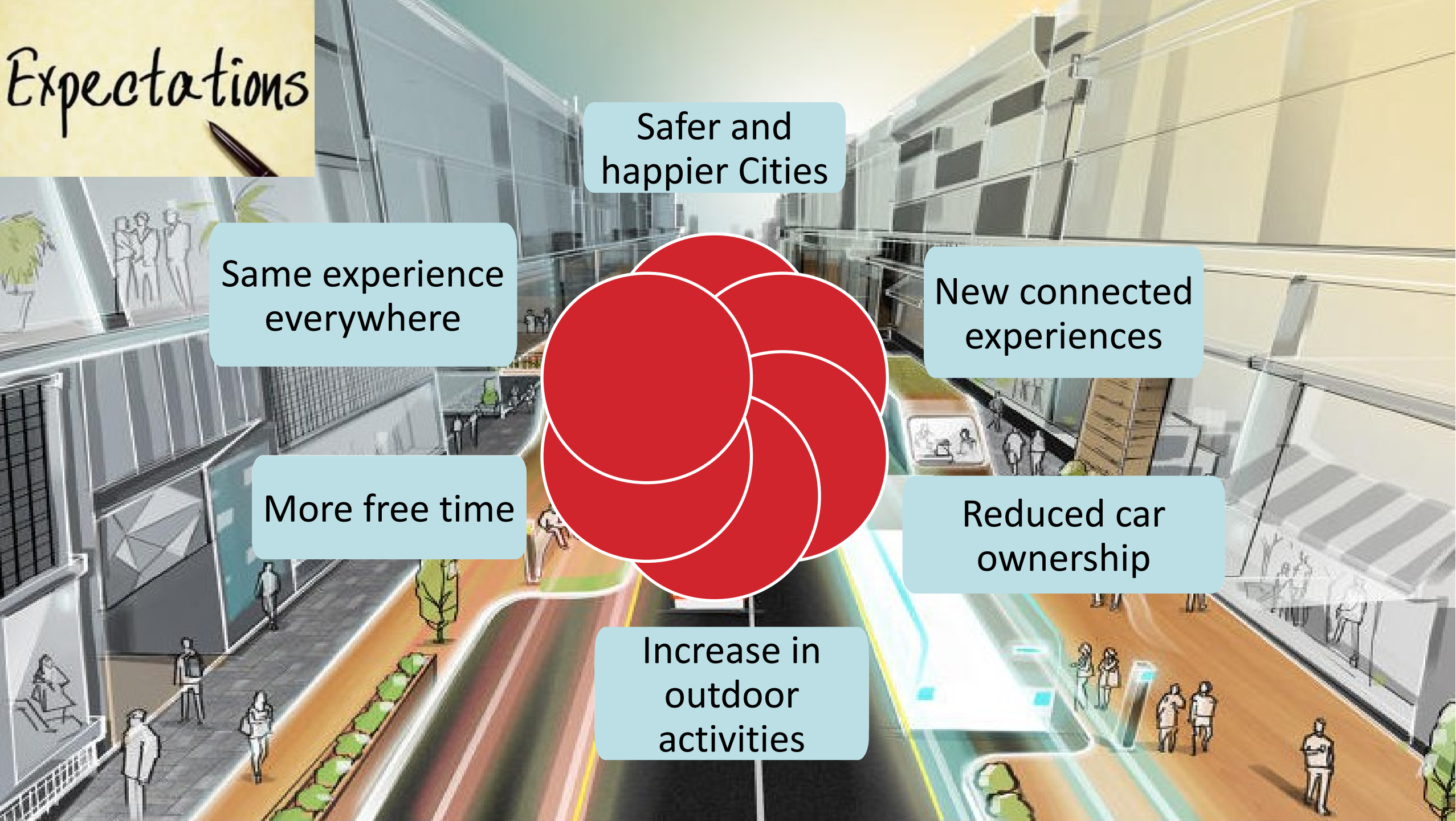
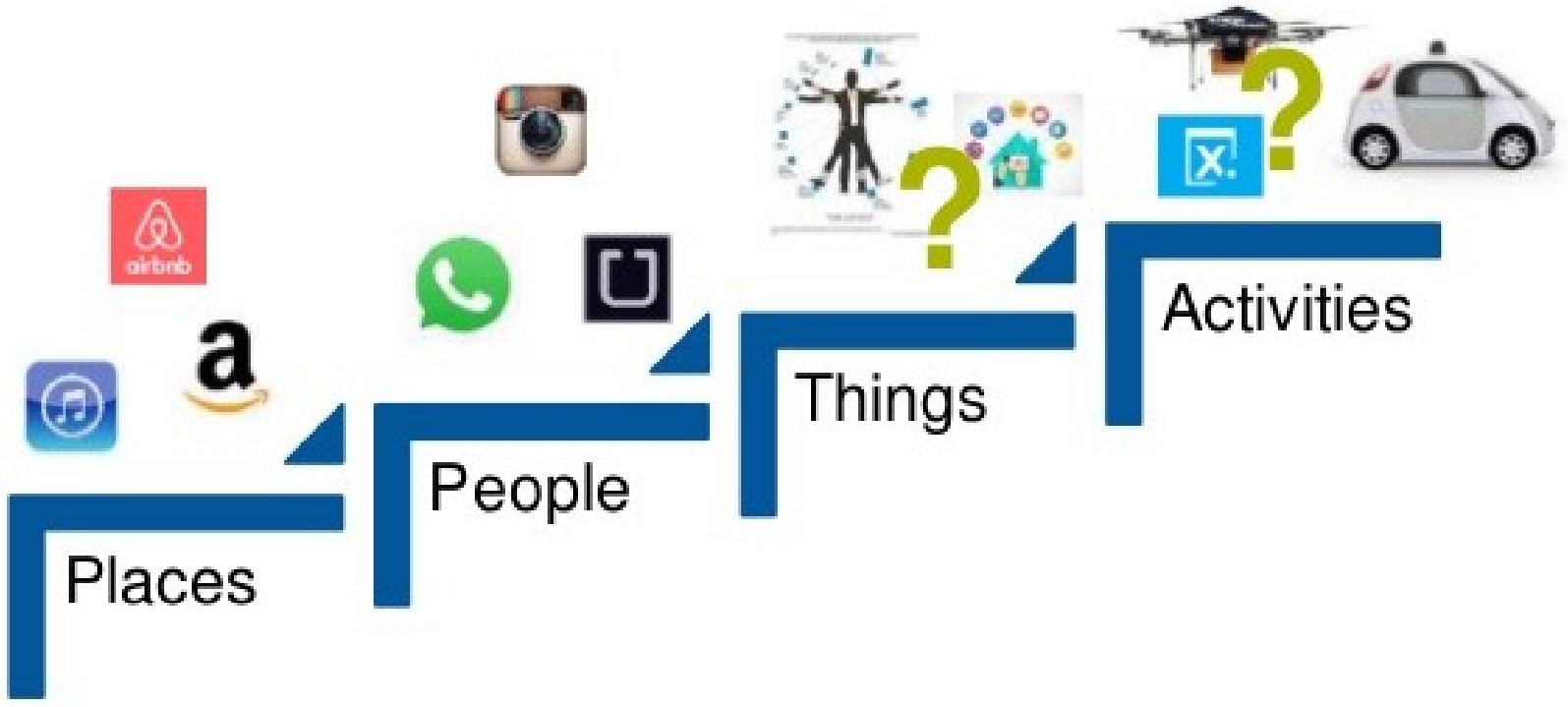
Expectations

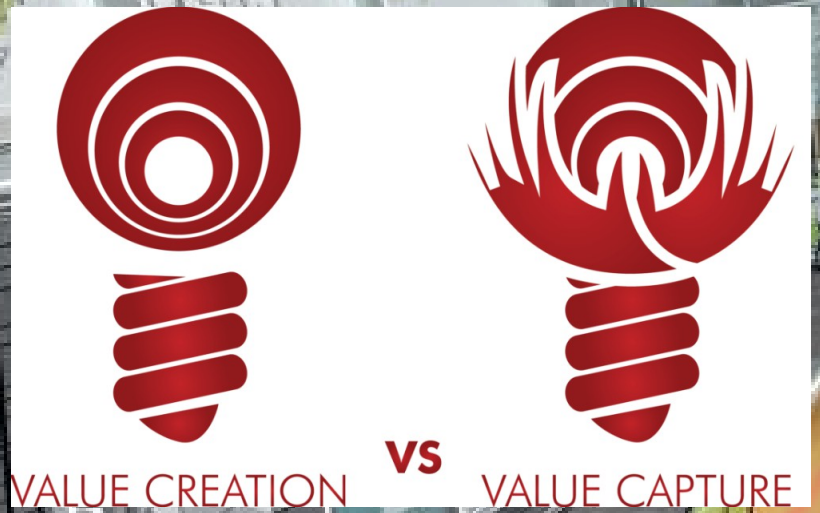


Disruption of business models through connectivity

CYBERCOM GROUP



The World is increasingly Activities and Experience driven



SERVICE MENU	
New In-Vehicle Experiences	$/month
Optimize your day with data	$/month
Take your profile with you	$/month
New productivity Apps	Freemium
Integrated commuting	$/month
Fleet management	$/month
Smart City integration	Gold/Silver packages
Google rides	Free, loyalty programs

Essential is to get from A to B

MaaS.fi

Mobility as a Service

EXAMPLE

“Get anywhere” mobility package for 300 €/month:

- Transportation from A to B according to a service-level agreement (e.g. pickup in 7 minutes)
- Including all transportation (regional public transport, taxi, car and ride sharing, bike sharing etc.)
- Including transport related services (city logistics, home deliveries etc.)
- Roaming in other cities and countries

Tekes

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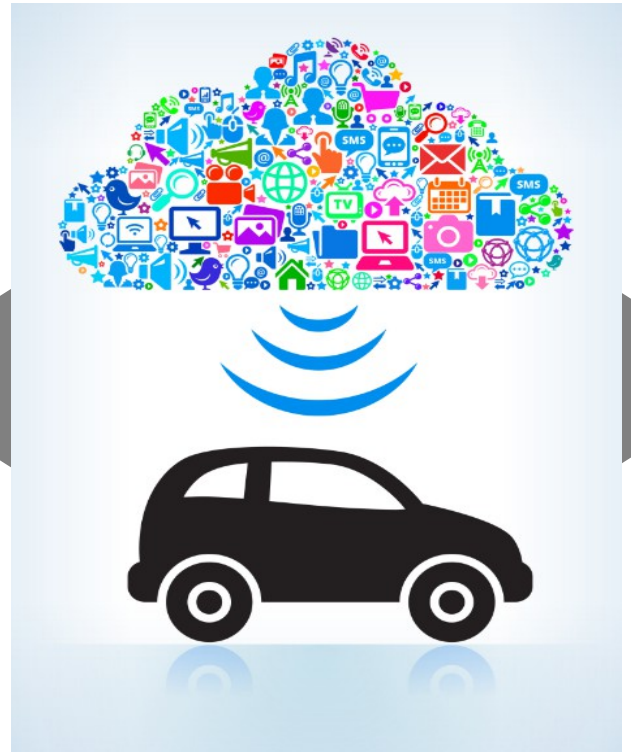
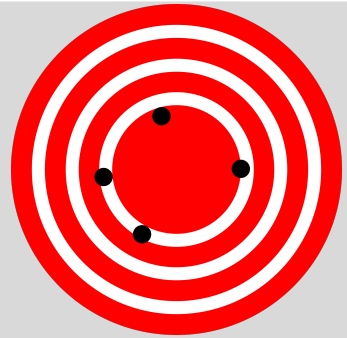
The Winning Recipe

1. Security and Reliability: Getting data into and out of the vehicle securely and timely

SECURITY

- E2E security starts with a HW root-of-trust
- No safety without security
- SW lifecycle management
- RVI for provisioning, authentication, authorization
- System wide Identity





RELIABILITY

- Predictable round-trip latency, QoS metrics
- Deterministic networking (TSN)
- 4G → 5G is vital
- Silicon & software footprint in the network will increase

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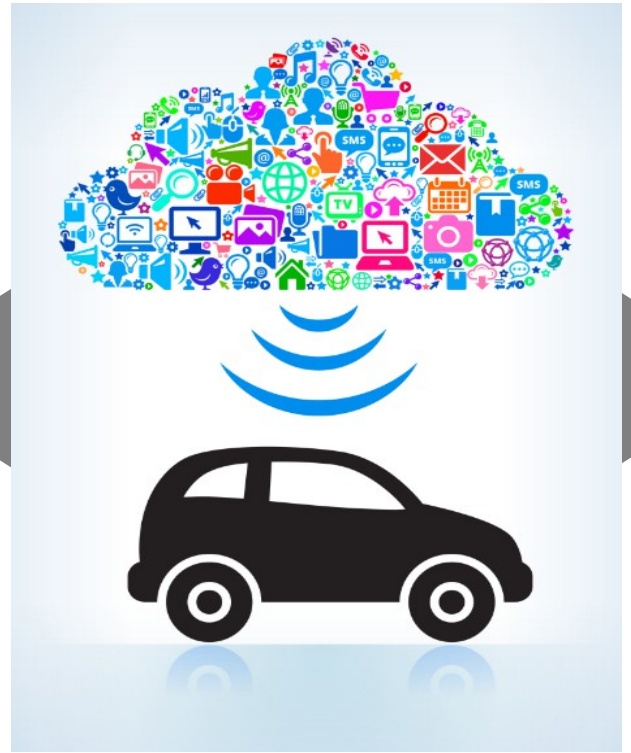
The Winning Recipe

2. Smart Infrastructure: Critical backend systems with guaranteed QoS

CLOUD NATIVE ARCHITECTURE

- On-prem vs public cloud
- How many 9's do you need?
- Multi Tenancy
- On-demand Usage
- Ubiquitous Access
- Elasticity
- Resilience
- Measured Usage



SOTFWARE DEFINED

- Virtualization
- Software defined networking
- Latency, availability and predictability become critical
- Enabling IT like cost-structures with OT-like QoS
- OPex instead of CAPex

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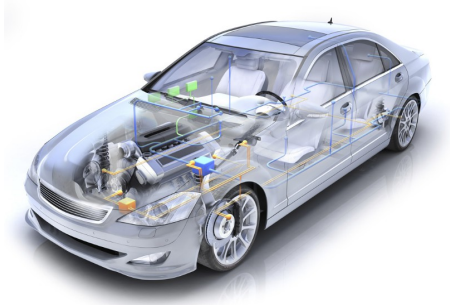
The Winning Recipe

3. Data → Insights → Actions

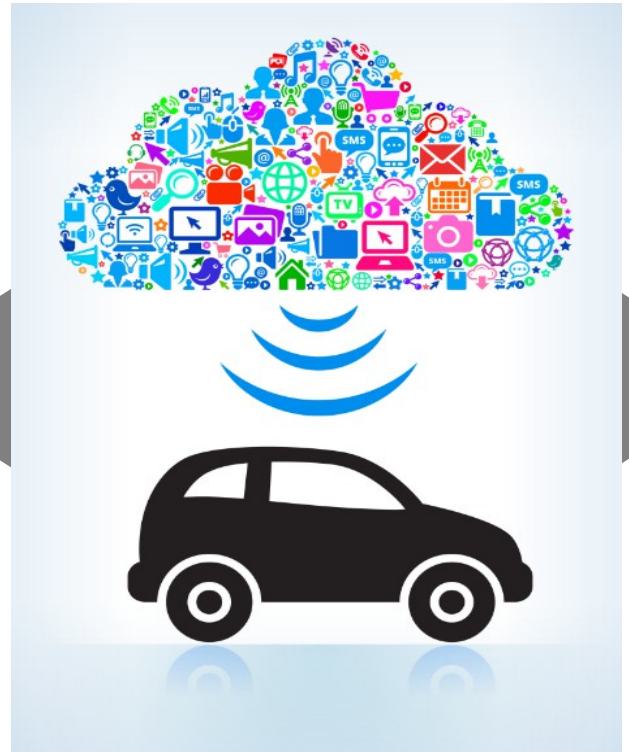


IN-VEHICLE

- Operational data driving autonomous actions
- Data normalization, computer vision, sensor fusion

Run machine learning models

Tracking and monitoring system performance



BUSINESS LOGIC

- Dashboards
- Trends and Patterns
- Fleet management
- Predictive maintenance
- Billing and payment systems
- Customer intimacy
- Application Platforms

- "Service Integration Platforms" linking cars with smart cities

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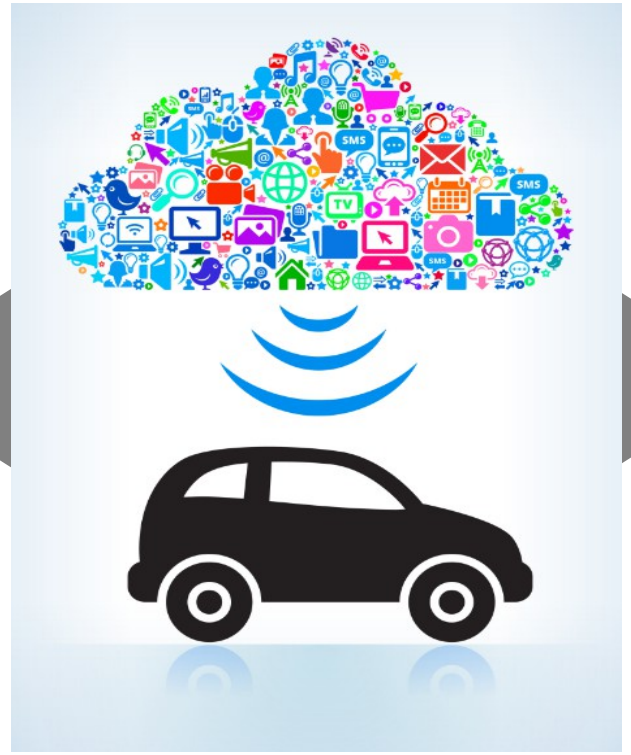
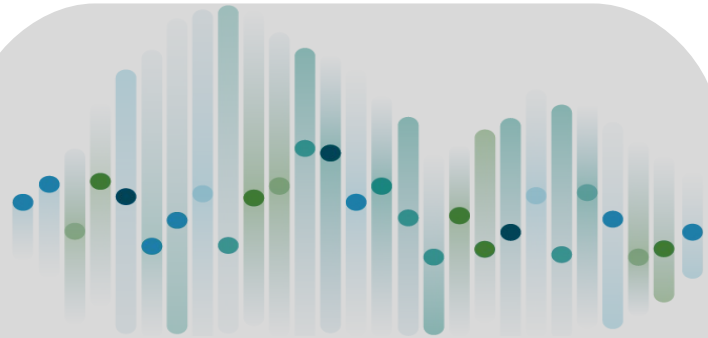
The Winning Recipe

4. Autonomy: Traditional cloud moving closer to the vehicle

FOG

- More in-vehicle compute and storage
- Local analytics and decision making: ML/DL training in the cloud, push models to the car
- Cloud evolution: gross scale data analytics, cross-domain data





ORCHESTRATION

- Dynamic and intelligent workload placement
- Workflow automation
- System monitoring
- Dynamically adapt to traffic flow and accidents

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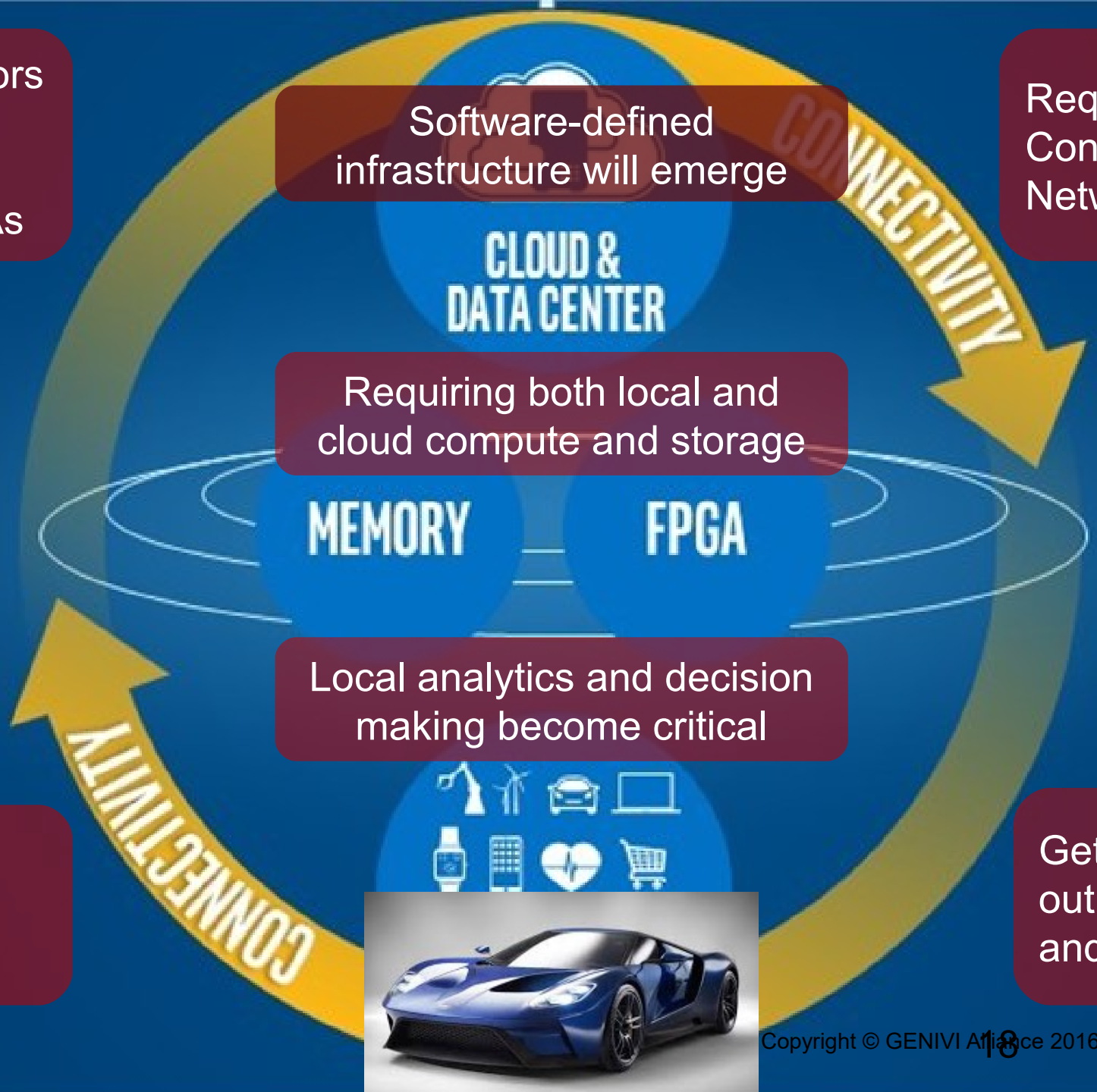
Cities and AV operators will demand highly reliable backend systems to meet SLAs

Software-defined infrastructure will emerge

Requiring us to rethink Connectivity and Networking Architecture



Requiring both local and cloud compute and storage

Local analytics and decision making become critical

Data becomes the currency of the connected world

Getting data into and out of the vehicle timely and securely

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