

Cars in Today's Technological Innovation

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2005



2013

Internet of Things in Everyday Life



Smart Watches / Wearables



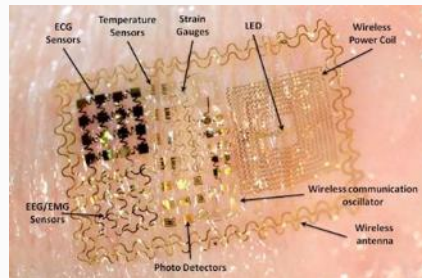
Health / Sleep Trackers



Pet Trackers



Smart Clothing



Smart Tattoos



Smart, Connected Cars, Homes

We're going to see more change in the next five to 10 years than we've seen in the last 50."

*Mary Barra, CEO,
General Motors*

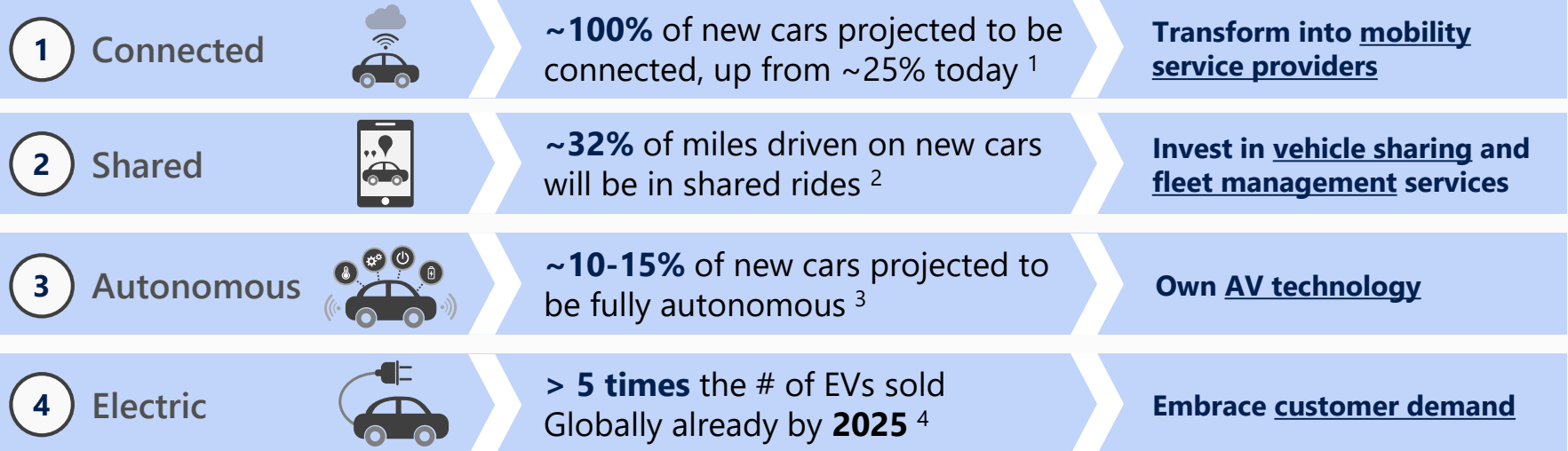


The Automotive Industry is at a Transformational Moment

The Industry is being Transformed by a Combination of Key Technology and Business Model Trends

By 2030...

As a result, automakers need to:



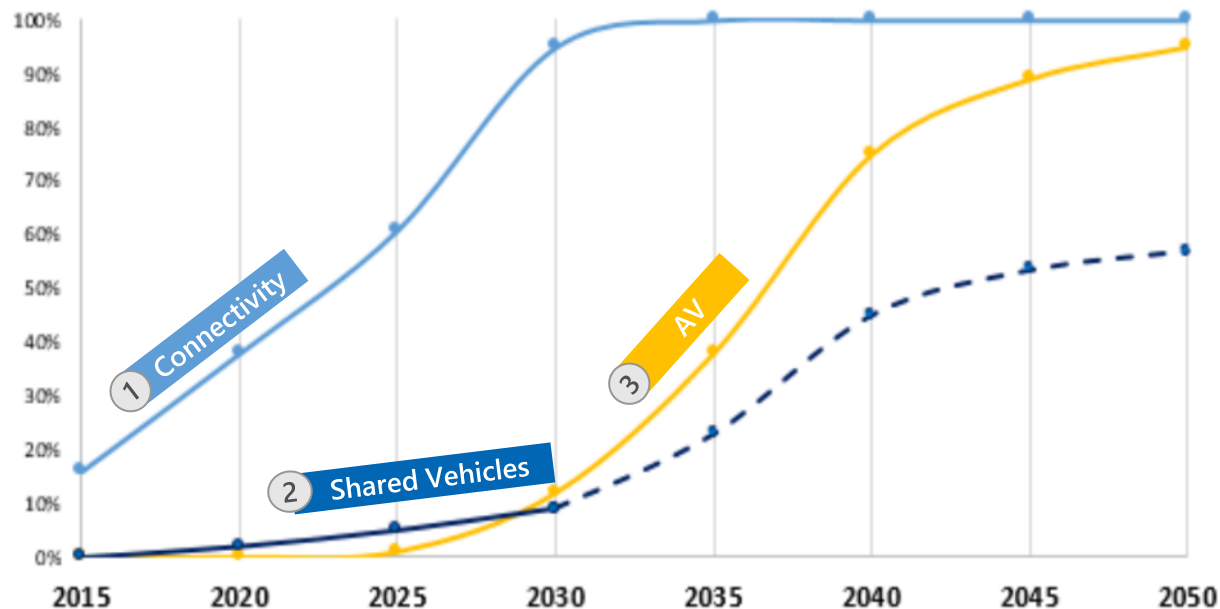
¹ Connected vehicle trend. Source: [Consultancy.uk](https://www.consultancy.uk)

³ Autonomous vehicle trend. Source: [McKinsey](https://www.mckinsey.com). Also see [this](#) and [this](#) report on stats showing 94% of accidents are due to human error. And further motivation towards autonomous

⁴ Electric vehicle trend. Source: Erik Fairbairn, CEO POD Point (maker of electric charging stations) in an [interview](#) with Clean Technica

Connected Car Transformation happens first, followed by Shared and Autonomous Vehicles

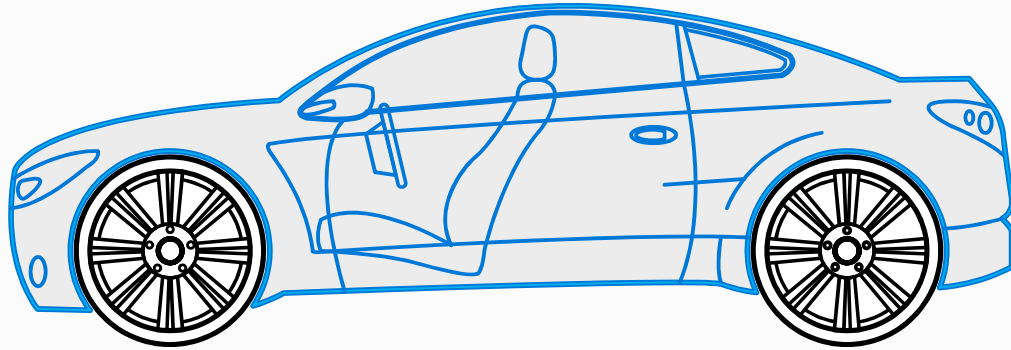
Adoption as a % of New Cars Sold —



- Ultimately, the majority of AVs (~60%) will be Shared Vehicles owned by Fleet Operators.
- The remainder will be Privately Owned Family Vehicles.

Note: Cars currently average a ~15 year replacement cycle
Source: McKinsey, IHS, Goldman Sachs, team analysis

Introducing the Microsoft Connected Vehicle Platform



The **Microsoft Connected Vehicle Platform** consists of a set of services, that enable automotive OEMs and Tier One suppliers to build global scalable connected vehicle solutions, deliver unique experiences for their customers and digitally transform their businesses.

Guiding Principles

Microsoft is not building a Car for Production

We are partnering with automakers and suppliers to enable them to build the best connected and autonomous cars possible.

Microsoft does not own the User Experience

The user experience belongs to each automaker and should reflect their brand identity; we will build platform capabilities that enable automakers to create experiences their users love.

Microsoft does not own the Data

The data belongs to the automaker and/or their customers, not to Microsoft. We will build services that can create exceptional value when data from multiple data sources (automakers, suppliers, etc.) are federated together and the data owners will always be able to control what data is shared into a federated service.

Microsoft Connected Vehicle

Use Insights from Vehicle Data to Prevent Downtime, Warranty and Recall Issues. Offer New Services that Improve User Experience

MICROSOFT CONNECTED VEHICLE PLATFORM

Spanning in-car and cloud. These pillars support common use cases for connected car.



Telematics and Predictive Services

COMMON SERVICES

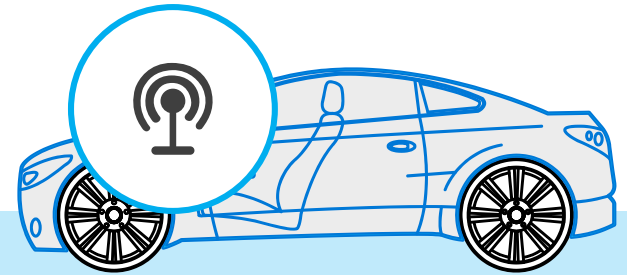
Azure PaaS Services + Microsoft Productivity Suite

Azure IoT Suite

Machine Learning & Analytics

Additional Azure

Storage | Compute | Network



Telemetry

Device-to-Cloud Messages

Telematics Command

Cloud-to-Device Messages

V2X Messages

Predictive Maintenance

Vehicle Health Report

Device Management

Find My Car

Remote Lock/Unlock

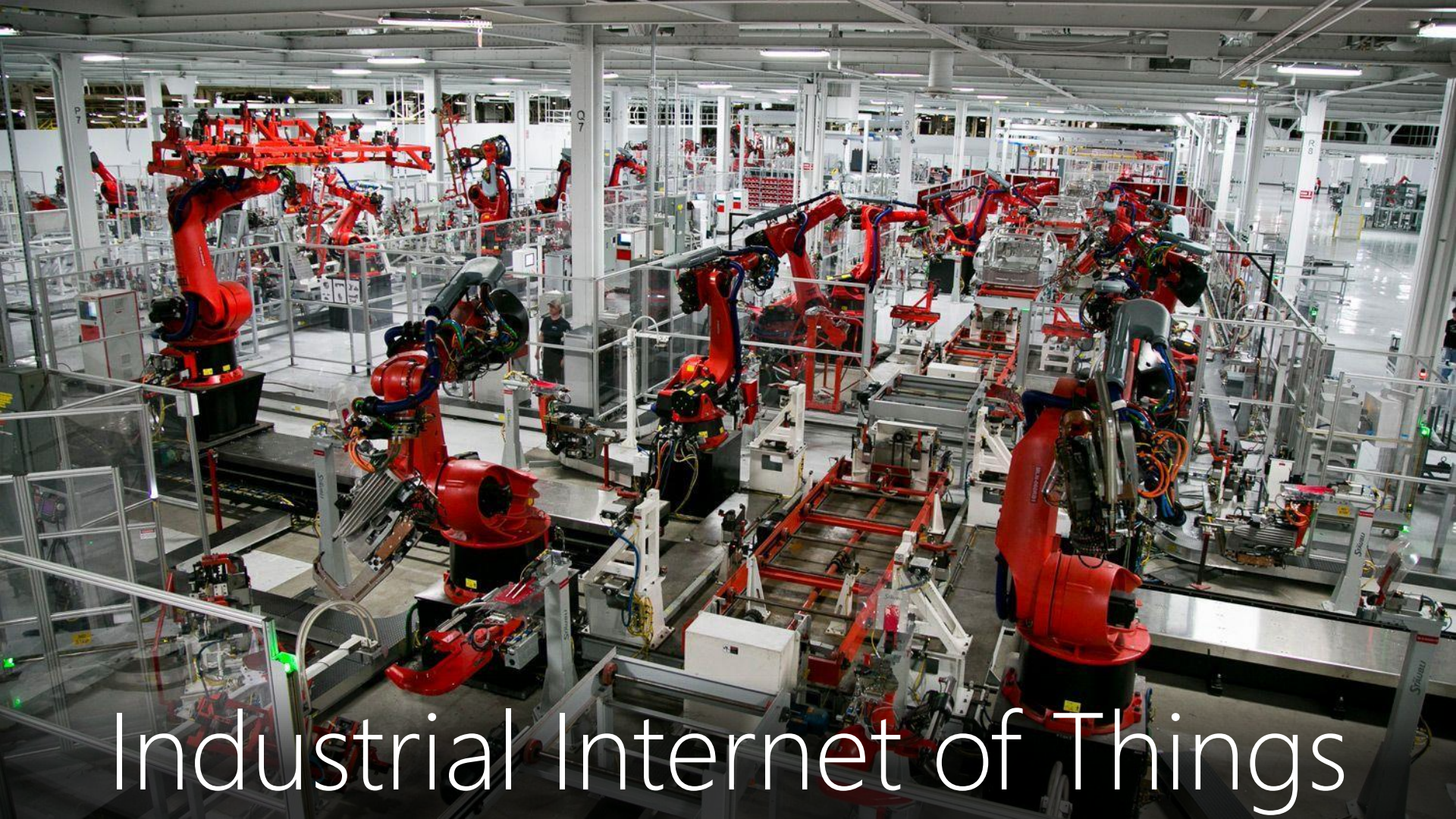
Remote Precondition

Over The Air Updates

Fleet Management like

Enterprise PC mgmt

Fleet Management

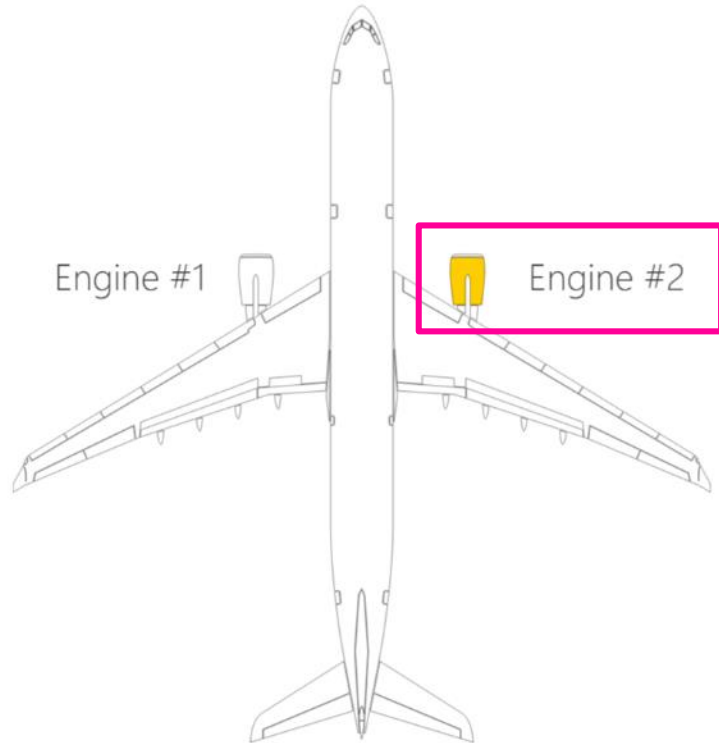


Industrial Internet of Things

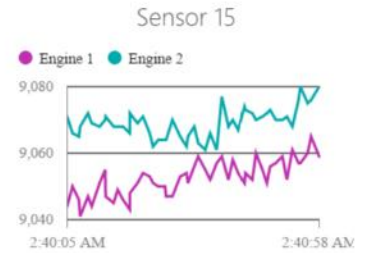
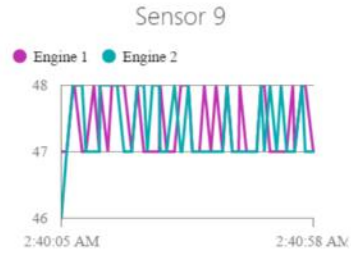


Aircraft map

Simulation in progress



Sensor history



Remaining Useful Life (RUL)
IN CYCLES

162
ENGINE #1

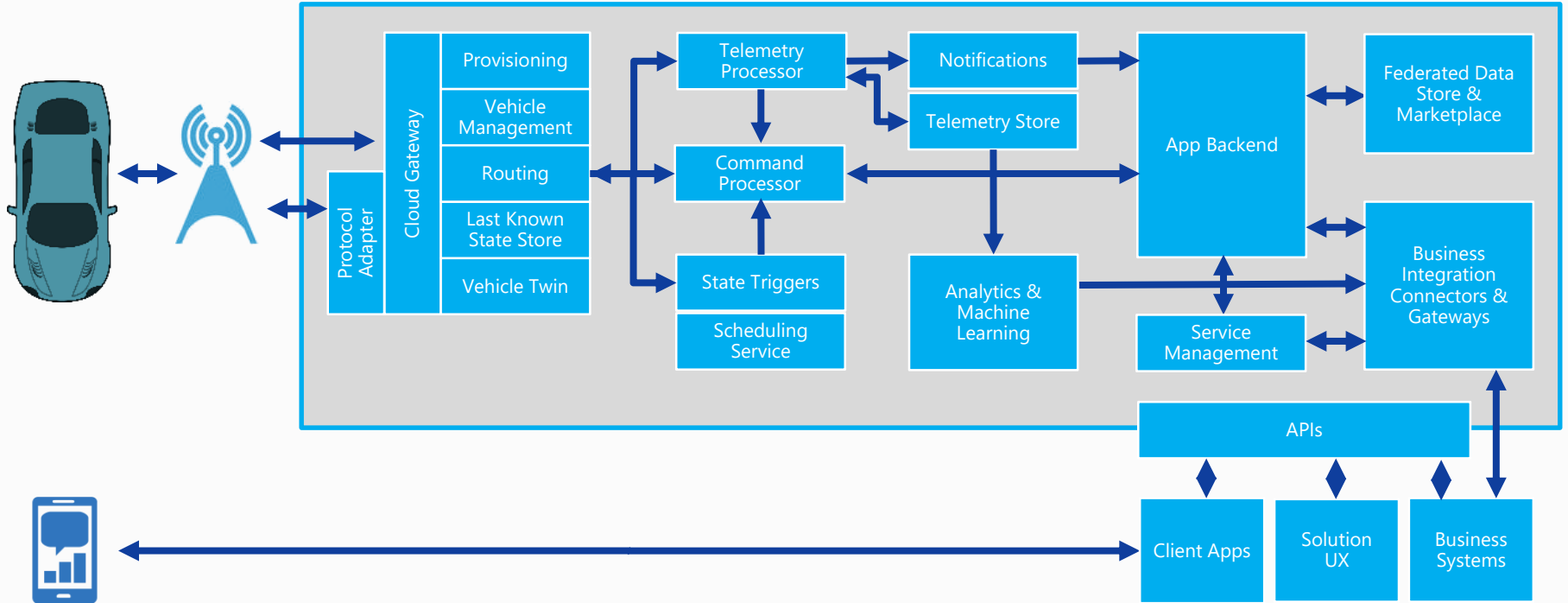
136 ⚠
ENGINE #2

Cycles
#

65
ENGINE #1

61
ENGINE #2

Connected Vehicle Platform Architecture



Microsoft Connected Vehicle

Help Customers do more while reducing Driver Distraction and Safety Hazards

MICROSOFT CONNECTED VEHICLE PLATFORM

Spanning in-car and cloud. These pillars support common use cases for connected car.



Telematics and Predictive Services



Productivity and Digital Life

COMMON SERVICES

Azure PaaS Services + Microsoft Productivity Suite

Azure IoT Suite

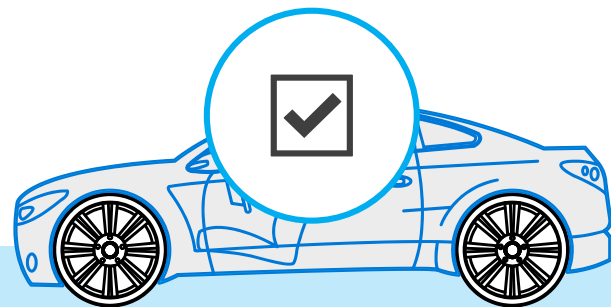
Machine Learning & Analytics

Cortana personal assistant

Office 365 & Skype

Additional Azure

Storage | Compute | Network



Personal Voice Assistant

Cortana in the Car & out of the Car

Calendar

Office 365

Communications

Office 365 Email, Skype Conferencing

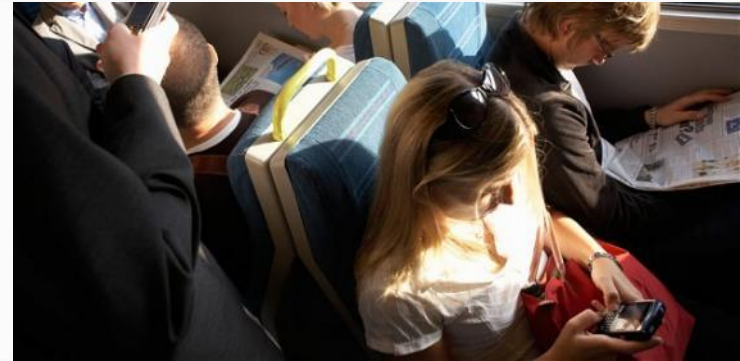
Task Management

Outlook / Office 365

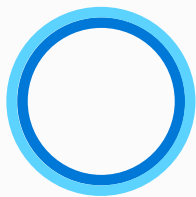
Conversations as a Platform

- Human Language is the new UI
- Bots are the new Apps
- Digital Assistant are Meta Apps
- Intelligence infused into all Interactions
- Microsoft Speech Recognition Beats Humans (5.1% vs. 5.9% word error rate)

<https://blogs.microsoft.com/ai/2016/10/18/historic-achievement-microsoft-researchers-reach-human-parity-conversational-speech-recognition/>

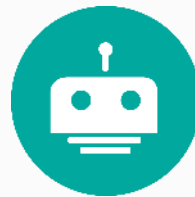


Bots vs. Agents



Agents:

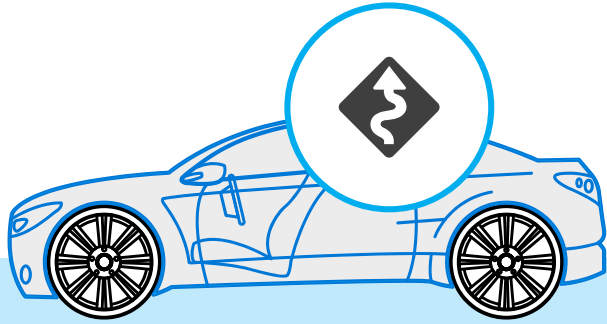
- Personal Digital Assistant
- Knows your Context and works on your behalf
- Holds your state
- Knows your Personal Information like Interests Calendar, etc.
- Can get help from relevant Bots



Bots:

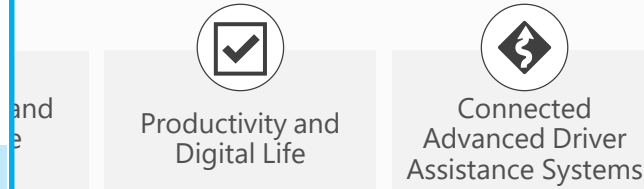
- Purpose built Services
- Transactional in Nature
- Need to know Information & Context for specific Task Completion only

Increase Safety, Optimize Vehicle Performance, & Deliver real-time Information to the Driver or Autonomous System



Deep Learning Neural Network for Batch Training
In-car Trained Model for real-time Evaluation
Ongoing Capture and Retraining
Capture, Analyze and Act on Live Road Conditions

Connected Vehicle Platform



Machine Learning & Analytics

Cortana personal assistant

Office 365 & Skype

Microsoft Graph

Artificial Intelligence

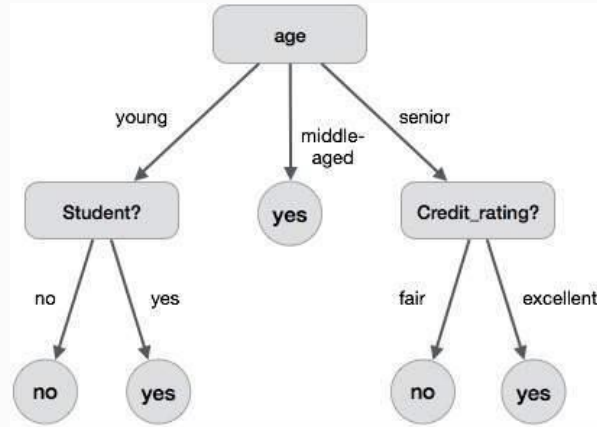
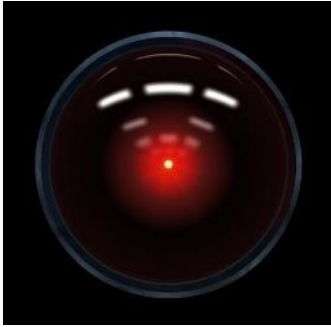
Additional Azure Services

Storage | Compute | Networking | Etc.

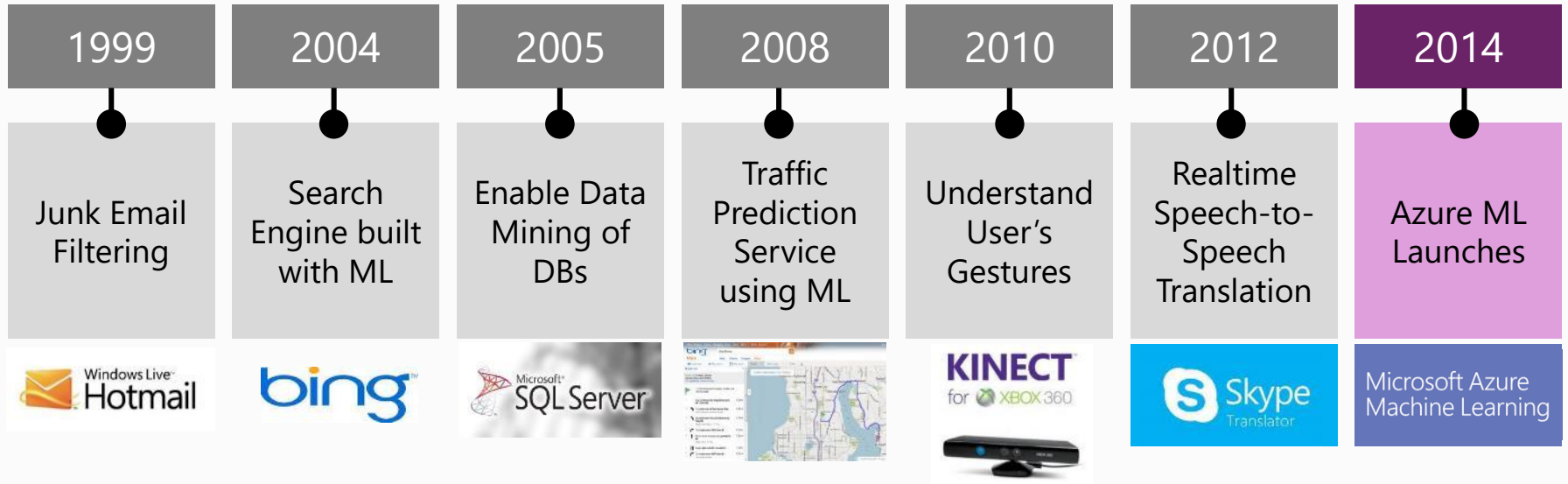
What is Artificial Intelligence?

General A.I.

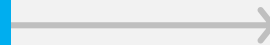
Specialized A.I.



Intelligent Services in the Cloud



Machine Learning Algorithms



Best of Microsoft

Machine Learning Studio

The screenshot displays the Microsoft Azure Machine Learning Studio interface. The top navigation bar shows the user's name, 'Luis Cabrera-Cordon-Free...', and the status 'Finished running'. The main workspace contains a workflow diagram with the following steps: 'Adult Census Income Binary...', 'Split Data', 'Two-Class Neural Network' (highlighted with a circled '1'), 'Train Model', 'Score Model', and 'Evaluate Model'. A 'SET UP WEB SERVICE' button is circled in the diagram. The right-hand 'Properties' pane is open for the 'Two-Class Neural Network' step, showing configuration options such as 'Create trainer mode' (Single Parameter), 'Hidden layer specification' (Fully-connected case), 'Number of hidden no...' (100), 'Learning rate' (0.1), 'Number of learning ite...' (100), 'The initial learning wei...' (0.1), 'The momentum' (0), 'The type of normalizer' (Min-Max normalizer), and 'Shuffle examples' (checked). The bottom toolbar includes icons for 'NEW', 'RUN HISTORY', 'SAVE', 'SAVE AS', 'DISCARD CHANGES', 'RUN', 'SET UP WEB SERVICE', and 'PUBLISH TO GALLERY'.

Microsoft Azure Machine Learning

Experiment created on 2/13/2016

Finished running ✓

Draft saved at 4:02:16 PM

Search experiment items

- Saved Datasets
- Trained Models
- Data Format Conversions
- Data Input and Output
- Data Transformation
- Feature Selection
- Machine Learning
- OpenCV Library Modules
- Python Language Modules
- R Language Modules
- Statistical Functions
- Text Analytics
- Web Service
- Deprecated

Adult Census Income Binary...

Split Data

Two-Class Neural Network ✓

Train Model ✓

Score Model ✓

Evaluate Model ✓

SET UP WEB SERVICE

Properties Project

Two-Class Neural Network

Create trainer mode
Single Parameter

Hidden layer specification
Fully-connected case

Number of hidden no...
100

Learning rate
0.1

Number of learning ite...
100

The initial learning wei...
0.1

The momentum
0

The type of normalizer
Min-Max normalizer

Shuffle examples

Quick Help

Creates a binary classifier using a neural network algorithm
(more help...)

NEW

RUN HISTORY

SAVE

SAVE AS

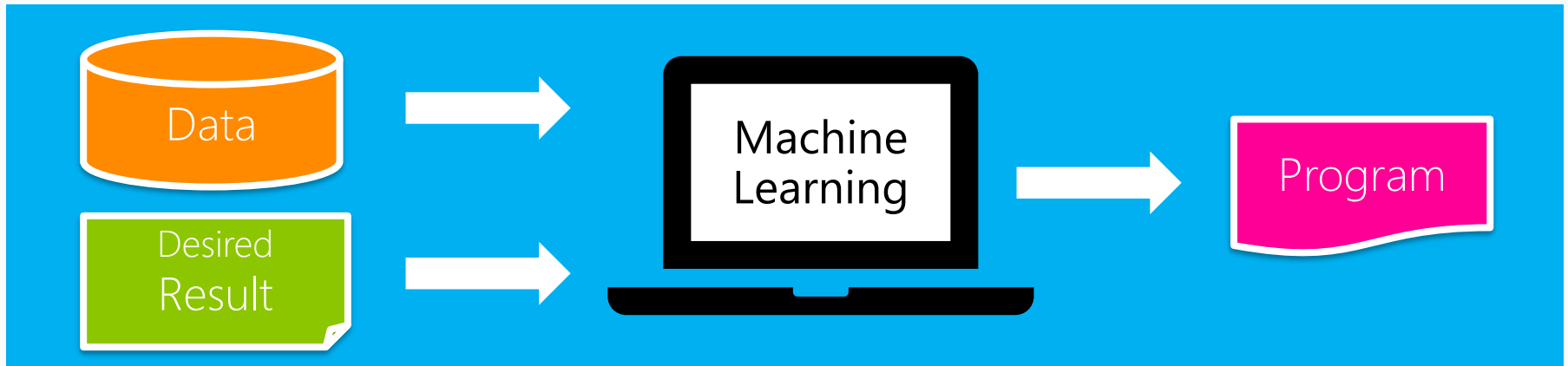
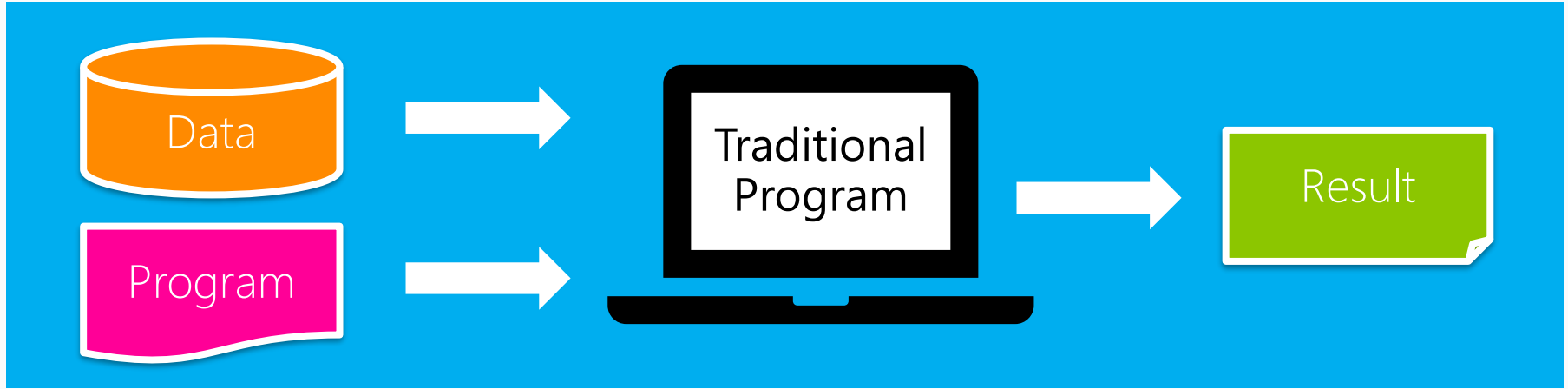
DISCARD CHANGES

RUN

SET UP WEB SERVICE

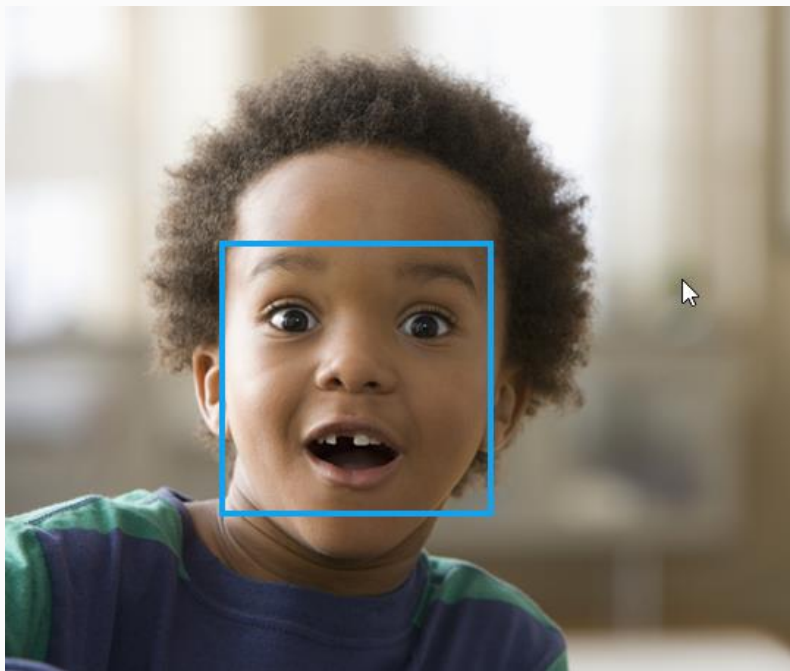
PUBLISH TO GALLERY

Machine Learning Explained



Cognitive Services

“Enable your Apps to See, Hear, Interpret, and Interact in more Human Ways.”



```
JSON: [
  {
    "faceRectangle": {
      "left": 175,
      "top": 187,
      "width": 215,
      "height": 215
    },
    "scores": {
      "anger": 0.000008473417,
      "contempt": 0.0000987896055,
      "disgust": 0.00003328445,
      "fear": 0.0005069857,
      "happiness": 0.132762313,
      "neutral": 0.0136927208,
      "sadness": 0.0000227907713,
      "surprise": 0.852874637
    }
  }
]
```

Language Understanding Intelligent Service

Understand what Users are Saying

- Determines Intent
- Detects Entities

Seamless Integration with
Speech Recognition

Learns over Time

Use pre-built, World Class
Models from Bing and Cortana



"How much
parking is available
in Urania?"

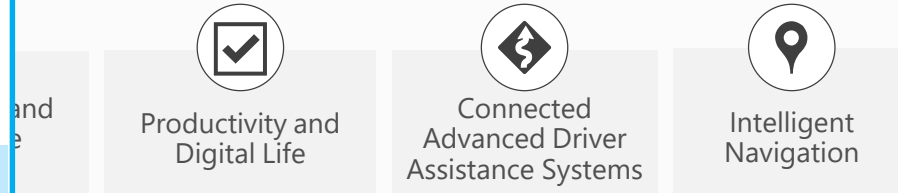
```
{
  "entities": [
    {
      "entity": "urania",
      "type": "Parking"
    }
  ],
  "intents": [
    {
      "intent": "FindParking",
      "score": 0.92853384
    },
    {
      "intent": "None",
      "score": 0.07289317
    },
    {
      "intent": "RepeatLastRequest",
      "score": 0.0167122427
    },
    {
      "intent": "ListAllParkings",
      "score": 0.0091929924
    }
  ]
}
```

Unify Navigation Data
Elements like Maps, Weather,
Traffic, and Parking to deliver
Optimized Routing and
Location Based Services



Geolocation & Geofencing
Contextual POI Search
Contextual Routing
Geospatial Analysis
Maps for Highly Automated Driving
**Intelligent Vehicle Routing based on
Up-To-Date data (V2X)**

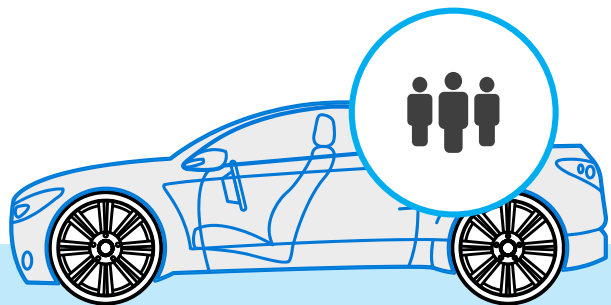
Connected Vehicle Platform



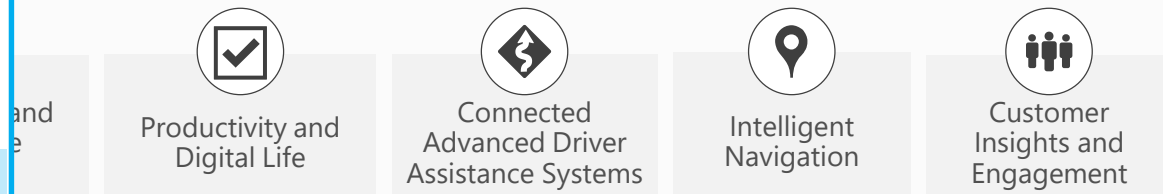
Additional Azure Services

Storage | Compute | Networking | Etc.

Connect Across the Entirety of a Customer's Digital Life through Custom Applications, CRM Integration, and new Business Models



Connected Vehicle Platform



Mobile Solutions
CRM Integration
Analytics & Insight Discovery &
Shopping Tools
Targeted Advertising

Microsoft Connected Vehicle Platform

PURPOSE BUILT

Customized instances of the platform. Microsoft can customize and operate.

Managed Services

Managed Services

Managed Services

OEM Specific Customization of Connected Vehicle Solution

OEM Specific Customization of Connected Vehicle Solution

OEM Specific Customization of Connected Vehicle Solution

MICROSOFT CONNECTED VEHICLE PLATFORM

Spanning in-car and cloud. These pillars support common use cases for connected car.



Telematics and Predictive Services



Productivity and Digital Life



Connected Advanced Driver Assistance Systems



Intelligent Navigation



Customer Insights and Engagement

COMMON SERVICES

Azure PaaS Services + Microsoft Productivity Suite

Azure IoT Suite

Machine Learning & Analytics

Cortana personal assistant

Office 365 & Skype

Microsoft Graph

Artificial Intelligence

Mapping & Location

Cortana Intelligence Suite

Additional Azure Services

Storage | Compute | Networking | Etc.

Why Microsoft?

Microsoft has been enabling Digital Transformation in Various Industries, including the Automotive Sector.

Built on a Global, Scalable, Open and Secure Platform.

Expertise in Hyper-Scale Cloud, IoT, Machine Learning and Artificial Intelligence.

Microsoft can do the Heavy Lifting on the Back End. Car Makers keep Delivering what matters most: Innovative Customer-facing Experiences.

We don't Compete, we Partner with Car Makers.

Built on
Microsoft technology



38

Azure regions
worldwide



\$15B

Invested in cloud



200+

Azure cloud
services available

Microsoft Azure: Security from the Ground Up

Largest Online Services
in the World

Centers of Excellence

Microsoft Digital Crimes Unit

Microsoft Security Response Center

Microsoft Malware Protection Center

Operational Security
Assurance (OSA) Process

Security Development
Lifecycle (SDL)



<http://azure.microsoft.com/documentation/articles/iot-security-best-practices/>

<http://azure.microsoft.com/documentation/articles/securing-iot-ground-up/>

Summary

Planning on a Connected Car Strategy is Crucial.
Customer Expectations of Cars are Changing. Fast.
Cars will become Self Driving, Shared Tools.
Fleet Management will become much more important.

Car Makers Should Focus on the Customer Experience
and how to Deepen Brand Attachment.
Apply the Knowhow of the Software Companies.

Resources

Microsoft Connected Vehicle Platform

<https://www.microsoft.com/en-us/internet-of-things/connected-vehicles>

Microsoft CVP Whitepaper

<http://corti.ch/cvp>

Microsoft Internet of Things for Transportation

<https://www.microsoft.com/en-us/internet-of-things/transportation>

Microsoft Internet of Things

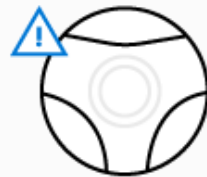
<https://www.microsoft.com/en-us/internet-of-things/>

Artificial Intelligence at Microsoft

<https://www.microsoft.com/en-us/ai>

Conversation as a Platform

<https://dev.botframework.com/>





Microsoft

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