



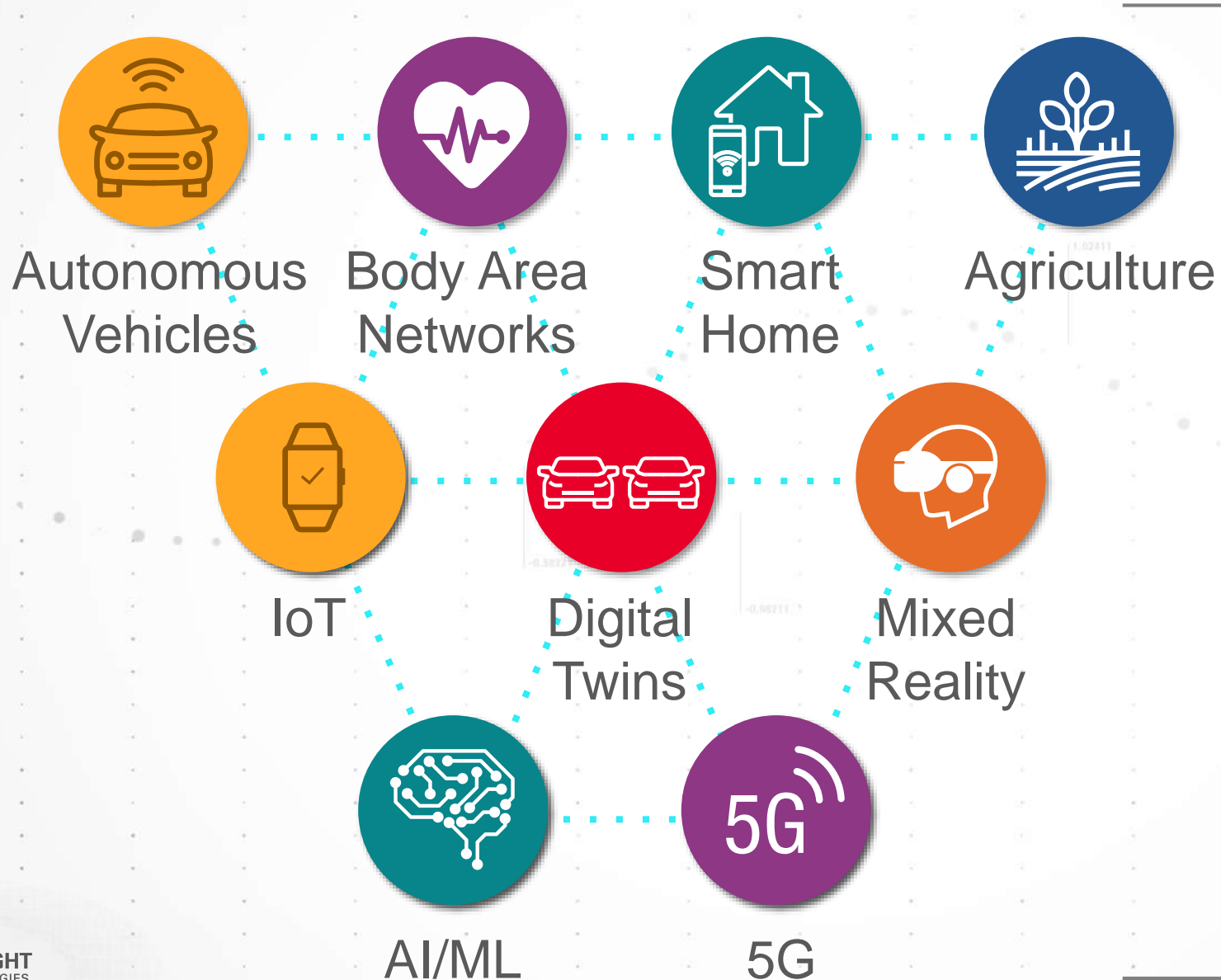
KEYSIGHT
WORLD 2019

Connecting the Dots

Marie Hattar
Chief Marketing Officer



Connecting the Dots

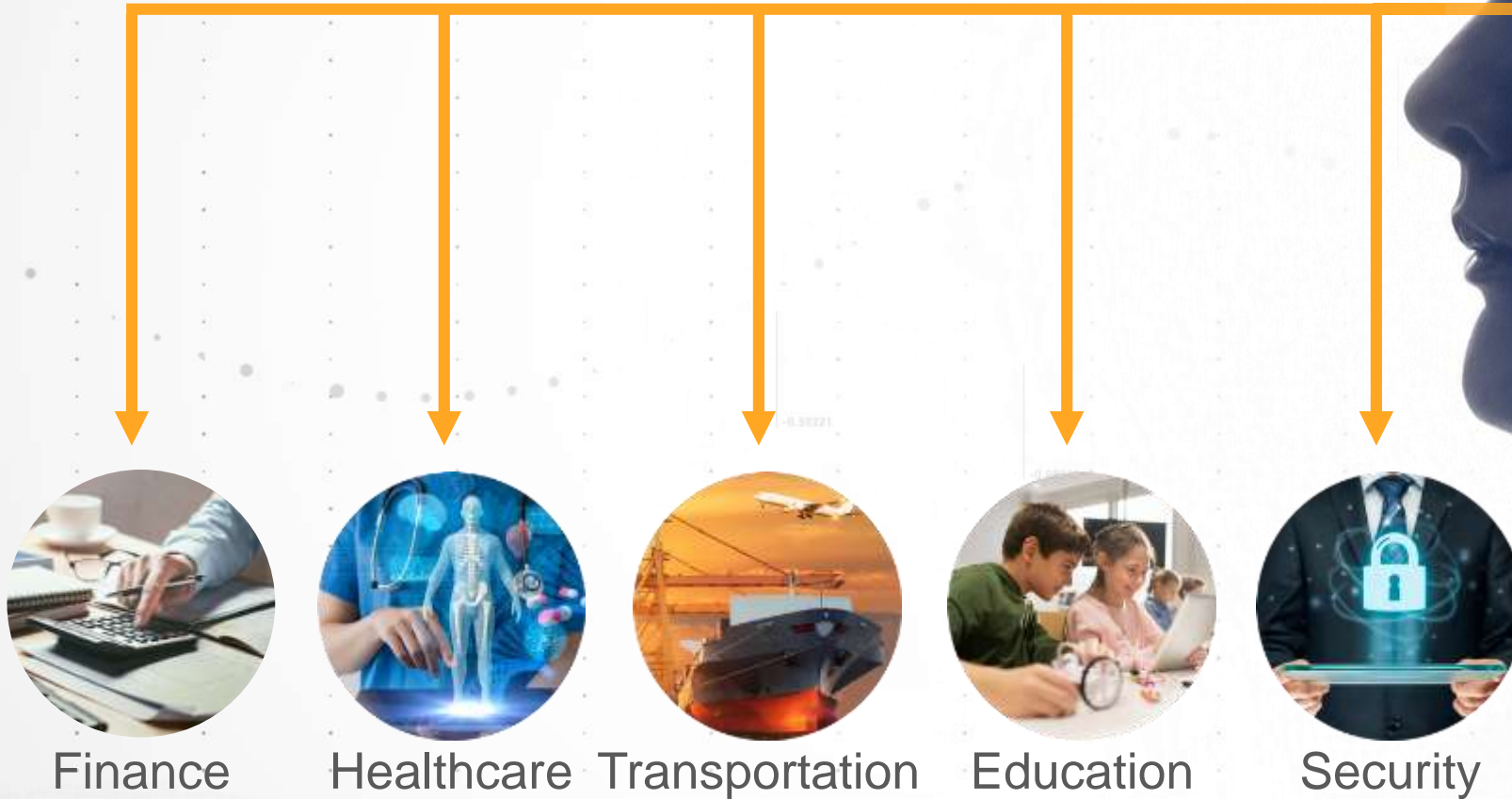


Business at
Keysight

Artificial Intelligence



Big Data



Artificial Intelligence

Metropolis



Industrial Revolution



Future of AI



Massively Scalable Datasets + Compute Power to Interpret



Solutions to Difficult Problems

Artificial Intelligence



Police Department

Early Experiments

AI-Assisted Crime Prediction

5G



High Bandwidth

Low Latency

Becoming **Real** Very Soon

New Services & Applications



NETFLIX



Uber

5G “Trapped Value”



4G vs 5G

The image is a composite graphic. On the left, there is a large, stylized '5G' in blue with a red diagonal line crossing through it, set against a background of blue hexagonal patterns. To the right, a city skyline with various skyscrapers is visible under a blue sky. Overlaid on the city and the '5G' text are white, glowing network lines and dots, representing a data network or cloud infrastructure.

Massive Investment

Re-Architecting Data Networks and the Cloud:
Rise of **Edge Computing** and **Micro-Cells**

What is the Edge?

Edge
Computing

Fog
Computing

Micro
Data Centers

Edge
Cloud

Cloudlets

Enterprise?

CORD?

Evolving Network Architecture



Millions

Edge Computing



LOCALIZED
1-10 Equipment Racks



10,000s plus

Regional Data Centers



MORE INTELLIGENCE...



100s

Cloud



Helping Our Customers Create the Bicycle for the Minds

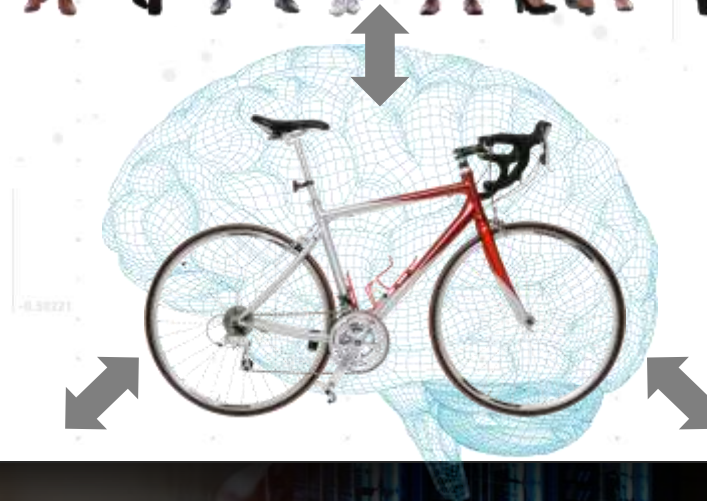
UNDERSTANDING, PREDICTING, AND DELIVERING SOLUTIONS



PEOPLE



Advanced software technologies
(AI and ML) + deep pool of human-driven experience and talent

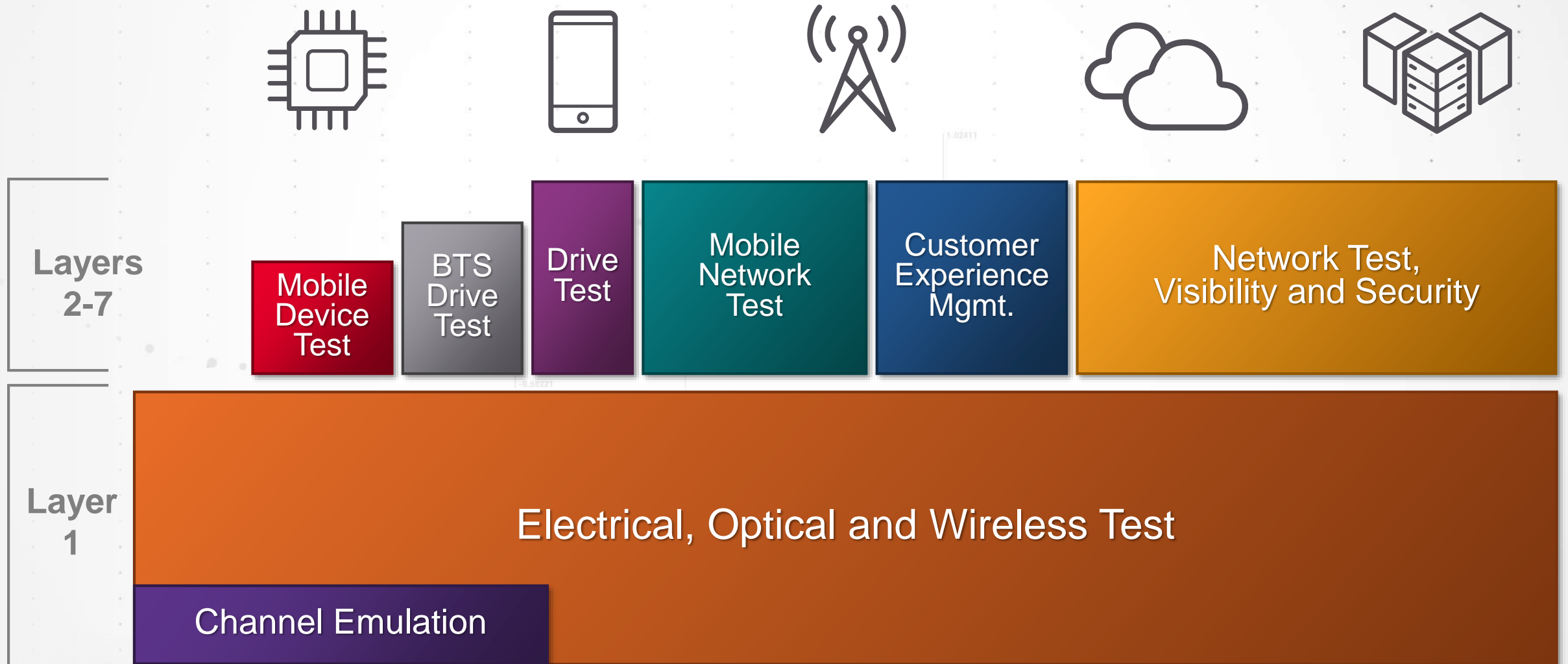


Ensure safe and effective communication

COMMUNICATION

COMPUTATION

Offering Layer 1 to Layer 7 Testing



Taiwan and 5G

- Trial Networks with traditional frequencies (3.5GHz) and mmWave (28GHz)
- Commercial service in 2020
- Business case is critical for operators to expand beyond high density and high value areas



Grow to
\$134B
USD
by 2035



Internet of Things & Industrial IoT

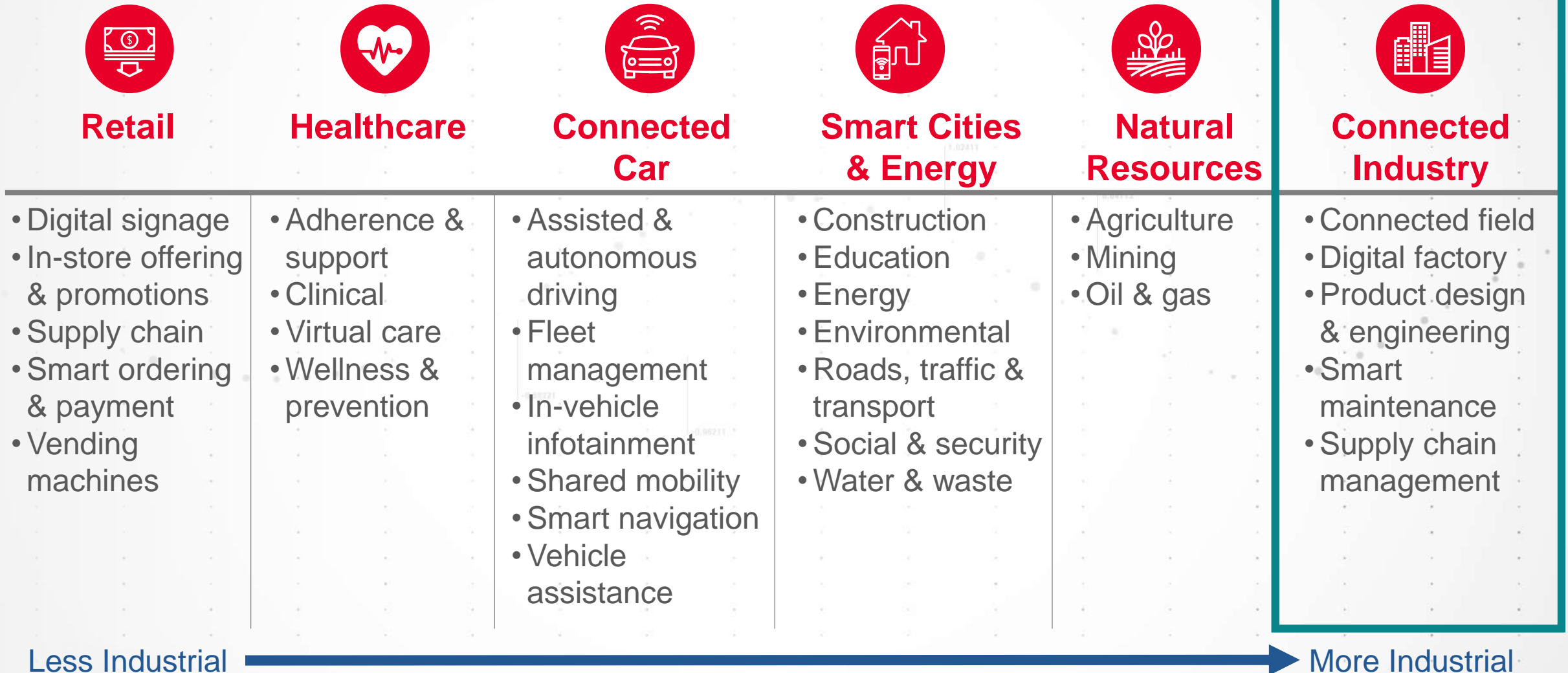


Industry 4.0: Linking **Operational Technology (OT)** and **Information Technology (IT)**

Reduce Downtime

Lower Cost

Industrial IoT



Evolving Requirements of IoT

IOT ARCHITECTURES WITH 5G IN MIND



RF, WiFi, 2G
Not Real-Time
Simple Calculations



5G Bandwidth
& Latency



Battery Run Time:
10-15 Years

Does the Internet Go Away?



By 2021, the 27B+ IoT devices will account for 5% of global IP traffic

Digital Twin



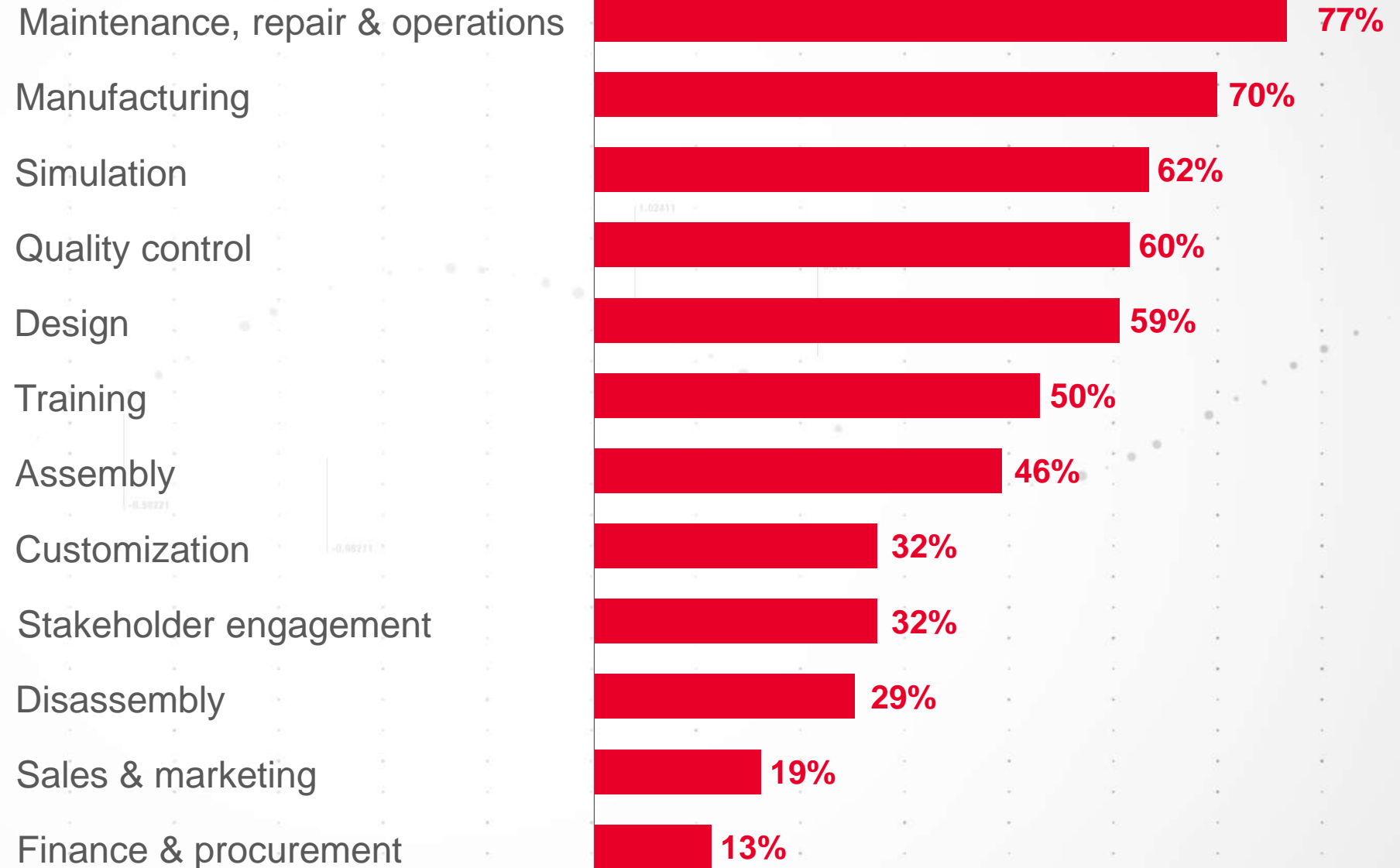
***Digital Twins
Growing to
1 Billion****

***20 Billion*
Connected Sensors
by 2020***

IBM, Microsoft, GE, Chevron, Tesla Are Early Adopters

Product Life Cycle

In which stages of the product life cycle do you see the digital twin offering greatest value*?



Mixed Reality: Virtual / Augmented / Extended



More and Faster Data Creates Shift from 100GE to
400GE Virtualized Network Architecture
Need for New Gen5 Interfaces: **PCIe 5.0** and **DDR 5.0**

Mixed Reality Applications

Healthcare



Retail



Customer Support



Mirror-World

Autonomous Vehicles



5G + IoT + Telemetry + AI + Edge Cloud + Digital Twins

Edge Cloud is Here for Autonomous Vehicles



Apollo Rocket



iPhone 6

NVIDIA chipsets: Drive AGX
Rated at 320 TOPS



Autonomous Car

32K
FASTER

3B
FASTER

Mobility 1.0

3

METERS
in 1940's



Mobility 2.0

Fewer Injuries



Less Pollution



3 Million New Jobs



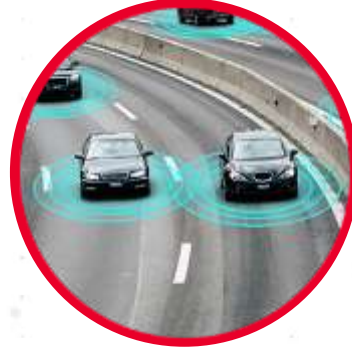
\$500 billion GDP contribution over the next 7 years
Shift to shared vehicles used 80% of time vs. 5% of private

ACES: \$200 Billion Invested Since 2010

AUTONOMOUS, CONNECTED, ELECTRIC AND SHARED



Level 0: There are no autonomous features.



Level 1: These cars can handle one task at a time, like automatic braking.



Level 2: These cars would have at least two automated functions.



Level 3: These cars handle "dynamic driving tasks" but might still need intervention



Level 4: These cars are officially driverless in certain environments.



Level 5: These cars can operate entirely on their own without any driver presence.

ACES: \$200 Billion Invested Since 2010

AUTONOMOUS, CONNECTED, ELECTRIC AND SHARED

Within 1 Year



Level 0: There are no autonomous features.



Level 3: These cars handle “dynamic driving tasks” but might still need intervention



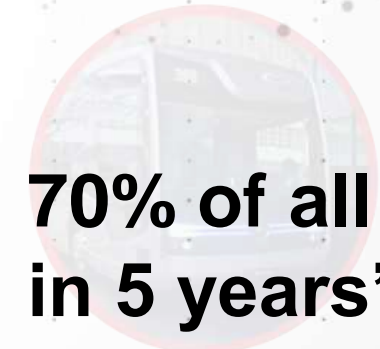
Level 1: These cars can handle one task at a time, like automatic braking.



Level 4: These cars are officially driverless in certain environments.



70% of all miles in 5 years”



Level 5: These cars can operate entirely on their own without any driver presence.

Vehicle-to-Everything (V2X) and Cellular V2X (C-V2X)

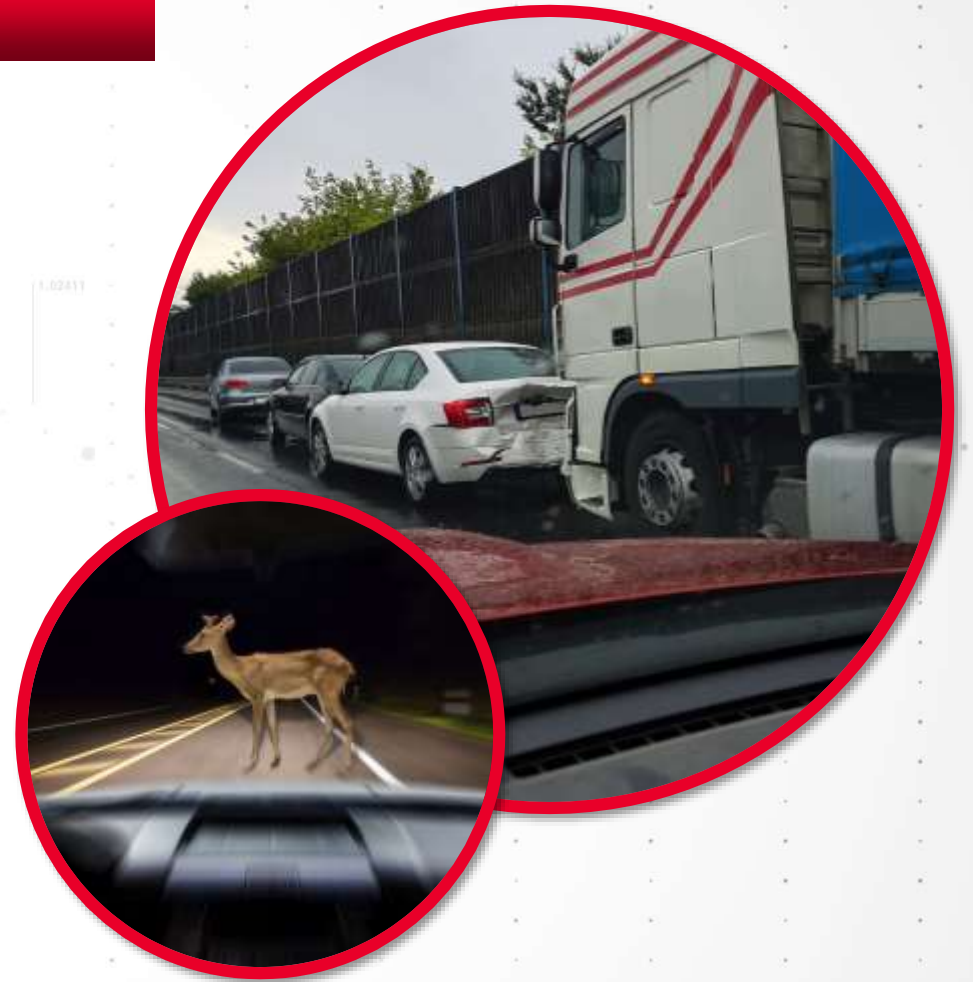
MORE STRINGENT TESTING AS LIFE CRITICAL

V2X

- See-through, 360-degree non-line-of sight sensing and extended range
- Convey intent by sharing sensor data and path planning
- Improve situation awareness via increased electronic horizon for soft safety alerts

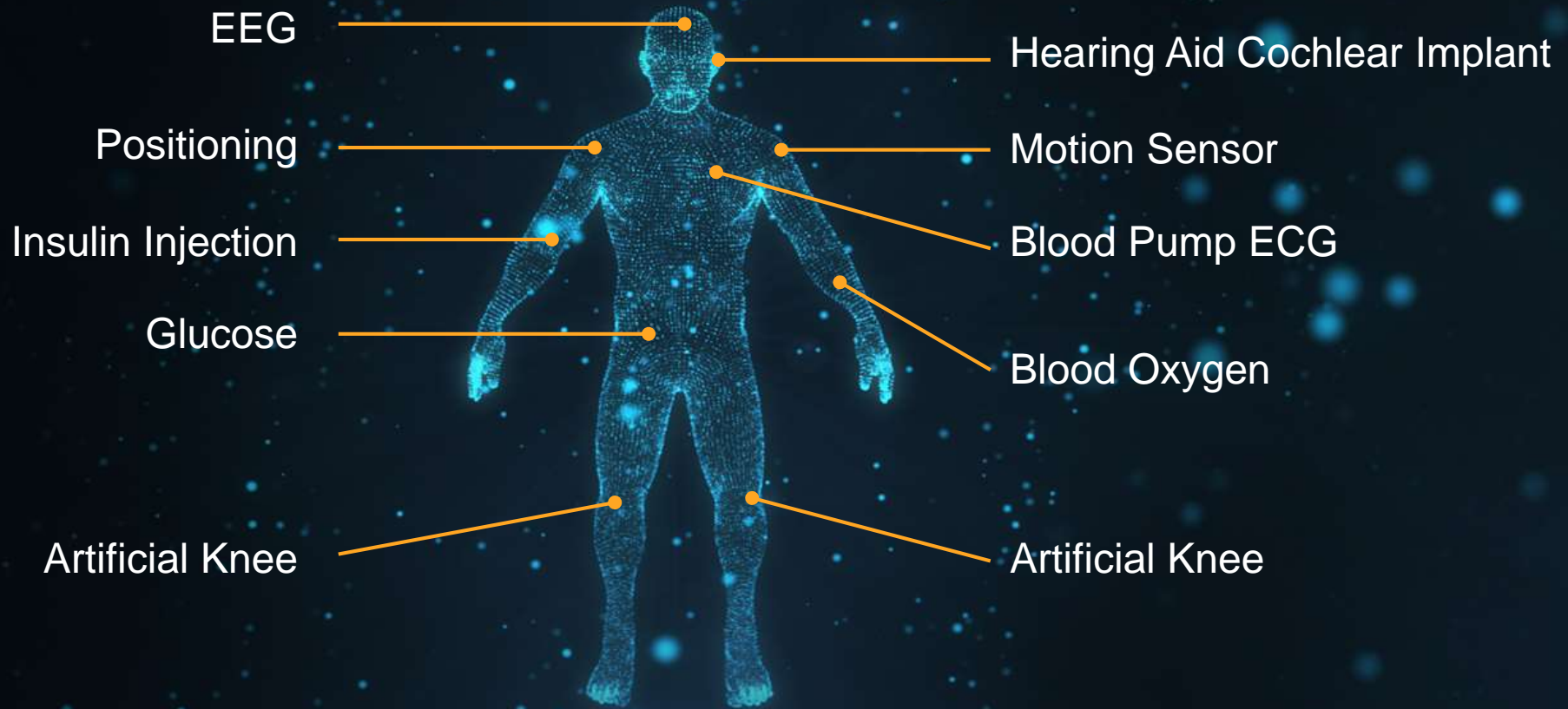
CV2X

- Real-time warnings to prevent chain collision and better accident prevention
- eCall when the vehicle senses an accident

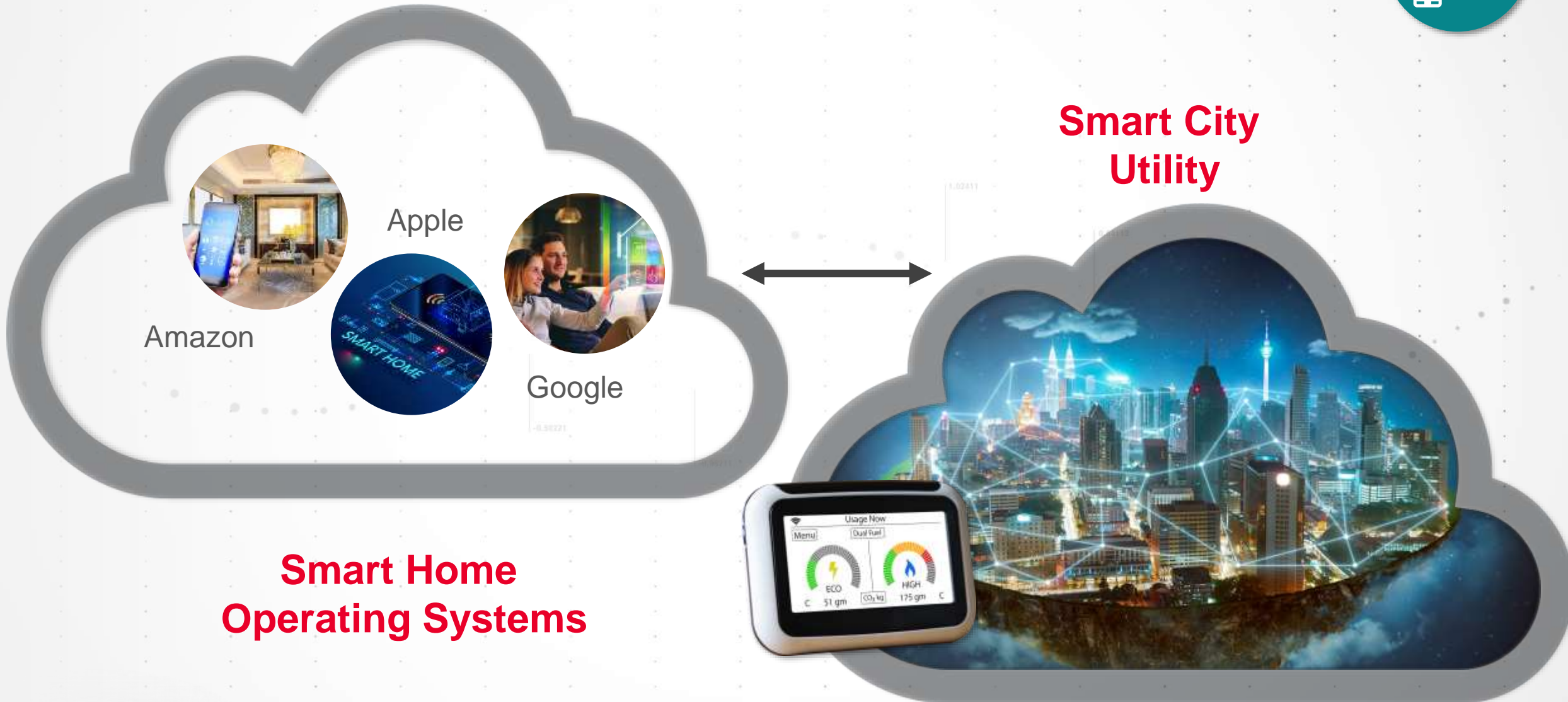


Significant market reaching \$62.7 Billion by 2023

Body Area Networks



Smart Homes



Agriculture



Monitor Climate / Fertilization



Minimize Wasted Water



Livestock Location & Health



Woof!

Woof!

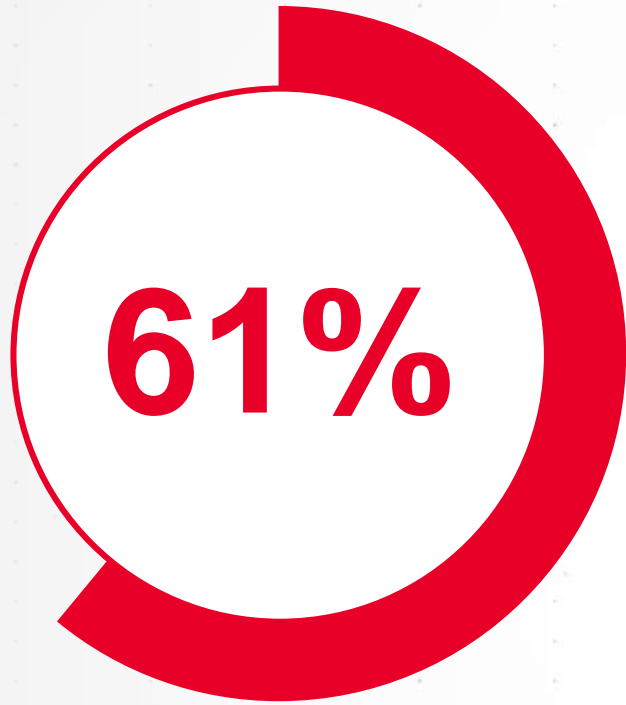
Woof!



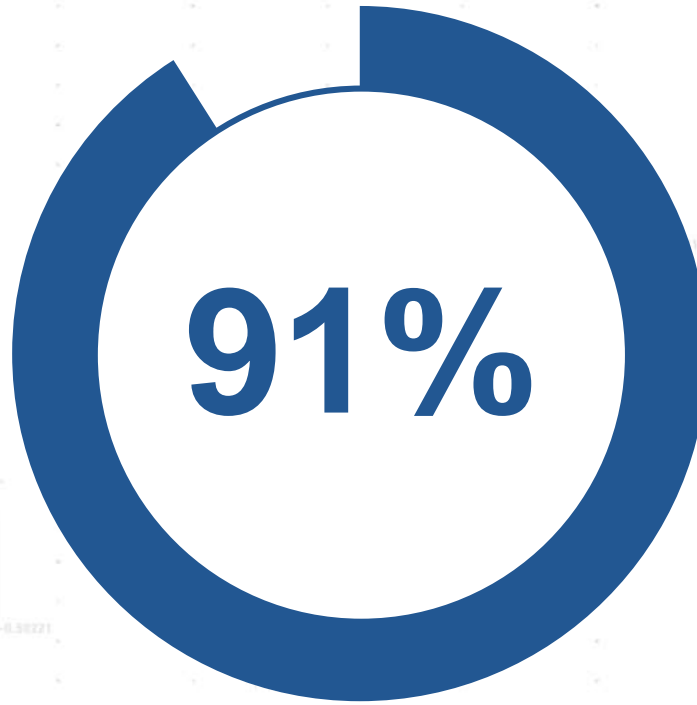
Impact on Keysight



Eliminating Silos to Speed Projects and Product Delivery



Engineers use 5+
design tools



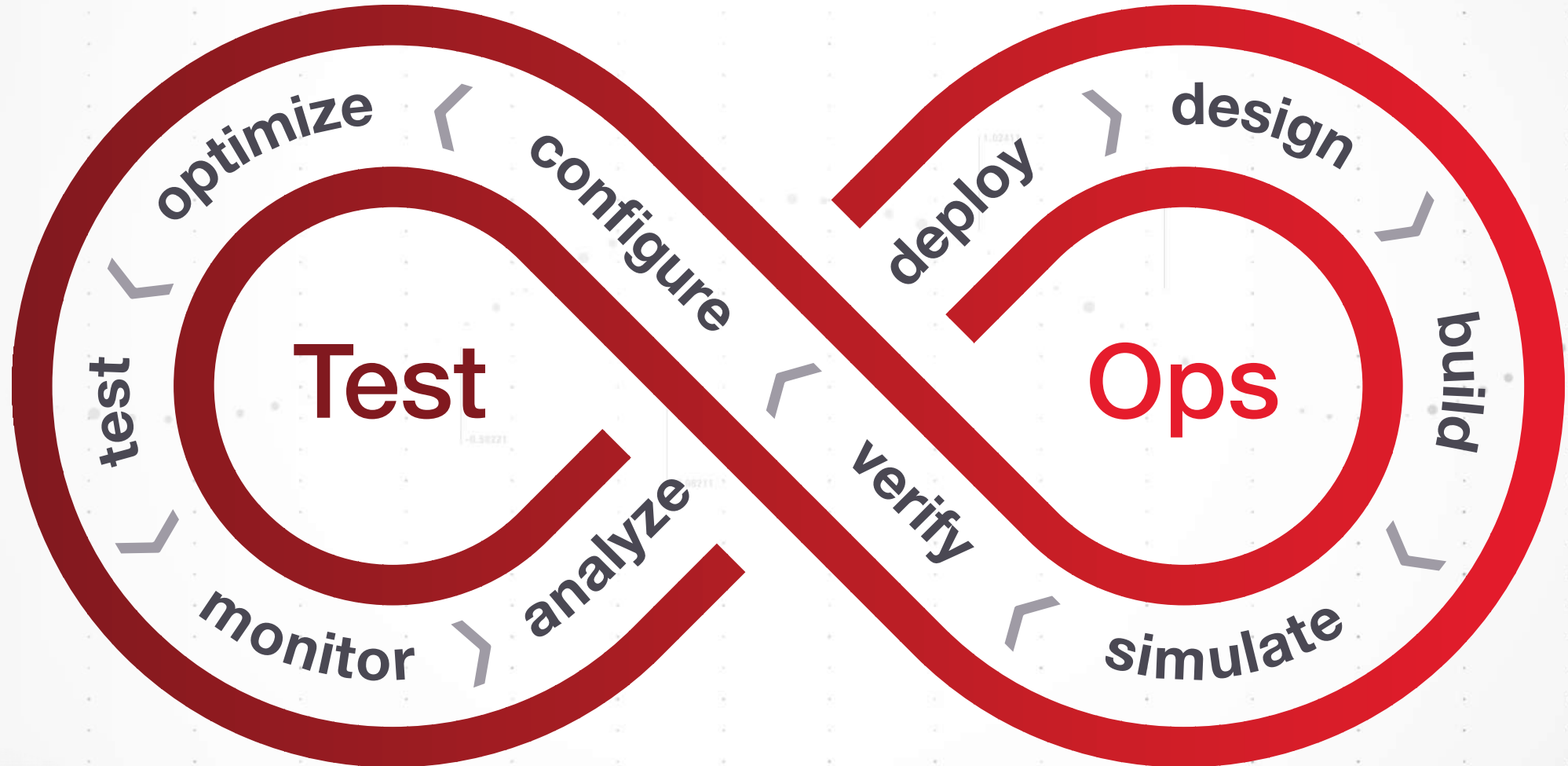
Engineers use 3+
test tools



2+ hours fixing tools &
software integration
gaps

PATHWAVE

TestOps: A New Approach for Design & Test



Taiwan

2017-2025 Digital Nation & Innovative Economic Development Program



Top 5 on Innovation Ranking According to WEF
Leader in **Neuromorphic Chips**

Smart Cities



Taipei City, Taichung, and Taoyuan

Summary



More Bandwidth:
95GHz, 3 THz

Standards
Bodies

Industry-Focused
Research

Deep Measurement
Expertise

Partner with You



KEYSIGHT
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