

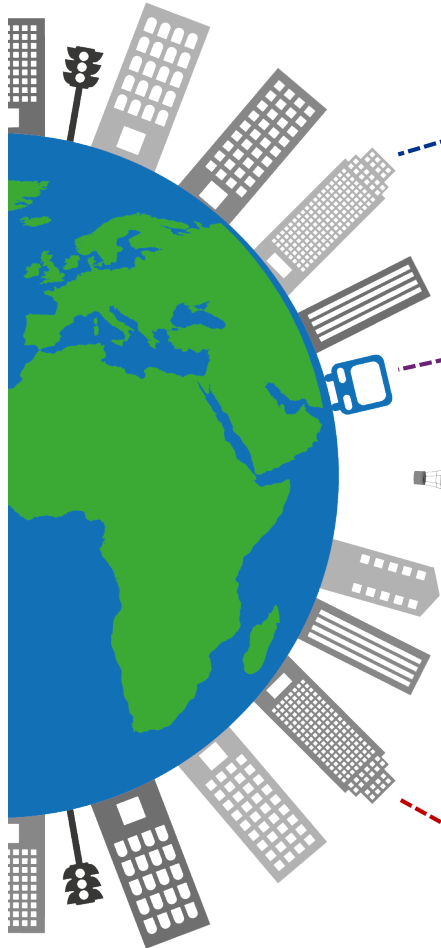


# Creating a Smarter World

UBC Smart City Team

March 2021

# What is a Smart City?



“a city that **monitors and integrates conditions of all of its critical infrastructures** – including roads, bridges, tunnels, rails, subways, airports seaports, communications, water, power, even major buildings – can better **optimize its resources**, plan its preventive maintenance activities, and **monitor security aspects** while **maximizing services to its citizens**”

- U.S. Office of Scientific and Technical Information

“an **instrumented, interconnected and intelligent city**” - IBM

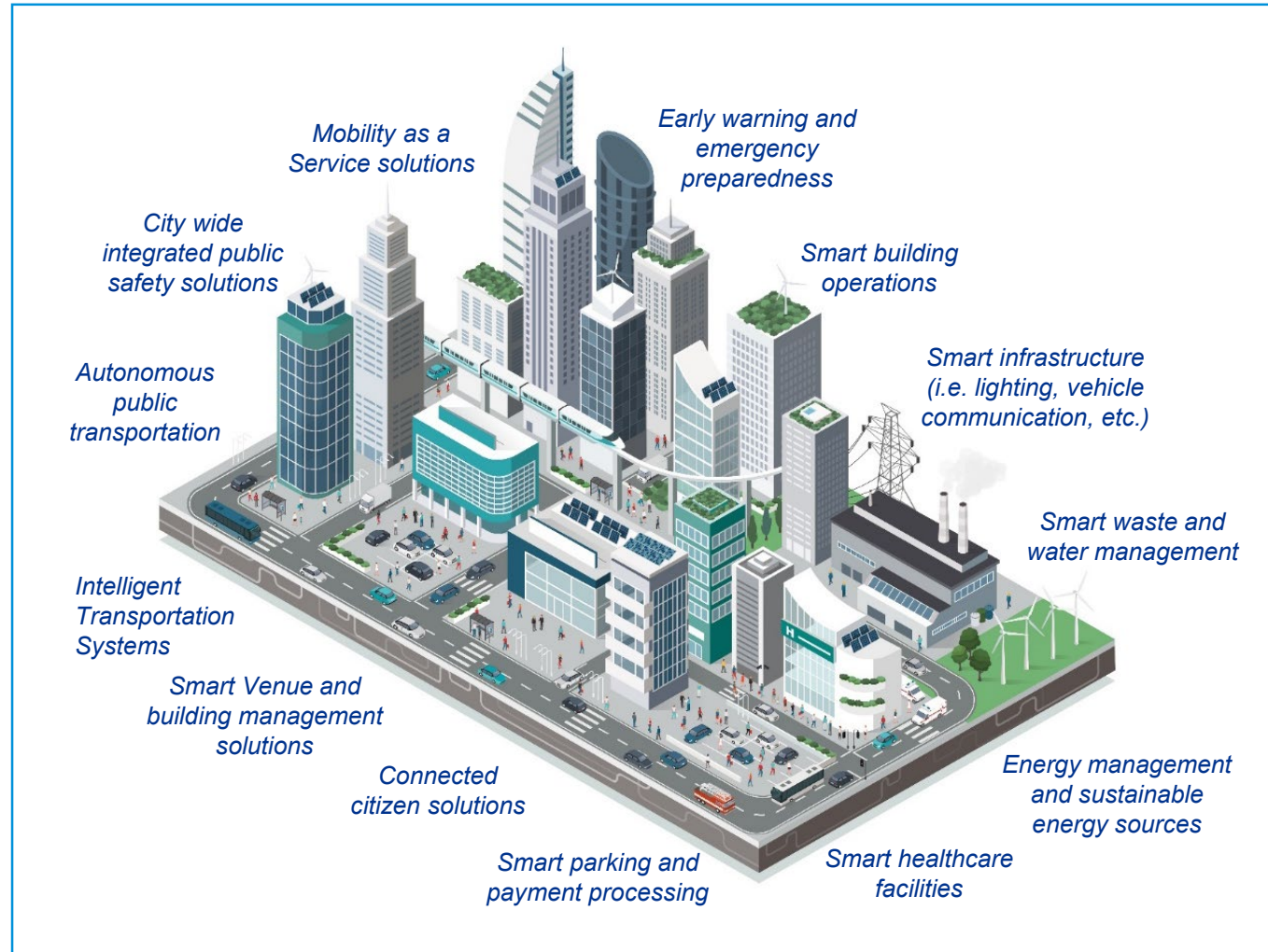
“The use of smart computing technologies to make the **critical infrastructure components and services** of a city – which include city administration, education, healthcare, public safety, real estate, transportation and utilities – more **intelligent, interconnected and efficient**” – Forrester Research

“Smart Cities **use information and communications technology** to enhance their **liveability, workability, sustainability and attractiveness**”

– Smart Cities Council Readiness Guide

“A smart city is a city that harnesses **data and innovation in technology** to make a city more **liveable, workable and sustainable** for its **citizens.**” – Chris Sainsbury, KPMG

# Smart Cities - Typical Used Cases



# Smart Agriculture





# **NEW TECHNOLOGY**

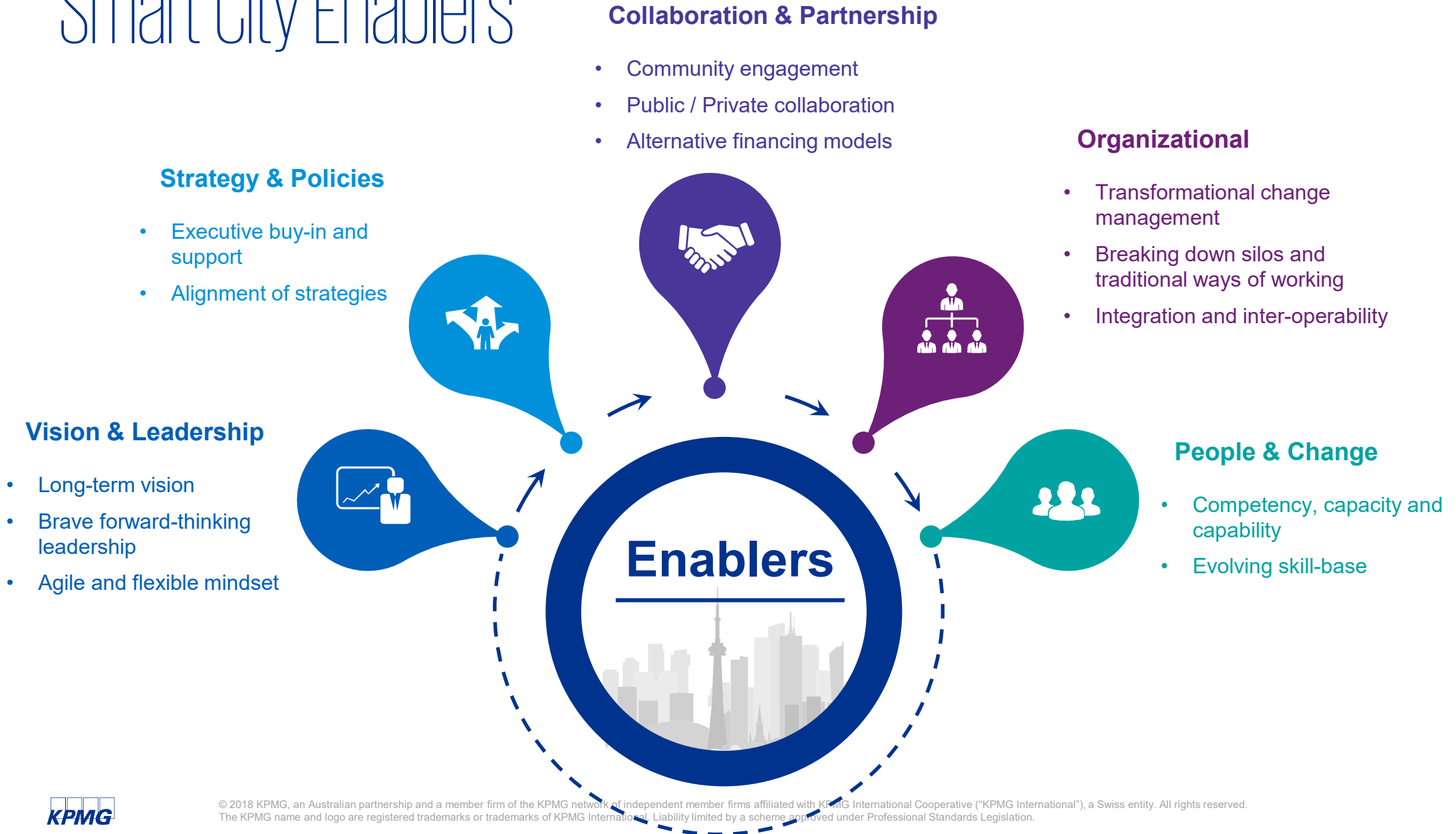
**AI, VR, BLOCKCHAIN**

**BIG DATA, ROBOTICS**

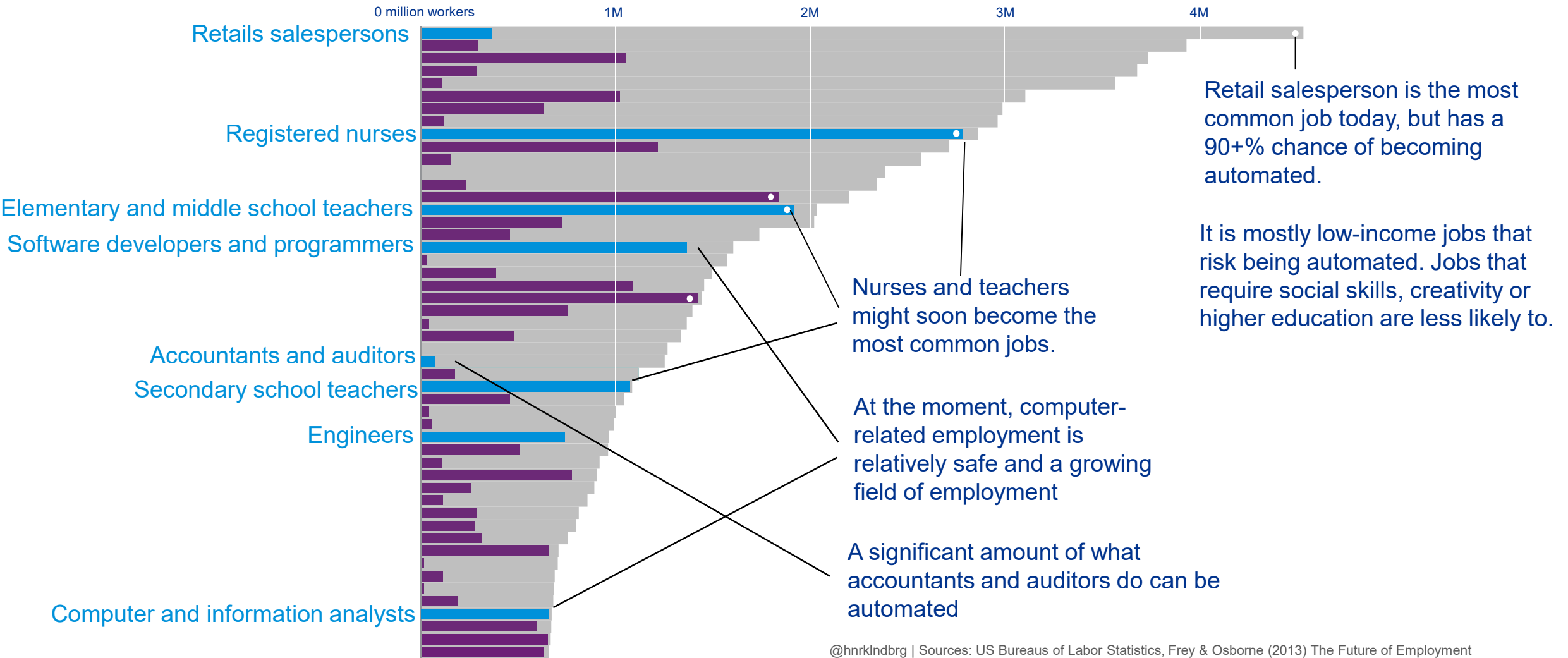
# Smart City Value Layers



# Smart City Enablers



# Workforce of the future



@hnrkIndbrg | Sources: US Bureau of Labor Statistics, Frey & Osborne (2013) The Future of Employment



# What is 5G? | Understanding the Journey to 5G

5G is more than a new generation of mobile connectivity, it's a completely different technology.

1980's

1990's

2000's

2010's

2020+

1G



2G



3G



4G



5G



SIMPLE  
TELEPHONY  
GOES MOBILE

MOBILE  
(PLUS TEXTING)  
GOES MAINSTREAM

BROADBAND &  
SMARTPHONES  
CHANGE EVERYTHING

MULTIPLE INTEGRATED  
DEVICES STREAMING  
HD & CLOUD

EXPONENTIAL CHANGE  
LED BY ENTERPRISE &  
IOT APPLICATION

ANALOGUE

ANALOGUE  
▼  
DIGITAL  
NARROWBAND

NARROWBAND  
▼  
BROADBAND

BROADBAND  
▼  
HIGH SPEED  
BROADBAND

BROADCAST  
▼  
"BEAMFORMING"  
POINT TO POINT

0 Mbps

0.5 Mbps

5 Mbps

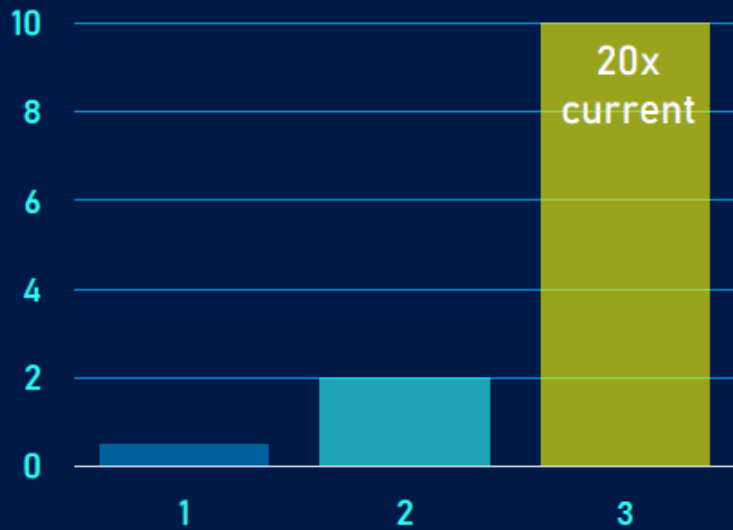
50 Mbps

2000 Mbps

# | What is 5G? | Performance Improvements

5G technology provides quantum improvements in speed, reliability, and capacity over previous generations.

## DATA RATES (Gbps)

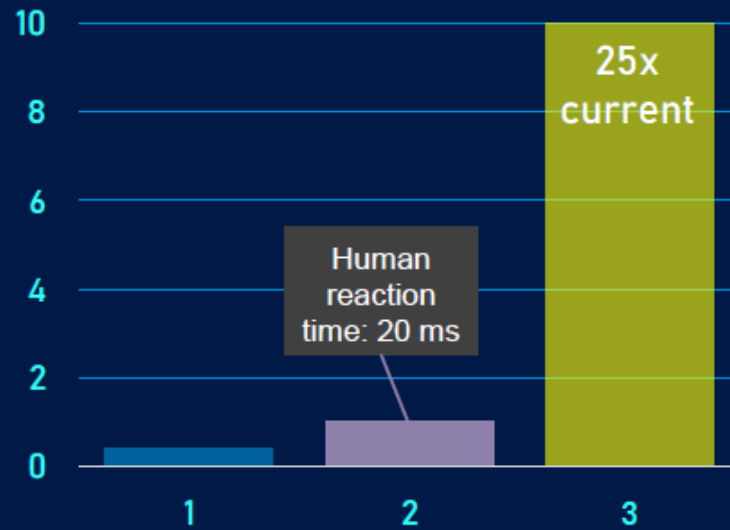


Download rates capable of up to 2.5GB of HD video in approx. 10 seconds.

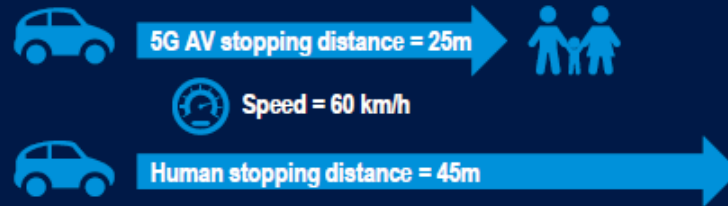


Such data rates will allow for improved capabilities for services that rely on real time video streaming and communication such as EMS, hospitals, police and security, traffic monitoring, construction, etc.

## LATENCY (rel. reaction time)

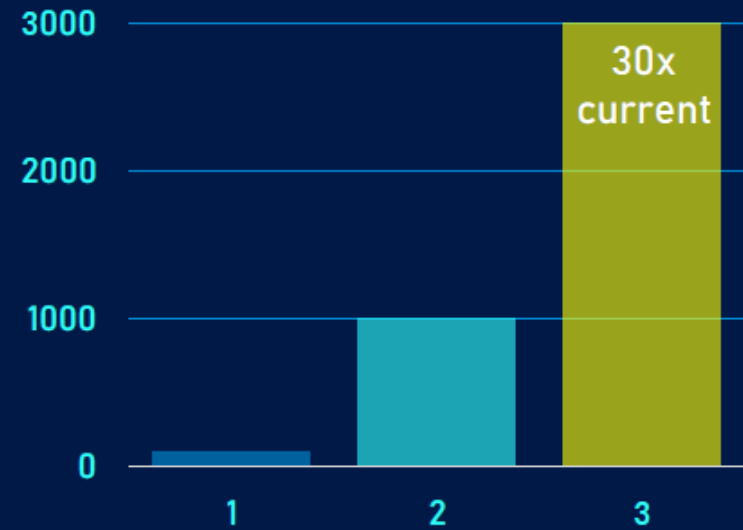


1-2 millisecond latency rates allow for 5G-enabled devices to communicate and perform in real time.



5G-enabled autonomous vehicles will react to road hazards instantaneously, producing significantly shorter stopping distances than vehicles operated by human beings (e.g. 20 m less distance at 60 km/h).

## CONNECTIONS (per KM<sup>2</sup>)



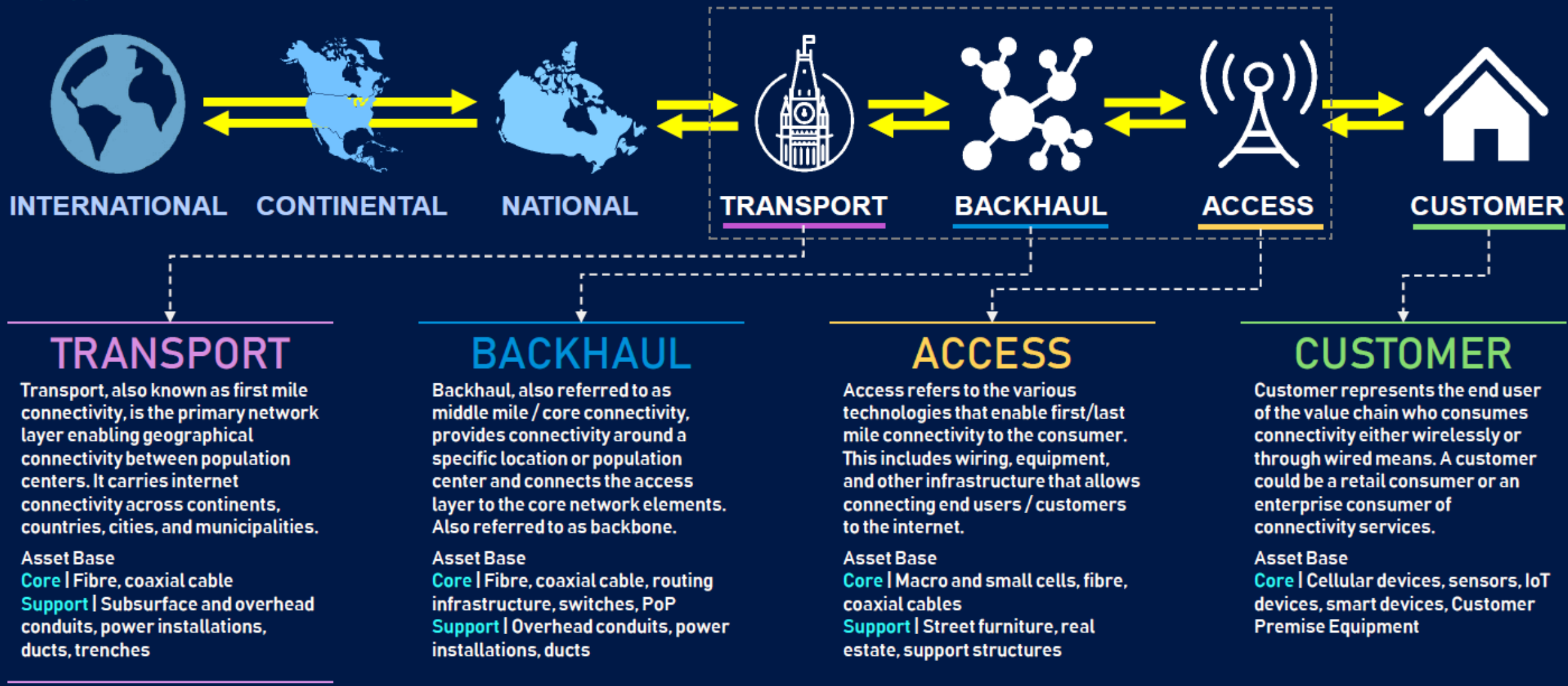
Approx. 1350 times the current population headcount per KM<sup>2</sup> for the city of Brampton.



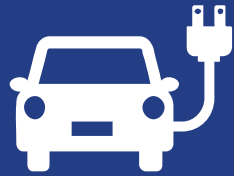
5G technology revolves around a shift from human-to-human communication to machine-to-machine communication; allowing for significantly larger volumes of information to be transferred and utilized.

# | What is 5G? | Infrastructure Expansion

When it comes to connectivity, municipalities have a presence in three specific layers of the connectivity value chain – transport, backhaul, and access.



# A vision of the future: The future of mobility



EV



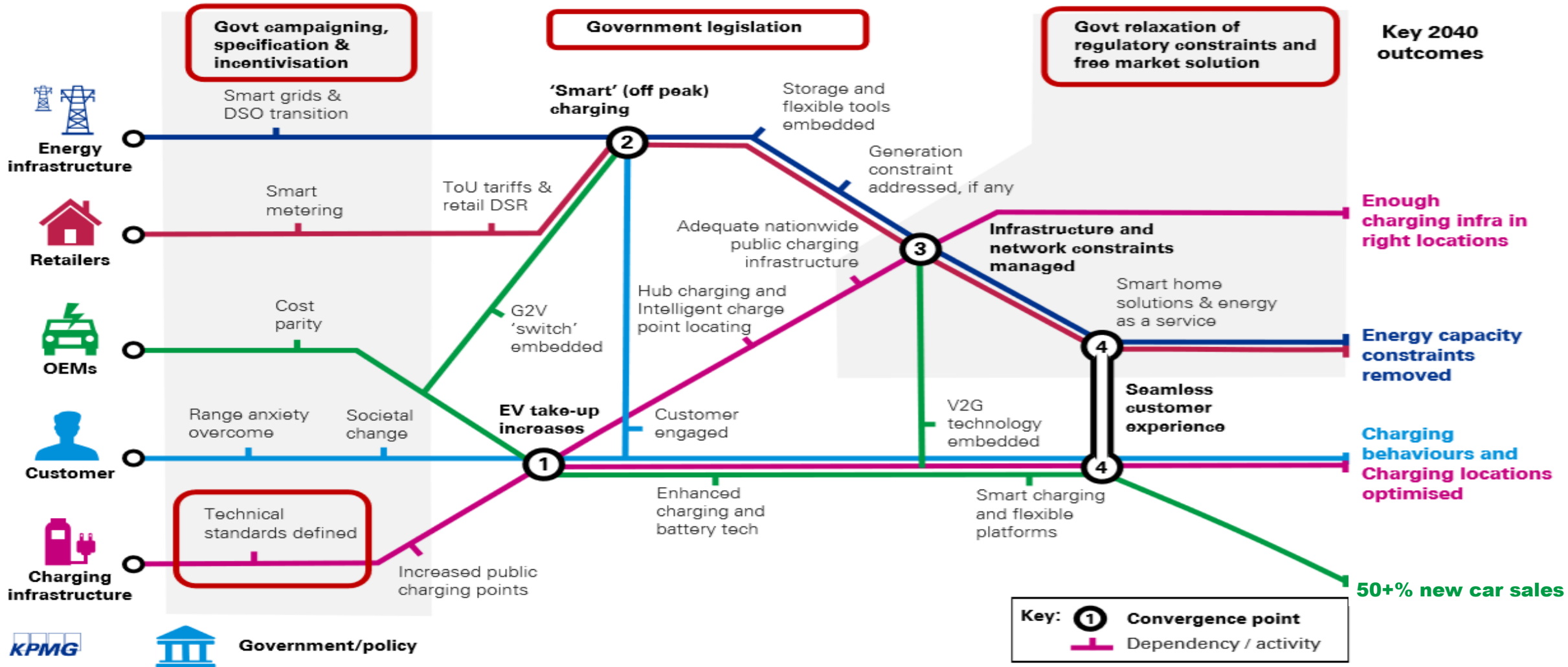
MAAS



AV











# The EV journey will be complex and participants will need to 'converge' at the critical milestones



# Broader impact across SECTORS

But the impact of future mobility is not just automotive and it is expected to have significant impact on how cities, countries, communities and businesses will operate and deliver value in the future.

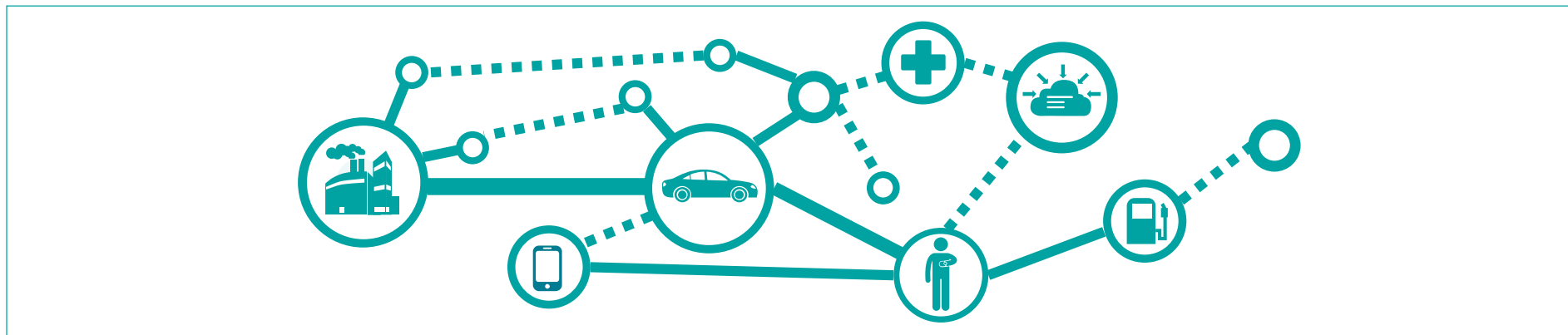
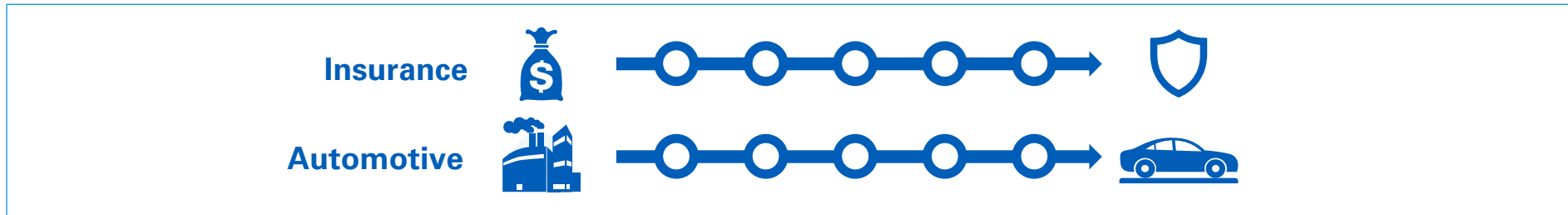
 ENERGY SECTOR	 BANKING SECTOR	 AUTOMOTIVE SECTOR	 INSURANCE SECTOR
<ul style="list-style-type: none"> <li>↑ Increase in demand for <b>power and utility</b></li> <li>↓ Decline in fuel sales</li> <li>↑ New vehicle charging business models</li> </ul>	<ul style="list-style-type: none"> <li>↑ New approach to asset securitization to fund the new ecosystem</li> <li>↑ New transit payments models &amp; mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>↑ Higher vehicle utilization but decline in OEM sales</li> <li>↑ Major shift from after-sales repair to software- based</li> </ul>	<ul style="list-style-type: none"> <li>↓ We no longer need individual insurance</li> <li>↑ Requirements for new business models to serve large AV fleets</li> </ul>

 INFRA SECTOR	 TMT SECTOR	 CONSUMER SECTOR	 GOVERNMENT SECTOR
<ul style="list-style-type: none"> <li>↑ Significant increase in AV adjacent infrastructure and multi-modal mobility</li> <li>↑ New delivery models for transport electrification</li> </ul>	<ul style="list-style-type: none"> <li>↑ Huge opportunities for telco for interconnected ecosystem</li> <li>↑ New business models to support connectivity</li> </ul>	<ul style="list-style-type: none"> <li>↑ Consumer time freed up for retail, entertainment and health opportunities</li> <li>↑ Response to changes in buying behavior</li> </ul>	<ul style="list-style-type: none"> <li>↑ New laws governing AVs and regulations for MaaS + insurance</li> <li>↓ Decrease in fuel based tax revenues</li> </ul>

Source(s): KPMG Mobility 2030 analysis

# Transformation of the Mobility Ecosystem

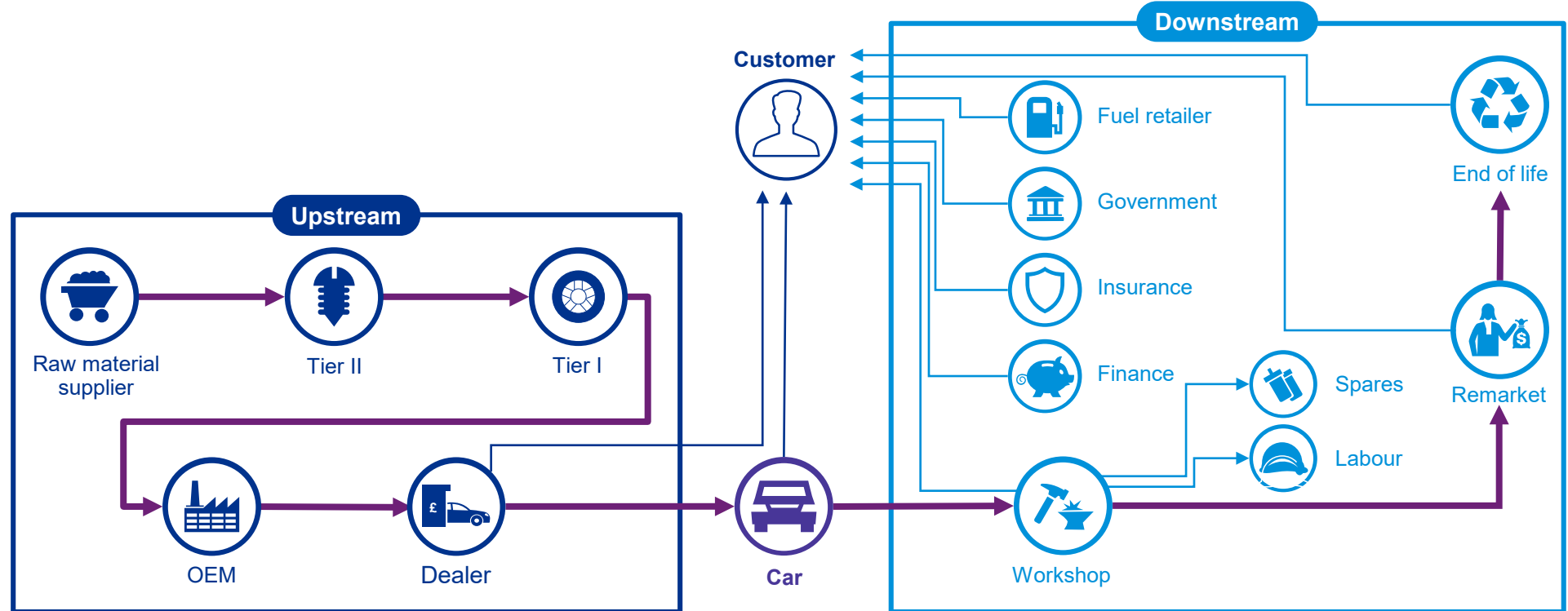
Historically the transport industry has operated along largely linear value chain lines...



...However, future mobility will require an ecosystem which is a complex network of a number of interconnected systems

# The value derived from today's personal car is driven by upstream & downstream elements with the customer self-aggregating services

**Current scenario** Revenues associated with a personally owned vehicle over a 10 year period where the consumer is the service aggregator



Source: KPMG UK Mobility 2030 analysis



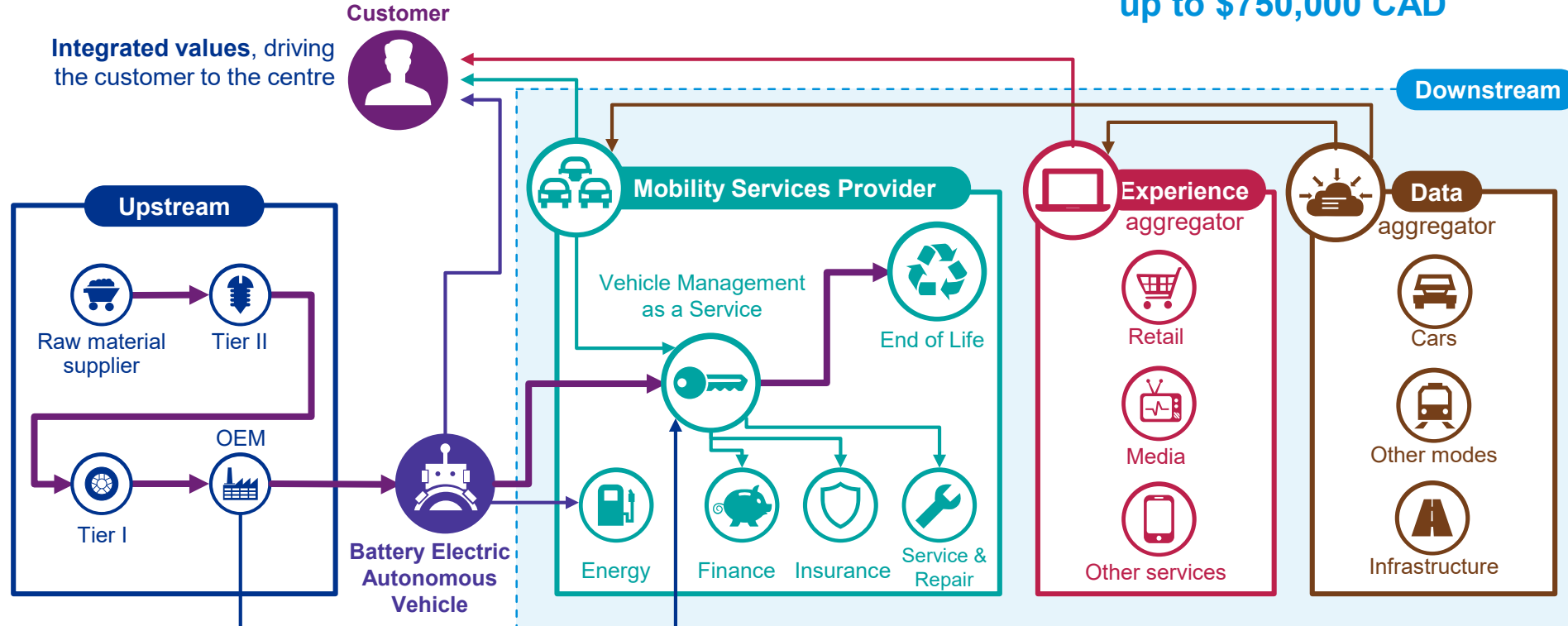
# The value derived in 2030 will be weighted towards the downstream with aggregators providing seamless services to customers

**2030 scenario** Revenues associated with a EV, AV, MaaS vehicle over a 10 year period, where mobility service providers and integrators aggregate services for consumers

**Upstream** \$40,000 CAD

**Downstream** \$450,000 CAD

**up to \$750,000 CAD**



# Five provocations for today's discussion. In future mobility:



1. The distinction between **public and private** transport **evaporates**



2. Cities are forced to adopt single **transport governance**



3. Cities introduce **mobility management** systems



4. There is **value capture** from distance or data pricing



5. Transport becomes **incidental** to the primary use of vehicles

# Questions?

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