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MAJOR FORCES



CHANGING POPULATIONS

MORE PEOPLE, OLDER PEOPLE, CROWDED CITIES... UNTOLD EFFICIENCIES, INNOVATIONS, INVENTIONS, DISCOVERIES ARE ESSENTIAL.



Congested cities: More cities will **ban/restrict** cars

- 2030** Globally, **1.4 billion** people over 60 by 2030 (about 600 million today). Same as total world population in 1900. –UN
- 2040** Global population goes from today's roughly 7 billion to **over 9 billion** by 2040. –UN
- 2050** Africa will be **25% of world population** by 2050. (16% today). –UN



Older consumers increasingly want freedom, independence, **more active** lifestyle. –Euromonitor

WHY DO WE CARE?

Crowded/gridlocked cities will impose more regulations/bans on private vehicles, so the need for alternate mobility services will increase.

Aging people want freedom and independence, and many have the means to pay for it.

Commercial vehicle logistics and efficiencies will become even more important.

Ever increasing proportion of elders requires mobility products and services which deliver both elder and caregiver needs as governments can't carry all the costs.

ON THE OTHER HAND:

People with means may leave the hassles of crowded big cities, and will still need personal use vehicles for generations.

As barriers mount, personal vehicle ownership becomes an even greater status symbol.

More people means more housing, infrastructure and food production, and the need for more trucks/commercial vehicles.



REVOLUTIONARY NEW TRANSPORTATION SYSTEMS

EVS, LEVEL 5 AVS, SHARING, DRONES... THE FUTURE ARRIVES AS NEW TECH FINALLY ALLOWS FOR A BREAK FROM THE SYSTEMS ORIGINALLY DEVELOPED IN THE 19TH CENTURY.



Uber fleet to be **driverless by 2030** –Uber CEO/Mobility Lab

NuTonomy to provide **self-driving taxi services** in Singapore by 2018, expand to 10 cities around the world by 2020 –YahooNews

On average, cars are only used **4% of the day**. –Morgan Stanley

1/3rd of the German city population are potential users of **car sharing**. –McKinsey

Speed of software changes everything. Vehicles updated seamlessly at the **speed of light**.



Delivery Option: Drone. Arrival Estimate: 2020 –MIT

WHY DO WE CARE?

As newer and more efficient systems become available, the need to own personal-use vehicles will decline.

Hundreds of millions of new middle-class consumers, who may not be able to afford a new vehicle, will need mobility services.

As Level 5 AVs bring costs down, more people may be able to afford "Uber" rides, possibly increasing the demand for new "shared" vehicles.

Mastering the convergence of software/updates/services is critical.

Who determines future transportation standards, and harmonization between systems, will be critical.

ON THE OTHER HAND:

The "need" for private vehicle ownership will decline, but the desire to personally own a vehicle will be around nearly forever, as the "freedom" involved in ownership is about so much more than just efficiency.

The critical autonomous market might not be "shared" rides for urban masses, but enabling luxurious personal-use for the well off.



POWER SHIFTS FROM WEST TO EAST

ASIAN NATIONS, ESPECIALLY CHINA, CONTINUE TO GAIN STRENGTH, WHILE THE OLD GUARD STRUGGLES TO TREAD WATER.

2030

Chinese consumers dominate automotive, tourism, financial services globally. –The Economist

China is the world's largest economy by 2030. Triples current GDP by 2040. –KPMG

By 2030, **Asia will be 54%** of world population. –UN

China's total automotive market expected to be **33 million per year** by 2025 (23.9 million in 2015) –IHS

India is the world's **most populous** nation by 2022. –UN

Alibaba is the **world's largest** retailer. –Forbes

New & better Chinese systems **influence global** expectations.



7 of top 10 cellphone makers are Chinese, two are S. Korean –Shipment Data

WHY DO WE CARE?

Rising consumers have little experience/knowledge of Ford.

Eastern brands may offer lower-cost products to a new class of consumers around the globe, but especially in the developing world.

Increasing Chinese buying power may mean designs/engineering specs must be primarily tailored to Chinese tastes/demands.

ON THE OTHER HAND:

Western brands may remain a draw for consumers in the developing markets, and maintain an advantage over local or other Eastern brands.

Rapidly aging Chinese population means fewer younger buyers, with more financial pressures, and more elderly in need.

MAJOR FORCES



MAGICAL INNOVATIONS

FROM ARTIFICIAL INTELLIGENCE TO NANOTECHNOLOGY TO ROBOTICS TO BIG DATA TO SPACE TRAVEL, CURRENT TECH IS LIKE A NEWBORN ABOUT TO GO THROUGH AN INCREDIBLE METAMORPHOSIS.

“Smart” everything – homes, cars, meters, factories, grids, buildings, materials, tools, etc. –Frost & Sullivan

Open source deep learning AI software, **democratizing data** to benefit humanity –MIT



90% of the digital data was created in the last two years. –KPMG



Robots will perform 90% of what doctors do currently—Booz Allen

Any sufficiently advanced technology is **indistinguishable** from magic. –Arthur C Clarke



AI evolves to be more human-like

Software will play a **critical role** in traffic flow –McKinsey

Even **faster** Pace of Change (Moore's Law)

New industries coming—others going –Booz Allen

WHY DO WE CARE?

Uncovering the new tech that delivers true customer satisfaction will be essential when everything changes so rapidly.

Some innovations will allow for new means of mobility, creating new business models, and affecting the demand curve for personally owned new vehicles.

ON THE OTHER HAND:

Some buyers will reject the push for ever newer tech, demanding good enough at the right price.

Some traditional buyers will go to their graves insisting they prefer things “the way they were” and demanding the tried and true.



ENVIRONMENTAL PRESSURE

TWO BILLION MORE PEOPLE ALONG WITH HUNDREDS OF MILLIONS MORE MIDDLE-CLASS CONSUMERS AND CARS ON THE ROAD PUTS EVEN MORE PRESSURE ON THE ENVIRONMENT.

Global Energy Demands **to increase 40%** 2015–2030. –KPMG



Pure EV **mandate growing** –CARB

2030

Climate change will force **food prices to double** by 2030 if nothing changes – starvation, riots, mass migration –KPMG

2040

“The Compact of Mayors was formed and is working to set new, aggressive climate improvement targets.” **40% shortage** of clean water by 2040 –KPMG

2050

EU City Centers contemplate banning ICE vehicles—**EU to ban cars** from cities by 2050. –Telegraph Newspaper Headline

Construction in the **next 40 years** to support increased populations and rapid urbanization may exceed all world construction to date. –U.S. Intel Council 2016

Growing **global middle class** outstrips food/waste/energy available due to climate change. –Global Trends 2030

WHY DO WE CARE?

Beyond increasing regulations, at some point a change in consumer sentiment towards environmental protection will affect actions and purchase decisions on a major scale. We need to be ready for that shift.

ON THE OTHER HAND:

Many people care about the environment but aren't willing to, or can't, pay extra to protect it. For them, meeting minimum regulations is enough.



MOUNTAINS OF DEBT

NATIONS AWASH IN DEBT AND STRUGGLING TO MEET THE BASIC NEEDS OF CITIZENS CAN'T EASILY TACKLE THE CHALLENGES OF THE FUTURE.



U.S. student loan debt **topped \$1.3 trillion** in 2016. Delinquencies continue to rise. –Forbes

2007–2014 Total global debt rose **\$57 Trillion** –McKinsey Global Institute

Broke nations have **fewer options** in international affairs

Broke nations have **limited ability** to remove/empty out slums –KPMG



Japan's debt is **3x its GDP** by 2030. Return to growth is hampered by the twin challenges – aging population and a mountain of public debt. –Financial Times

WHY DO WE CARE?

Less discretionary income/purchasing power (from higher taxes, higher interest rates, pension issues, etc.) makes new-vehicle purchases more difficult.

ON THE OTHER HAND:

Crumbling roads, decaying infrastructure and lack of spending on new transportation systems will make rugged trucks and tough SUVs even more appealing.

People pushed out of the new-vehicle world will still need to get around.

GREAT CARS, TRUCKS, UTILITIES, AND PERFORMANCE VEHICLES



OUR WINNING ASPIRATION

Ford Motor Company was built on the belief that freedom of movement drives human progress.

It's a belief that has always fueled our passion to create great cars and trucks. And today, it drives our commitment to ***become the world's most trusted mobility company, designing smart vehicles in a smart world that help people move more safely, confidently and freely.***

Smart Vehicles in a Smart World

TECHNOLOGY TRENDS

Revolution in Computing & Software

Revolution in Computing & Software

Data/Analytics Artificial Intelligence & Visualization

Data/Analytics Artificial Intelligence & Visualization

Biology & Brain Machine Interface

Biology & Brain Machine Interface

Connectivity Networking / Internet of Everything

Connectivity Networking / Internet of Everything

Advanced Materials & Manufacturing

Advanced Materials & Manufacturing

New Mobility & Autonomy

New Mobility & Autonomy

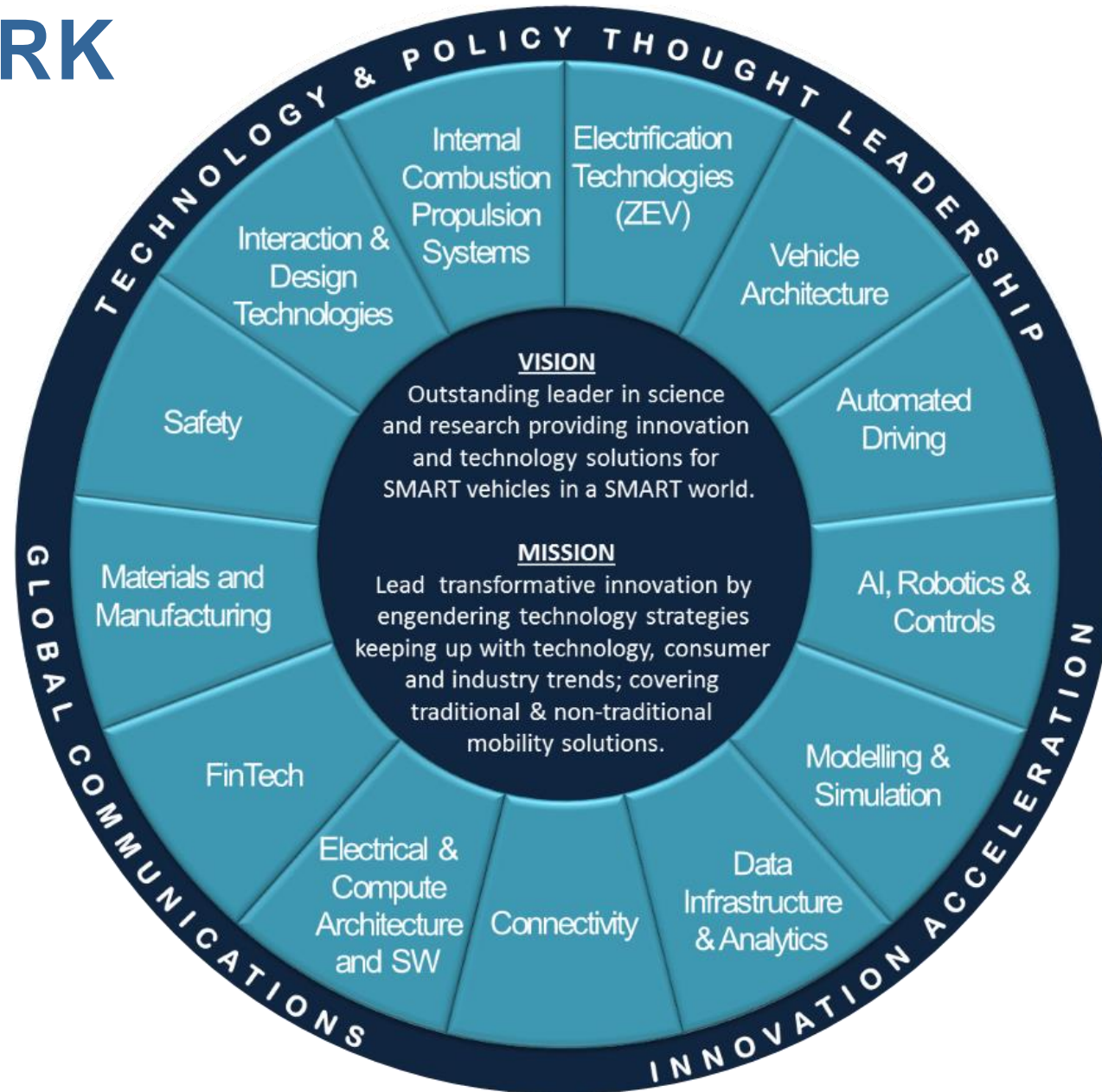
Clean Energy & De-carbonation

Clean Energy & De-carbonation

CORPORATE TECHNOLOGY STRATEGIC FRAMEWORK



Go Further



A blue-tinted architectural rendering of a modern city street. The scene is filled with people walking on sidewalks, some on bicycles. In the foreground, a dark SUV is parked on the right side of the road. The background features several multi-story buildings, including one with a prominent cylindrical tower. The overall atmosphere is that of a vibrant, pedestrian-friendly urban environment.

**WHAT IF
THE LIVING STREET
BROUGHT A NEW SENSE
OF COMMUNITY AND
SHARED PURPOSE?**

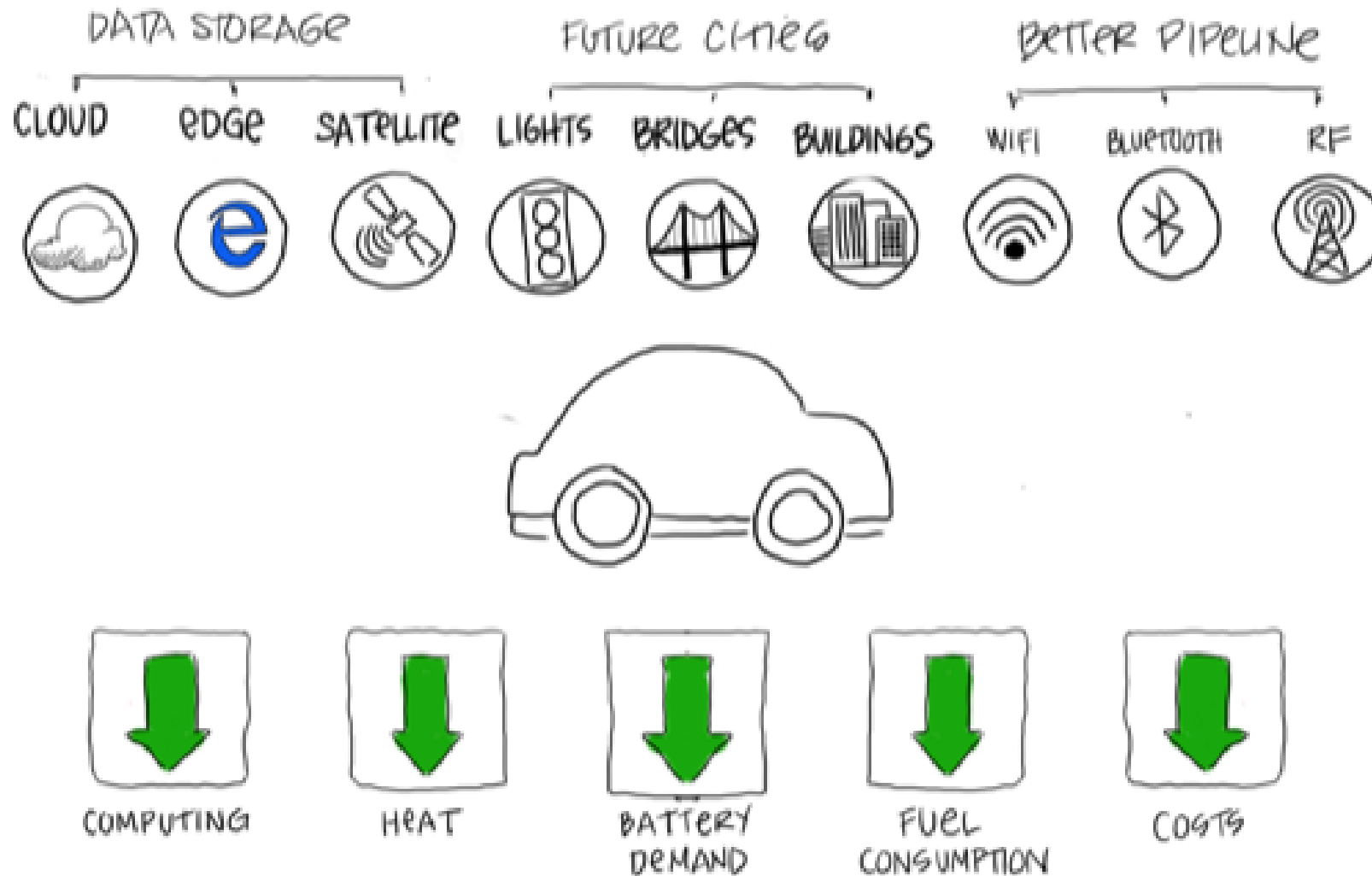
TAKING BACK THE STREETS



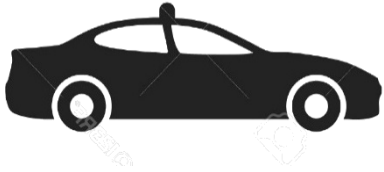
ENSURE EVERYTHING SPEAKS THE SAME LANGUAGE



LEVERAGING THE ENVIRONMENT AUTONOMOUS VEHICLE 2.0



LEVEL 4 AV



- Stand-alone AV
- Does not require information from the outside world

V2X / DSRC



- Smarter paths
- More comfortable rides



- Awareness of city logistics
- Ubiquitous situational awareness
- AI enhanced planning and prediction
- Cooperative planning and dynamic re-routing

RESEARCH & ADVANCED ENGINEERING ORGANIZATION



Competency:

- Technical Fellows
- Technical Specialists
- Education:
 - 34% PhD
 - 42% Masters
 - 24% Bachelors

Diversity:

- Diverse in nationality, culture, and education
- Employees from 55 countries
- Three geographical locations



Questions

