Megatrends and the Future of Innovation

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Monitoring the external environment is important: Remember when . . .

- **Netscape**: 89% market share and $8B market cap
- **Lehman Brothers**: Considered a trusted, stable financial securities firm
- **iPhone**: “There’s no chance the iPhone is going to get any significant market share.” – Software Exec
- **Borders**: $3B in sales with double-digit growth
- **Social Media (Facebook, Twitter, YouTube)**: Didn’t exist . . .
Economic growth is driven by two primary forces:

Demographics: Population Growth Accelerating

- Global population (billions of people)
- Years until used by 25% of US population

<table>
<thead>
<tr>
<th>Technology</th>
<th>Years until used by 25% of US population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity (1873*)</td>
<td>46</td>
</tr>
<tr>
<td>Telephone (1876*)</td>
<td>35</td>
</tr>
<tr>
<td>Radio (1897*)</td>
<td>31</td>
</tr>
<tr>
<td>Television (1926*)</td>
<td>26</td>
</tr>
<tr>
<td>PC (1975*)</td>
<td>16</td>
</tr>
<tr>
<td>Mobile Phone (1983*)</td>
<td>13</td>
</tr>
<tr>
<td>Internet (1991*)</td>
<td>7</td>
</tr>
</tbody>
</table>

* First year of commercial availability

Driven by global and local megatrends

Source: Pew Research, United Nations

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Our long term view of economic development....

A long term model for success.....adapting as conversion rates accelerate
Market insights and foresights guide our innovation engine

1. Reimagining Natural Resources
   - Pushing Traditional Resource Boundaries
   - Harnessing New Resources
   - Using Less to Do More
   - Managing Climate Risk

2. Shifting Demographics
   - Urbanizing Populations
   - Burgeoning Middle Class
   - Evolving Face of Healthcare
   - Rising Workforce Burden

3. Expanding Digital Economy
   - Omni-Channel Experience
   - Collaborative Economy
   - Big Data and Advanced Analytics
   - Internet of Things (IoT)
   - Evolved Manufacturing

4. Evolving Economic Landscape
   - Pro-Growth Policies
   - Economic Power Beyond the State
   - Increasing Consumption in Labor-Based Economies
   - Impact of Global Turmoil
Shifting Demographics

Fertility rates have been dropping across the world while life expectancy continues to rise. By 2050 over 21% of people worldwide are projected to be above the age of 60.

Urban infrastructure solutions need to be smart and sustainable to absorb additional 2.6B people by 2050.
Megatrend Implications: Shifting Demographics

Subtrends of Shifting Demographics

Urbanizing Populations
Massive movement toward cities is leading to infrastructure challenges for governments

Burgeoning Middle Class
Migration to cities and industrialization of developing markets will grow the middle class

Evolving Face of Healthcare
Increased life expectancy and a global push for access to healthcare are driving businesses to reengineer offerings

Rising Workforce Burden
Fewer workers must support more dependents as the graying population retires and ages
Expanding Digital Economy

Cheap computing and IoT drive efficiencies, with data analyses leading to increased safety and security
Megatrend Implications: Expanding Digital Economy

By 2020 there will be over 4 billion Internet users and 80 billion connected devices worldwide. Moreover, the B2B online retail market is expected to be worth $12 trillion by 2020 (six times the size of the B2C market).

Subtrends of Expanding Digital Economy

Collaborative Economy
Knowledge, capital, labor and other assets are shared in new ways through digital platforms.

Omni-Channel Experience
Customers expect consistent messaging, information and experiences through integrated channels.

Big Data and Advanced Analytics
Storage, aggregation and analysis of data create insights, and ultimately, foresights.

Internet of Things (IoT)
Physical objects that sense and communicate are changing how and where decisions are made.

Evolved Manufacturing
Digitization is transforming not only the products around us, but also the way they are made.
Shifting populations and digital economy drive Smart Cities

**Shifting Demographics**

- 700+ million people will be added to urban populations over the next 10 years
- McKinsey estimates that cities will need to double their annual capital investment to $20 trillion by 2025

**Expanding Digital Economy**

- Computing costs have declined 33% per year over the last two decades
- Value creation from IoT is expected to exceed $14 trillion across industries

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**Defining Smart Cities**

- Digital technology embedded across all city functions
- Use information and communications technology to enhance livability, workability and sustainability

**Number of Smart Cities Worldwide**

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>21</td>
<td>24</td>
<td>28</td>
<td>33</td>
<td>39</td>
<td>45</td>
<td>88</td>
</tr>
</tbody>
</table>

Source: Smart Cities Council, IHS

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Smart transportation is a major value driver of Smart Cities

Potential to address significant issues...

Cost of Traffic Congestion to US Economy (billions USD)

$124

$186

2013

2030*

Global Smart Urban Mobility Infrastructure Market (billions USD)

$5.1

$25.1

2015

2024

+19%

*Projection if no significant action taken to alleviate congestion

Source: Smart Cities Council, INRIX, Navigant Research

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India illustrates potential for smart transportation

Smart Transport Solutions

- Bicycle sharing system
- Dynamic carpooling/car sharing
- Geospatial-enabled efficient transportation system
- GPS-based tracking and route information of public transport
- Integrated transit hubs
- Public transport surveillance
- Road user charging

Source: India Times, Accenture, NASSCOM
Select cities already see benefits of smart transportation

**Copenhagen: Smart Street Lighting**
- Helps cyclists avoid traffic
- Lets truck drivers know when to expect traffic light changes

**Kansas City: Keeping Train Lines Clear**
- Monitor public train lines
- Automatically alert authorities if there are obstructions

**Minneapolis: Event Planning and Resource Allocation**
- Easily identify streets with roadwork for road-based events, such as parades and 5k races
- Analyze city resources to ensure there is adequate police, fire and medical support

Benefits and potential of autonomous vehicles are enormous...

**Improved Safety**
Machine learning capable of identifying objects such as other cars, pedestrians and changes in the environment

**Proactive control**
Understanding the terrain or road conditions ahead, autonomous vehicles can make adjustments ahead of demand

**Increasing efficiency**
Networked cars able to improve fuel economy through optimization of power usage as well as traffic flow

**Entertainment and education**
With no need to focus on active driving, passengers will be able to explore the world around them or other interests

**Marketing opportunities**
Vehicles connected to networks can call attention to relevant points of interest and even products held by a passerby

**Media and communication**
Combined with other technologies such as virtual reality, passengers can be productive and connected

Source: Institute for the Future
...but there are challenges on the path to realizing the vision

Security
As networked computers, autonomous vehicles are subject to cybersecurity concerns such as hacking

Cost-Benefit Tradeoff
Infrastructure cost additions will need to be offset by improvements in safety as well as system-wide efficiency

Networks
Up to 1GB of data would be used by an autonomous car every second which can add up to +300GB per month

Ethics
Ethical considerations such as the choices an autonomous car makes when deciding between the safety of pedestrians, other cars or occupants are still outstanding

Source: Wired, Institute for the Future, MIT
Final thoughts on Megatrends

- New and evolving **markets** at the intersection of these trends
- **Technologies** that enable innovation in these new markets
- **Business models** that can grow and adapt to the changing global environments
Thank you