HP ANNUAL MEGATRENDS 2019

SIGGRAPH 2019
Barbara Marshall
Megatrends are transformative, global forces that define the future world with their far-reaching impacts on businesses, societies, economies, cultures and personal lives.
**AGENDA FOR TODAY**

**ECONOMIC SEGMENTATION**
- Have & Have-Nots
- Rise of Asia
- Labor, Jobs & Wages
- Automation
- Education & Reskilling

**ENERGY & DATA**

**ULTRA-EFFICIENT COMPUTE ARCHITECTURES**

**SOFTWARE 2.0**

**VIRTUAL MACHINES**

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**NEW TRENDS CONSIDERED**

<table>
<thead>
<tr>
<th>Category</th>
<th>Trends</th>
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<tr>
<td>RAPID URBANIZATION</td>
<td>- People Moving to Larger Cities</td>
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<td>- Smaller, Shared Spaces</td>
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<td>- New Business Models</td>
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<td>- Constraints drive Sustainability</td>
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<td>- Aging Population</td>
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<td>- Shrinking &amp; Aging Workforce</td>
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<td>- Gen Z &amp; Silver Spenders</td>
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<td>- Healthcare Problem</td>
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<td>- Government Pressure</td>
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<td>- Everything Connected</td>
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<td>- Digital platforms &amp; ecosystems</td>
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<td>- Disrupt or be disrupted</td>
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<td>- Security paramount</td>
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<td>- Everything Smarter</td>
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<td>- Automated &amp; Personalized</td>
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<td>- Cheaper, More Accessible, Faster</td>
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<td>- Nature Inspired Manufacturing</td>
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<td>- Theranostics</td>
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<td>- Frictionless Business</td>
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<td>- The Future of Anonymity and Privacy</td>
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<td>- The Technology Dopamine Effect</td>
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<td>- Rise of Asia</td>
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<td>- Anti Globalization</td>
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<td>- Tech-Lash</td>
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<td>- AI &amp; Automation</td>
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<td>- Virtual Machines</td>
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<td>- Education 10X Technologies</td>
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<td>- Cyber Physical Biological Security</td>
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<td>- Net Zero Factories</td>
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<td>- Software 2.0</td>
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<td>- Networking 2.0</td>
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<td>- Ultra-Efficient Compute Architectures</td>
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<td>- Approximate Compute Quantum Information Science</td>
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**MEGATRENDS**

**TECH TRENDS**

**RAPID URBANIZATION**

**CHANGING DEMOGRAPHICS**

**HYPER GLOBALIZATION**

**ACCELERATED INNOVATION**
INCOME & PERSONAL CONSUMPTION DRIVES THE ECONOMY

Upwards of 2/3rds of GDP is driven by consumer spending, largely driven by income.

DISPOSABLE INCOME – LEADING METRIC OF WHERE THE MONEY IS AND WILL BE
HAVE & HAVE-NOTS
Where is the money and where will it be?

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VIRTUAL MACHINES
SEPARATED GROWTH INTO “HAVES” & “HAVE-NOTS”
Different amounts of money have the same Purchase Power Parity or PPP in different places around the world.

$USD Equivalent In Purchasing Power Parity (PPP)

HAVES
USA
$35k

HAVE NOTS

How Much Local Currency?
$ 45.1K Iceland
$ 31.9K Japan
$ 19.9K Indonesia
$ 9.5K India

THE ECONOMIST: BIG MAC INDEX

Indonesia $2.19
South Africa $2.32
India $2.50
China $3.10
Japan $3.51
Poland $3.74
Britain $4.23
Singapore $4.28
Brazil $4.40
Australia $4.52
Germany $4.74
USA $5.51
Sweden $5.58
Switzerland $6.54

Sources: Oxford Economics with HP Analysis; Numbeo.com; California Association of Realtors

Sources: Statista

PURCHASING POWER (PPP) PROVIDES APPLES-TO-APPELES COMPARISON ACROSS MARKETS
RISE OF ASIA

Dramatic income growth with some wild cards
RISING INCOMES FOR NEARLY ALL, BUT ALSO GREATER INEQUALITY

Incomes are rising throughout the world

AVERAGE HOUSEHOLD DISPOSABLE INCOME, BY REGION
Thousands, US$ PPP, Constant 2015 prices

- AMS
  - 2001: $62K
  - 2018: $71K
  - 2035: $82K

- EMEA
  - 2001: $37K
  - 2018: $39K
  - 2035: $56K

Globally, share of disposable income by income bracket:

- Top 1%
  - 1980: 16%
  - 2016: 20%
  - Change: +4%

- Top 2-10%
  - 1980: 33%
  - 2016: 32%
  - Change: -1%

- Middle 40%
  - 1980: 43%
  - 2016: 38%
  - Change: -5%

- Bottom 50%
  - 1980: 8%
  - 2016: 10%
  - Change: +2%

Source: World Inequality Database; Oxford Economics; HP Analysis

RISING INCOMES SHOULD DRIVE TAM OPPORTUNITIES ACROSS THE WORLD
HAVES GROWING EVERYWHERE, MIXED HAVE-NOTS PICTURE

Change in Have & Have-Not households from 2010 to 2035

- **NA**: +66M (+34%), -8M (-4%)
- **EUR**: +67M (+18%), -3M (-1%)
- **APJ**: +585M (+42%), -141M (-10%)
- **LATAM**: +39M (+21%), +24M (+13%)
- **MEA**: +78M (+18%), +167M (+38%)

LARGEST GROWTH OPPORTUNITIES OVER THE NEXT DECADE POINT TO ASIA

Source: Oxford Economics and HP Analysis
SHOULD WE RE-EVALUATE GROWTH ACROSS SELECT APJ SUB-REGIONS & CITIES?
THE CHINA FACTOR
China’s continued growth is a key influencer & question on broader economic growth in Asia and parts of EMEA

- Highest number of middle class households globally by 2030
- Highest number of affluent households globally by 2030
- Belt & Road Initiative (BRI) Commitments to 69 countries (more $ than from the World Bank)
- Of Asia’s household disposable income by 2030
- Globally in VC funding to start-ups in Q2’18
- For world’s fastest growing start-up ecosystem – ex. Pinduoduo (PDD) passed JD in active users in 2017

Source: UN, Oxford Economics, Center for Global Development, Center for International Development, and HP Analysis
LABOR, JOBS & WAGES

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VIRTUAL MACHINES
GLOBAL SHORTAGES IN HIGH-SKILL LABOR APPEAR BY 2025

GAP driven by combo of changing demographics, growing economies & tightening immigration

By 2030 . . .

16%

Est. Gap in High-skilled workers within Tech, Media & Telco Sector

India - only major economy with a high-skilled labor surplus est.

GLOBAL HIGH SKILL LABOR DEFICIT BY ECONOMY (2030)
Tech, Media & Telcom Sector - top 20 markets evaluated to date

Est. $ Annual Wage Premium by 2030 driven by Labor Gap

Source: Korn Ferry (2018), HP Analysis

HP OPERATES TODAY IN RANGE OF MARKETS AT RISK AROUND LABOR AND WAGES
AUTOMATION / EDUCATION & RESKILLING

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VIRTUAL MACHINES
AUTOMATION ALONG WITH EDUCATION & RESKILLING WILL BECOME AN INCREASINGLY IMPORTANT TO OFFSET LABOR GAPS

AUTOMATION POTENTIAL DIRECTLY LINKED TO TYPE OF HUMAN TASK – CROSS INDUSTRY

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time Spent By Activity</th>
<th>Automation Potential, % of Time</th>
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<tbody>
<tr>
<td>Managing others</td>
<td>6%</td>
<td>18.0%</td>
</tr>
<tr>
<td>Applying expertise</td>
<td>14%</td>
<td>17.0%</td>
</tr>
<tr>
<td>Stakeholder interactions</td>
<td>16%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Unpredictable physical work</td>
<td>12%</td>
<td>26.0%</td>
</tr>
<tr>
<td>Data collection</td>
<td>17%</td>
<td>64.0%</td>
</tr>
<tr>
<td>Data processing</td>
<td>16%</td>
<td>69.0%</td>
</tr>
<tr>
<td>Predictable physical work</td>
<td>19%</td>
<td>81.0%</td>
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</table>


AUTOMATION CAN ADDRESS LABOR GAP BUT REQUIRES EDUCATION & RESKILLING
THANK YOU

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Find Megatrend videos (English) here:

- Megatrends Overall – [https://youtu.be/oJCBBL1FBw0](https://youtu.be/oJCBBL1FBw0)
- Rapid Urbanization – [https://youtu.be/Vldlu6z8P1A](https://youtu.be/Vldlu6z8P1A)
- Accelerated Innovation - [https://youtu.be/1cqlN-kA-7s](https://youtu.be/1cqlN-kA-7s)