Implications of the future of work
McKinsey Global Institute research on the future of work

>3 years of proprietary research into Automation, Artificial Intelligence, the gig economy, and income inequality

- **Proprietary data set** that maps over 800 occupations against 2,000 activities and over 20 capabilities required across US, China, Germany, India, Mexico, and Japan

- **Experts consulted across industries** including: Richard N. Cooper (Harvard), Christopher Pissarides, Nobel laureate; Michael Spence, Nobel laureate; Laura Tyson (Berkeley)

- **Reports and research include:**
  - Jobs Lost, Jobs Gained (Dec 2017)
  - A Future That Works (Jan 2017)
  - Independent Work (Oct 2016)
  - A Labor Market That Works (June 2016)
  - Digital America (Dec 2015)
Why now? Advances in data availability, processing costs, and analytical algorithms

1. Costs of data storage and processing
2. Data availability
3. Analytical advances

**Artificial intelligence**
The science of making intelligent machines

**Machine learning**
A major approach to realise AI

**Deep learning**
A branch of ML

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### 1. Costs of data storage and processing

- 1980
- 2015

#### Costs of data storage and processing

1980: Basic demographic data (e.g., city, income)
Transactions data (e.g., ATMs, mobile apps)
Government agencies (e.g., tax payment report, updated demographic data)

2015: Analytical advances

#### Data availability

1950s: Basic demo data

- Basic demo data
- Trans basic data
- Government agencies

1980s: Basic demo data

- Trans basic data
- Government agencies
- Regular survey/satisfaction data

2010s: Analytical advances

- Social media sentiment
- Website navigation data
- Trans social data
- Website navigation data

#### Analytical advances

- Machine learning
- Deep learning
Intelligent tools have the potential to unlock huge savings, elevate performance, and enable new products and services.

**Robotic process automation**
Automate routine tasks through existing user interfaces (e.g., data extraction and cleaning).

**Machine learning**
Identify patterns in data through supervised and unsupervised learning (e.g., decision algorithms).

**Smart workflows**
Integrate tasks performed by groups of humans and machines (e.g., month end processes).

**Natural language processing**
Create seamless interactions between humans and technology (e.g., data-to-story translation).

**Cognitive agents**
Build a virtual workforce capable of supporting employees and customers (e.g., employee service centers).
Data collection and processing and physical activities in predictable environments have the highest technical automation potential.

Automation potential across activity categories based on currently demonstrated technologies:

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Time spent in all US occupations (%)</th>
<th>Time spent on activities that can be automated</th>
<th>Total wages in US, 2014 ($ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage</td>
<td>7</td>
<td>9</td>
<td>596</td>
</tr>
<tr>
<td>Expertise</td>
<td>14</td>
<td>18</td>
<td>1,190</td>
</tr>
<tr>
<td>Interface</td>
<td>16</td>
<td>20</td>
<td>896</td>
</tr>
<tr>
<td>Unpredictable physical</td>
<td>12</td>
<td>25</td>
<td>504</td>
</tr>
<tr>
<td>Collect data</td>
<td>17</td>
<td>63</td>
<td>1030</td>
</tr>
<tr>
<td>Predictable physical</td>
<td>16</td>
<td>67</td>
<td>766</td>
</tr>
<tr>
<td>Process data</td>
<td>18</td>
<td>69</td>
<td>931</td>
</tr>
</tbody>
</table>

Most susceptible activities:

51% of US wages $2.7 trillion in wages
Most jobs will change rather than disappear: 60 percent of occupations have 30 percent of activities that are fully automatable.

- 1% of occupations have close to ~100% of tasks automatable.
- ~60% of occupations have ~30% of tasks automatable.

Example occupations:
- Psychiatrists
- Legislators
- Fashion designers
- Managers
- Engineers
- Bus drivers
- Nursing assistants
- Web developers
- Stock clerks
- Travel agents
- Dental lab technicians
- Sewing machine operators
- Assembly-line workers

% of occupations (100% = 820 occupations)

% of automatable activities based on current technology

- 100% 90%
- 80% 70%
- 60% 50%
- 40% 30%
- 20% 10%
- 0%
Impact of automation will vary by sector and type of work

How work will change: meta-skills will be critical to adapt to evolving soft and hard skills demanded by the market

- **Examples**
  - Lifelong learning aspiration/growth mindset
  - Self-direction
  - Comfort with change, uncertainty
  - Creativity
  - Critical thinking and problem solving
  - Social intelligence
  - Communication and influence
  - Software development
  - Design
  - Product management
  - Big data analytics
  - Agile methodologies
  - Lean management practices

- **Frequency of market changes in demand**
  - Always critical
  - Always critical, depth and complexity of skills demanded will increase
  - Specific skills demanded will change several times within a career
Success will be determined by the ability to redesign work and right-skill workforces for the future.

**Shifts in skill needs within next ~10 years**

- **Example skills that will grow in criticality**
  - Adaptability and lifelong learning meta-skills
  - Digital design and development
  - Advanced analytics
  - Innovation
  - Complex communication

- **Example skills that will decline in criticality**
  - Predictable physical work
  - Data input and retrieval
  - Simple data analysis

**Redesigning work and reskilling**

The ability of employers to re-organize work and right-skill their workforce for the future will be the rate limiting factor of leveraging new technologies.

**Accelerating War for Talent**

"In the next 5 years, the demand for talent to deliver on new [digital] capabilities will significantly outstrip supply. For agile skills, demand will be 4x supply; for big-data talent, it will be 50-60% greater than supply."
Thank you