The Future of Work in an era of Exponential Technology Development

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Transformative Context
Disruptive Technologies
The Future of Business
Future of Work Skills & Management Challenges
The Future of Business

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- Critical insights into a rapidly changing world
- Project completed in 19 weeks
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The Future of Business

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When Worlds Collide

A Digitized Society With a Global Brain

A Physical & Local World
Moore’s Law – exponentiality in the physical world as well as in computing
Can we Change our DNA?

Play by the Rules of the Game

Create a New Game
‘Future Proofed’ Organisations Work on 3 Horizons in Parallel

1-12 Months
Operational Excellence

1-3 Years
Search for Growth

4-10+ Years
Creating the Future
10 Key Disruptions Shaping the Global Business Environment, Driving Change, Creating Opportunity

1. Shift from Physical to Digital Mindsets
2. Exponential Science and Technology Developments – e.g. Internet of Things, Big Data, Artificial Intelligence and Robotics
3. Linear Versus Exponential Business Thinking
4. Human Versus Machine
5. Potential for Major Shifts in Employment Patterns
6. ‘Financial Stress’ Driving New Economic Thinking
7. Migration from Central Control to Distributed - Digital Currencies, Blockchain and CryptoContracts
8. New Industries are Emerging
9. Desire for Trust and Transparency
10. Social Structures and Political Governance Models at the Crossroads
Disruptive Technologies
A Possibility Explosion from Exponential Science and Technology Developments
What’s Next in ICT? We can Anticipate at Least 60% of the Technology Timeline

It is Key to Understand the Core Trends…
‘Magic’ and Science are Blurring

Mapping and Uploading the Human Brain

Cognitive, Genetic, Physical and Electronic Enhancement of the Human Body
Understanding the Transformative Role of IT

Customer Centric ‘Hive Mind’

Innovate to Differentiate

Talent: Develop and Leverage Staff

Re-engineer Processes
Our Technologies are Evolving & Merging
...Wearable...

FROM HEAD TO TOE WEARABLE TECHNOLOGY

SHIRT
Conductive thread means a computer is literally built into the fabric of the shirt, providing the processing power for all the other wearable gadgets.

GLASSES
Overlays navigation directions and information about points of interest directly on to the wearer's field of vision.

WRISTBAND
A sensor that tracks movement to determine the number of steps taken through the day – 10,000 is ideal – and how much sleep the wearer gets at night.

WRISTWATCH
Vibrates when a message arrives and displays it on the watch face. Tells the time too.

HAND
Embedded under the skin is a chip containing medical records, passport data and credit records. Information is transferred by waving the hand over a suitable scanner.

TROUSERS
Also made with conductive thread, the trousers take the energy generated by movement and use it to power the other gadgets.

SHOES
GPS chip provides directions using LED lights in each shoe: the left shoe indicates direction, while the right shows distance.
...Embedded...
...Augmented and Immersive...
... Hyperconnected to a Multi-Sensory ‘Internet of Humanity’...
Driverless Cars / Autonomous Vehicles
The Blockchain & Digital Currencies
Strati – First 3D Printed Car (Local Motors)
4D Printed Products

Objects that reshape themselves or self-assemble over time.
Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans. E.g. Speech recognition, visual perception, learning, reasoning, inference, strategising, planning, intuition, decision-making, language translation.
Machines that learn will be more like us ... but better(?)
Robots are Entering the Workforce
Brain-Computer Interface (BCI)

A brain–computer interface is a direct communication pathway between an enhanced or wired brain and an external device. BCIs are often directed at researching, mapping, assisting, augmenting, or repairing human cognitive or sensory-motor functions.
A World of Multiple Actors
Human 2.0, Robots, Androids, Holograms, Display-based AI Manifestations
The Future of Business
Case Studies: When Business Ignores the Signals

- **Kodak** ignored new market entrants and were over confident in its brand. Market share declined rapidly.
- Digital camera developed in 1975, but was dropped.
- 2013 emerged from Chapter 11 Bankruptcy Protection - now Print Systems, Enterprise Inkjet Systems, Micro 3D Printing and Packaging, Software and Solutions, Film.

- In 2000 **Netflix** proposed partnership to Blockbuster - Netflix would run Blockbuster’s brand online, Blockbuster promote Netflix in stores.
- Netflix advantages: no retail locations, lower costs, greater variety.
- Blockbuster unable / unwilling to alter business model.
- Blockbuster went bankrupt in 2010 and Netflix is now a $28 billion dollar company.
Information and Communications Technology

- Mobile Internet - Devices, Services, Infrastructure, Commerce
- Next Generation Intelligent, Personalised Internet
- Cloud Based Applications, Infrastructure, Services
- Internet of Things / Internet of Everything / Internet of Humanity
- Big Data, Data Mining and the Automation of Knowledge
- AI and Deep Learning
- Blockchain Systems and Distributed Autonomous Organisations
Production and Construction Systems & Technologies

- Advanced Robotics / Drones
- 3D/4D Printing and Advanced Materials
- Genomics and Synthetic Biology
- Biomimcry Applied to Product Design and Engineered Systems
- Rapid / Green / Sustainable Construction
Citizen Services & Domestic Infrastructure

- Healthcare and Caring
- Smart Homes
- Human Enhancement
- Autonomous & Self Drive Vehicles
- Education
- Environmentally Friendly Technologies

New Societal Infrastructure & Services

- Food & New Methods of Production
- Economy & New Economic Models
- Smart Cities
- Transport
- E-government
Industry Transformation

- Global Infrastructure - Roads, Transport, Energy, Water
- Automation of Professional Services - E.g. Accounting, Legal, Consultancy, and Architecture
- Financial Services Technologies

Energy & Environment

- Renewable Energy
- Advanced Oil / Gas Extraction
- Climate Change & Environmental Protection
Tomorrow's Growth Sectors

12 disruptive technologies that can make an impact by 2025

- Mobile Internet
- Automation of knowledge work
- Internet of Things
- Cloud
- Advanced robotics
- Autonomous and near-autonomous vehicles
- Next-generation genomics
- Energy storage
- 3-D printing
- Advanced materials
- Advanced oil and gas exploration and recovery
- Renewable energy

McKinsey Global Institute has zeroed in on a dozen disruptive technologies from a list of 100 that have a potential to deliver economic value of up to $33 trillion a year.

Size of global economic output estimated in 2025

$100 trillion
Case Studies: When Business Disrupts Markets

- **UBER** founded as a transportation company that utilized licensed taxi drivers for ridesharing services.
- Integrate a mobile application to connect passengers with drivers of vehicles for hire within a specified geographical area.
- Uber is disrupting the market for taxi cabs and transportation in general.
- More customer oriented experience including track their vehicle as it is in route to them and new payment options.
- The future: driverless cars, delivery, on-demand urban air transportation,

- **Airbnb** offers user-friendly site for discovering and booking accommodation.
- Curated listings more than "renting a spare room" - about discovering cool/quirky/creative properties.
- Rentals generally 30-80% lower than available hotels. Free to list - AirBnB charges 3% fee to process payments. Guests pay the service fee to AirBnB. Low entry barrier.
- Potential to transform the traditional model of a accommodation / space rental.
Rapid Execution  e.g. Superfast Construction
Ark Hotel - Dongting Lake - China
## Pursuit of Exponential Growth

<table>
<thead>
<tr>
<th>Company</th>
<th>Industry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AirBnB</td>
<td>Hotels</td>
<td>90x more listings per employee</td>
</tr>
<tr>
<td>GitHub</td>
<td>Software</td>
<td>109x more repositories per employee</td>
</tr>
<tr>
<td>Local Motors</td>
<td>Automotive</td>
<td>1000x cheaper to develop a new car model</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-22x faster to manufacture a car</td>
</tr>
<tr>
<td>Quirky</td>
<td>Consumer Goods</td>
<td>10x faster product development (29 vs 300 days)</td>
</tr>
<tr>
<td>Google Ventures</td>
<td>Investments</td>
<td>2.5x more investments in early stage start-ups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10x faster through design process</td>
</tr>
<tr>
<td>Valve</td>
<td>Gaming</td>
<td>30x more market cap per employee</td>
</tr>
<tr>
<td>Tesla</td>
<td>Automotive</td>
<td>30x more market cap per employee</td>
</tr>
<tr>
<td>Tangerine (formerly ING Direct</td>
<td>Banking</td>
<td>7x more customers per employee</td>
</tr>
<tr>
<td>Canada)</td>
<td></td>
<td>4x more deposits per customer</td>
</tr>
</tbody>
</table>
## Exponential Market Cap Improvement

<table>
<thead>
<tr>
<th>Company</th>
<th>Age (yrs)</th>
<th>2011 valuation</th>
<th>2016 valuation</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haier</td>
<td>31</td>
<td>$19 billion</td>
<td>$60 billion (2014)</td>
<td>3x</td>
</tr>
<tr>
<td>Valve</td>
<td>19</td>
<td>$1.5 billion</td>
<td>$4.5 billion (2014)</td>
<td>3x</td>
</tr>
<tr>
<td>Google</td>
<td>18</td>
<td>$150 billion</td>
<td>$533.4 billion</td>
<td>3.6x</td>
</tr>
<tr>
<td>Uber</td>
<td>8</td>
<td>$2 billion</td>
<td>$62.5 billion</td>
<td>31x</td>
</tr>
<tr>
<td>AirBnB</td>
<td>7</td>
<td>$2 billion</td>
<td>$25.5 billion</td>
<td>12.8x</td>
</tr>
<tr>
<td>Github</td>
<td>7</td>
<td>$500 million (est.)</td>
<td>$2 billion</td>
<td>4x</td>
</tr>
<tr>
<td>Waze</td>
<td>7</td>
<td>$25 million</td>
<td>$1.15 billion (sold to Google in 2013)</td>
<td>46x</td>
</tr>
<tr>
<td>Qirky</td>
<td>6</td>
<td>$50 million</td>
<td>Closed</td>
<td>40x at peak</td>
</tr>
<tr>
<td>Snapchat</td>
<td>4</td>
<td>0</td>
<td>$16 billion</td>
<td>16,000x +</td>
</tr>
</tbody>
</table>
Future Skills and Management Challenges
The Future Jobs Landscape –
The economic impact of robotic advances & AI

Will networked, automated, AI and robotic devices have displaced more jobs than they have created by 2025?

48% - robots & digital agents will displace significant numbers of blue- and white-collar workers

Increases in income inequality, significant numbers of unemployable people, breakdowns in the social order.

52% - technology will not displace more jobs than it creates. Lost jobs offset by ingenuity creating new occupations, & industries.

Current social structures (e.g. Education) not preparing people for the skills needed in the future job market.

Opportunity to reassess society’s relationship to employment?
Give time for leisure, self-improvement, or time with loved ones?

Source: Pew Research (2014)
The Future Jobs Landscape – Which jobs are most vulnerable?

- 47% of workers in USA had jobs at high risk of potential automation
  - Transport and logistics (taxi and delivery drivers)
  - Sales and services (cashiers, counter and rental clerks, telemarketers and accountants)
  - Office support (receptionists and security guards)
- 35% of the workforce for UK, 49% Japan

“The impact of automation this time around is broader-based: not every industry was affected two centuries ago, but every industry uses computers today.”

The Future Jobs Landscape – Automation of the global economy

- 54 countries representing 95% of global GDP, 2,000+ work activities
- The proportion of jobs that can be fully automated by adapting currently demonstrated technology is less than 5%
  - although for middle-skill categories could rise to 20%
- 60% of all jobs have at least 30% activities technically automatable, based on current technologies
- Automation technologies could affect 49% of the world economy - 1.1 billion employees and $12.7 trillion in wages.
- China, India, Japan, and USA—account for more than half of these totals.
- Two+ decades before automation reaches 50% of all of today’s work activities

The Future Jobs Landscape – Job Creation

- Knowledge-enabled jobs become possible as machines embed intelligence and knowledge
- Accessible to less skilled workers
- Google India - Internet Saathi (Friends of the Internet) program in which rural women are trained to use the Internet
- They become local agents providing Internet enabled services e.g. distributors for telecom products (phones, SIM cards, and data packs), field data collectors for research agencies, financial services agents, and para-technicians helping local people access government services

The Future Jobs Landscape – An increasingly dynamic jobs landscape

- 65% of children entering primary school today will work in job types that don’t yet exist
- 3.5 x as many jobs lost to disruptive labour market changes 2015–2020 than created
- Losses in routine white collar office functions, gains in Computer, Mathematical, Architecture, Engineering related fields
- Job categories and functions that they expect to become critically important by 2020:
  - data analysts – leveraging big data and AI
  - specialized sales representatives - commercializing and articulating propositions
  - senior managers and leaders - to steer companies through the upcoming change and disruption

Source: WEF The Future of Jobs (2016)
“By 2020, more than a third of the desired core skill sets of most occupations will be comprised of skills that are not yet considered crucial to the job today. Social skills — such as persuasion, emotional intelligence and teaching others—will be in higher demand across industries than narrow technical skills, such as programming or equipment operation and control.”

Source: WEF The Future of Jobs (2016)
21st Century Survival Skills

- Foresight
- Curiosity
- Sense making
- Accelerated learning
- Tolerance of uncertainty
- Scenario thinking
- Coping with complexity
Future Work Skills 2020

While all six drivers are important in shaping the landscape in which each skill emerges, the color-coding and placement here indicate which drivers have particular relevance to the development of each of the skills.

**KEY**

- **Extreme Longevity**: Increasing global lifespans change the nature of careers and learning.
- **Computational World**: Massive increase in sensors and processing power make the world a programmable system.
- **Superstructured Organizations**: Social technologies drive new forms of production and value creation.
- **Rise of Smart Machines and Systems**: Workplace robotics nudge human workers out of routine, repetitive tasks.
- **New Media Ecology**: New communication tools require new media literacies beyond text.
- **Globally-Connected World**: Increased global interconnectivity puts diversity and adaptability at the center of organizational operations.

**Drivers—disruptive shifts that will reshape the workforce landscape**

- **Trans-disciplinarity**
- **Design Mindset**
- **Virtual Collaboration**
- **Cross Cultural Competency**
- **New Media Literacy**
- **Computational Thinking**
- **Cognitive Load Management**
- **Novel and Adaptive Thinking**
- **Social Intelligence**

**Key skill needed in the future workforce**

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Characteristics of collaboration based upon the nature and clarity of the goals

<table>
<thead>
<tr>
<th>Nature of Goals</th>
<th>Clarity of Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual goals</td>
<td>Clear &amp; predictable</td>
</tr>
<tr>
<td>Collective goals</td>
<td>Uncharted &amp; uncertain</td>
</tr>
</tbody>
</table>

- **COORDINATION**
- **CO-CREATION**
- **COMPETITION**
- **COOPERATION**
The management style required when working in uncertain situations can be challenging.
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- 60 Chapters
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- Amazon Bestseller
- Within 2 Weeks

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- 25 Chapters

**50:50 SCENARIOS FOR THE NEXT 50 YEARS**

- June 2017
- 50 Chapters

**A VERY HUMAN Future**

- November 2017
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