Disruptive technologies: a consultant’s perspective

How to adapt to a rapidly changing world

2018 Meeting of the Global Leadership Forum – Construction Engineering and Management, Stellenbosch University

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Top 5 Trends*

1. Zonne-energie 39,0%
2. Blockchain 24,7%
3. Social Media 19,7%
4. Zelfrijdende auto’s 15,9%
5. Robotica 15,1%
The world around us: Operating in Industry 4.0
Connecting virtual and physical world

With changes going faster and faster...
Talking a different language

<table>
<thead>
<tr>
<th>Generation</th>
<th>Years</th>
<th>Key Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby Boomers</td>
<td>1946-1964</td>
<td>Cold War, Swinging Sixties, African American Civil Rights</td>
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<tr>
<td>Generation X</td>
<td>1965-1980</td>
<td>Fall of Berlin Wall, Reagan-Era, Technology (personal computing)</td>
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<tr>
<td>Generation Y</td>
<td>1981-1994</td>
<td>Internet, Social Media, Video Games, Digital Entrepreneurship</td>
</tr>
<tr>
<td>Generation Z</td>
<td>1995-2009</td>
<td>Economic downturn, Global warming, Cloud computing, Virtual Reality</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage in UK workforce</th>
<th>3%</th>
<th>33%</th>
<th>35%</th>
<th>25%</th>
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<table>
<thead>
<tr>
<th>Attitude towards career</th>
<th>Jobs for life</th>
<th>Organisational - careers are defined by employer</th>
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<tbody>
<tr>
<td></td>
<td>“Portfolio” careers - kind of profession, not to employer</td>
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<tr>
<td></td>
<td>Digital entrepreneurs - work with organisations</td>
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<td></td>
<td>More flexibility - work for organisations</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Signature products</th>
<th>Automobile</th>
<th>Television</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication media</td>
<td>Internet</td>
<td>Telephone</td>
</tr>
<tr>
<td></td>
<td>Email</td>
<td>Text/voice</td>
</tr>
</tbody>
</table>

| Preference when making financial decisions | Face-to-face meetings | Face-to-face meetings but increasingly email is used |
|---------------------------------------------|-----------------------|
|                                             | Online - would prefer to communicate if time permits |

Source: Thames, University of Exeter

UPCOMING BIG BANGS
SOME EXAMPLES BY INDUSTRY

**HEALTH CARE**
Biometric sensors demystify the shamanistic myth of medicine

**PROFESSIONAL SERVICES**
DIY services, Cloud and SaaS Solutions

**RETAIL**
The disruptive force of the sharing economy

**MANUFACTURING**
The “Internet of Things” drives the supply chain from the bottom

**GOVERNMENT**
Market pricing for public services

**CONSUMER PRODUCTS**
Market-led marketing takes over

**ENERGY**
Practical fuel cells, launched on Kickstarter

**EDUCATION**
The virtual ivory tower revolutionizes learning

**UTILITIES**
Portable electricity networks mirror wireless communications

**PHARMACEUTICALS**
Bespoke drugs based on your DNA

**RETAIL BANKING**
The end of cash

**FINANCE**
Money becomes just another form of information

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Disruption to established industries including construction, consulting and education will continue to happen – are we prepared?

Definitions

Innovation…
“the introduction of something new that creates value”
“a new idea, method, or device that creates value

Digital Innovation…
“innovation enabled by digital technologies that leads to the creation of value”

Digital Technologies…
“combinations of information, computing, communication, and connectivity technologies”
Role of innovation as way to adapt

**TRANSFORMATIONAL**
Developing breakthroughs and creating things for markets that don’t yet exist

**ADJACENT**
Expanding from existing business into “new to the company” business

**CORE**
Optimizing existing products for existing customers

WHERE TO PLAY (MARKETS & CUSTOMERS)  
EXISTING  INCREMENTAL  NEW

HOW TO WIN (PRODUCTS & ASSETS)  
EXISTING  INCREMENTAL  NEW

Different types of innovation: effort and impact

WHERE TO PLAY (MARKETS & CUSTOMERS)  
EXISTING  INCREMENTAL  NEW

HOW TO WIN (PRODUCTS & ASSETS)  
EXISTING  INCREMENTAL  NEW

Average activity in a balanced portfolio

Average return on a balanced portfolio

10%  20%  70%

TRANSFORMATIONAL  ADJACENT  CORE
A **disruptive innovation** is an innovation that creates a new market and value network and eventually disrupts an existing market and value network, displacing established market leading firms, products and alliances.

The term was defined and phenomenon analyzed by **Clayton M. Christensen** and coworkers beginning in 1995.
The innovators dilemma: a quick summary

...the threat of disruption is also the greatest opportunity a leadership team will ever face.

Dual Transformation
What does it mean for universities?

- Keep the balance between improving the current system while also investing in new technologies and ways of doing things
- Be friendly and open to the development of disruptive technologies – in education and in the construction industry
- Realise that the new startup idea might not be a money spinner to start of

What does it mean to startups?

- There are many venues and opportunities to explore
- Seek the help of the university to experiment with the new technologies
- Encourage entrepreneurship
Understanding digital:
What does digital mean?
What does it imply for us?
Gartner analysis

“Amsterdam Airport Schiphol aims to be the best digital airport worldwide… this requires an integrated approach with all of our partners.”
Digital innovation

- Digital to the core was written by Gartner employees
- Sets out the basic challenges that the digital environment brings to all organizations and how to react to it
- Used as base for this section of the module

Digital advances create three business macro forces:

**Resolution Revolution**
Progress in the ability to see in higher fidelity and exercise more precision control

**Compound Uncertainty**
The intertwined timing opportunity-uncertainty of technology performance, regulatory change and cultural acceptance

**Boundary Blurring**
The digital dissolving of borders that traditionally separated one industry from another
Resolution Revolution

Let’s enterprises see the world in ever-higher data fidelity...

...and manage the world with fine-grained precision control.

Compound Uncertainty

Impacts the timing of digital opportunity and threat:

The triple tipping point must be judged or nudged.
As products and services become cloud connected, algorithm enabled and data dependent... whose industry is it anyway?

"If you went to bed last night as an industrial company... ...you're going to wake up in the morning as a software and analytics company."

Jeffrey Immelt
CEO, General Electric
2014
Remap Your Industry
Remodel Your Enterprise
Remake Yourself

Transformational leadership required at three levels:

Outside

The thinking does not start inside your four gray walls.
Remap your industry

- Clients going digital
- Competitor teaming
- Threat of entrants
- Threat of substitutes

Remap your enterprise

- Strategy and objectives
- Transformation plan
- Assessment of the org: capabilities and gaps
- Finance

Vision of company going digital
Remap yourself!

- Muster the courage
- Remix your risk reward equation
- Live the talk/show the passion!
- Find your (market driven) quest

Now for the practical side – how (engineering) consultants are embracing digital
Driven from the top: Chief innovation officer appointed

Culture of innovation continued and reinforced

Digital taken to the core

Understand client needs /need for new products and services

Partner to expand skills

Full buy-in of staff and rewards

Note: this is my interpretation and not necessarily the official policy

Pioneering partnership to unlock potential of real-time data analytics to smart cities, building, water and transportation issues
Using oculus rift as virtual reality at a design stage

Virtual reality walk through in airport terminal design
3D Building Information Management (BIM) models – going from talking to exploiting

The new digital EIS: visual, interactive, collaborative
Collaborative design - iRooms

Out of the office: the rise of the digital nomad
Staff in a digital world

Aurecon: Digital brings new insights and opportunities – the whole value chain in mining digitised
Aurecon: Building design is not only about bits and bytes, but flesh and bones – buildings of the future/people at the centre

Challenges to education – what universities are doing
- World Economic Forum views
- The future!
Universities need a Netflix moment

If we want to future proof today’s students for the fourth industrial revolution, let’s start by disrupting the education system itself WEF paper 2018
What is the future of work in this new era?

As educators, we have a singular responsibility to prepare all students for a rapidly changing job market, and to educate them to be architects of the world in which we live. In today’s economy, when the future of work is changing faster than our old models of education can accommodate, this is no easy task.

History tells us that those who prepare for the seismic shifts in work activities will have an immense opportunity to flourish. As stewards of the future of education, with access to immense intellectual resources and the influence to apply those resources to our core mission, university leaders have a leading role to play in helping the workforce adapt to these disruptive technologies, ensuring that the new economy works for everyone.

As the world’s leaders in industry, government, and education engage on the future of work and other important topics at this year’s World Economic Forum in Davos, universities must play a committed role to addressing these challenges and seizing these opportunities. To succeed, we all must ensure that talent from the diverse, global community has access to opportunity in the new economy.

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Skills required job candidates: 2020 vs 2015

<table>
<thead>
<tr>
<th>Top 10 skills in 2020</th>
<th>Top 10 skills in 2015</th>
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<tbody>
<tr>
<td>1. Complex Problem Solving</td>
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</tr>
<tr>
<td>2. Critical Thinking</td>
<td>2. Coordinating with Others</td>
</tr>
<tr>
<td>3. Creativity</td>
<td>3. People Management</td>
</tr>
<tr>
<td>4. People Management</td>
<td>4. Critical Thinking</td>
</tr>
<tr>
<td>5. Coordinating with Others</td>
<td>5. Negotiation</td>
</tr>
<tr>
<td>6. Emotional Intelligence</td>
<td>6. Quality Control</td>
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<tr>
<td>7. Judgment and Decision Making</td>
<td>7. Service Orientation</td>
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Source: Future of Jobs Report, World Economic Forum

Desirable skills in a job candidate and how they’re changing over time.
What universities are doing on Innovation

Fostering entrepreneurship
Encouraging collaboration with private sector
Promoting diversity and inclusion
Exploring the nexus of technology and society

Conclusion

• Disruption of industries are a reality
• Universities are feeding disruption through startups
• Understanding the theory of disruption and innovators dilemma helps
• The digital world is transforming all aspects of society and in unexpected ways
• What role should the university play?
• What can you do?

Questions

• What are the characteristics of the construction industry – is the industry prone to disruption? How and where?
• What role should the university play to stimulate the disruption?
• What role is there for the universities to play to prepare the workforce for the disrupted world?
• Will the university itself be disrupted?

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