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Master of Professional Practice

Title of Project:

How organisations disrupt ‘business as usual’ in response to exponential environmental and technological change and the relevance of this to mainstreaming sustainable practice.

What disruption is, how New Zealand organisations are responding and what it means for the Centre for Sustainable Practice and Otago Polytechnic

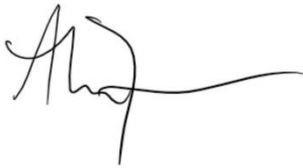
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I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of an institution of higher learning.

A handwritten signature in black ink, appearing to read 'Alexa', with a long horizontal flourish extending to the right.

Alexa Forbes

“The future is widely misunderstood. Our forebears expected it to be pretty much like their present, which had been pretty much like their past.”

–Ray Kurzweil, The Singularity Is Near

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Abbreviations

Master of Professional Practice	MPP
The Centre for Sustainable Practice	The Centre
Massive Open Online Course	MOOC
Artificial Intelligence	AI
Federation of Māori Authorities	FOMA
Department of Conservation	DOC
Equivalent Full Time Students	EFTS

Executive Summary

Understanding the exponential function is integral to understanding what is driving deep changes to our civilisation and our environment, to grasping the sheer pace of change coming and to planning future action. Part of this is the need to understand the deceptive nature of the doubling curve in its early stages because of the low start point and early low impact of the initially shallow curve.

The convergence of twin disruptive forces, exponentially developing technologies and exponential environmental degradation, is a key consideration in the delivery of education for sustainable practice and so to the future of the Centre for Sustainable Practice, (the Centre). This study is designed to inform development of the Centre and its place within these forces. This has to include the impact of these forces on the more general world of higher education.

As in the rest of the world, many organisations in New Zealand are undergoing disruption to business models - six were researched as part of this study to build a picture of what it's like to work under those circumstances and how relatively-normal business continues while disruption occurs. This qualitative section was designed to combine with the thinking from sections one and two to inform a plan for the future of the Centre – potentially as a disruptive pilot for the wider Otago Polytechnic. Ultimately, there are many more questions than answers and further work is needed to answer the questions and then seriously consider the future role of the Centre. If the Centre sought to behave as a truly disruptive innovator (assuming the Centre could become such a thing) it would, by its very nature, be seeking to completely overturn the processes of the incumbent mothership, because that's actually how the process of disruption works. A series of questions are posed to act as thought accelerators that will allow Centre staff and staff of the wider polytechnic, to understand change and the consequences of our reaction to it.

The first two sections investigate the global mega trends and thinking around exponentiality and disruption, and then how these are beginning to drive changes to higher education that are likely to disrupt current business models of education. Sections three and four narrow the focus to New Zealand organisations and then finally to the context of the Centre.

Why this course of study

In 2014 a learner in the Graduate Diploma in Sustainable Practice programme persuaded me to buy a Bitcoin from him. He said that the platform that enabled crypto currency like Bitcoin was going to change everything in finance and therefore economies, and therefore society and therefore everything. He said that by spending several hundred dollars on a Bitcoin (\$450), it would be easier to follow the blockchain (formerly known as block chain¹) evolution/revolution and this would allow understanding about where human intelligence might be going, because the finance sector was one of many facing exponential (doubling) change that would be highly disruptive. Prior to this discussion, my learning work and professional practice was centred around understanding environmental change, pollution, the ‘why’ of allowing economic systems to damage our ability to maintain the ecosystems we rely on to live, and the even bigger ‘why’ of a lack of sustained community response to this threat, particularly when such work can be so easily scaled. I realised that to understand this, I needed to understand disruption – technological/economic as well as socio-ecological - and its relevance to my work.

My view now is that because of our limited, linear ways of thinking that place economy higher than our environmental living systems on the attention radar, technology presents a greater driver of change for human thinking and action than environmental damage. My discussions with six New Zealand organisations highlights this. Accepting this was a new direction for me because I had previously been constrained by the overarching logic of the need for change driven by ecological imperatives. Buying that bitcoin took me deep down the rabbit hole of technology, future thinking, disruption, exponential change, and changed all that. Climate change impacts are now likely exponential² and technological change is too³. As these two major forces converge, we are looking at a future where everything will be disrupted through systemic exponentiality – a concept that is so hard for the human brain to comprehend.

¹ Blockchain. (n.d.). Retrieved August 6, 2017, from <https://en.wikipedia.org/wiki/Blockchain>

² Hansen, J., Sato, M., Hearty, P., Ruedy, R., Kelley, M., Masson-Delmotte, V., Lo, K. (2015). Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming is highly dangerous. *Atmospheric Chemistry and Physics Discussions*, 15(14), 20059-20179. doi:10.5194/acpd-15-20059-2015 – pg 7

³ Berman, A. E., & Dorrier, J. (2016, March 22). Technology feels like it's accelerating - because it actually is. Retrieved November 15, 2016, from <https://singularityhub.com/2016/03/22/technology-feels-like-its-accelerating-because-it-actually-is/>

In my work for the Centre, I needed a further qualification to be able to progress my career. The serendipitous collision of that need, and this introduction to tech-led disruption, led me to enrol in a Masters of Professional Practice (MPP) at work, for work. My aim was and is to drive my own personal and professional development while also looking for a way to develop the futures thinking that will support the Centre I work for and its mother institution (Otago Polytechnic).

Adding to my eclectic motivation mix, I am also a local government elected member (Councillor and Chair of Infrastructure at Queenstown Lakes District Council) and as such am grounded in the everyday realities of arguments about growth, congestion and groaning sewers. This combination of perspectives; educator, politician, environmentalist and future-ophile has allowed me to look at my responses to different situations and how one part of what I do impacts on the others. My study over the past two years or more takes me ranging into the future and back to the past as I try to think systemically, and consider how yesterday's solutions have become today's problems and tomorrow's opportunities. Complementing this, my work with our learners and on our local traffic issues grounds the thinking into the here and now reality of change, human reaction to it, and the breaking system that is hierarchical structures.

To complete Assignment Three of the MPP task, I broke it down into five broad sections:

1. Broadly map the global drivers of change
2. Consider how these drivers can disrupt the system of higher education
3. Consider how others in New Zealand are responding to disruptive forces in their sectors
4. Consider how the Centre for Sustainable Practice might respond to change
5. Describe my own progress and learning throughout

These sections are mapped in Figure 1 below as nested circles showing the big system and drilling down into my own areas of focus.

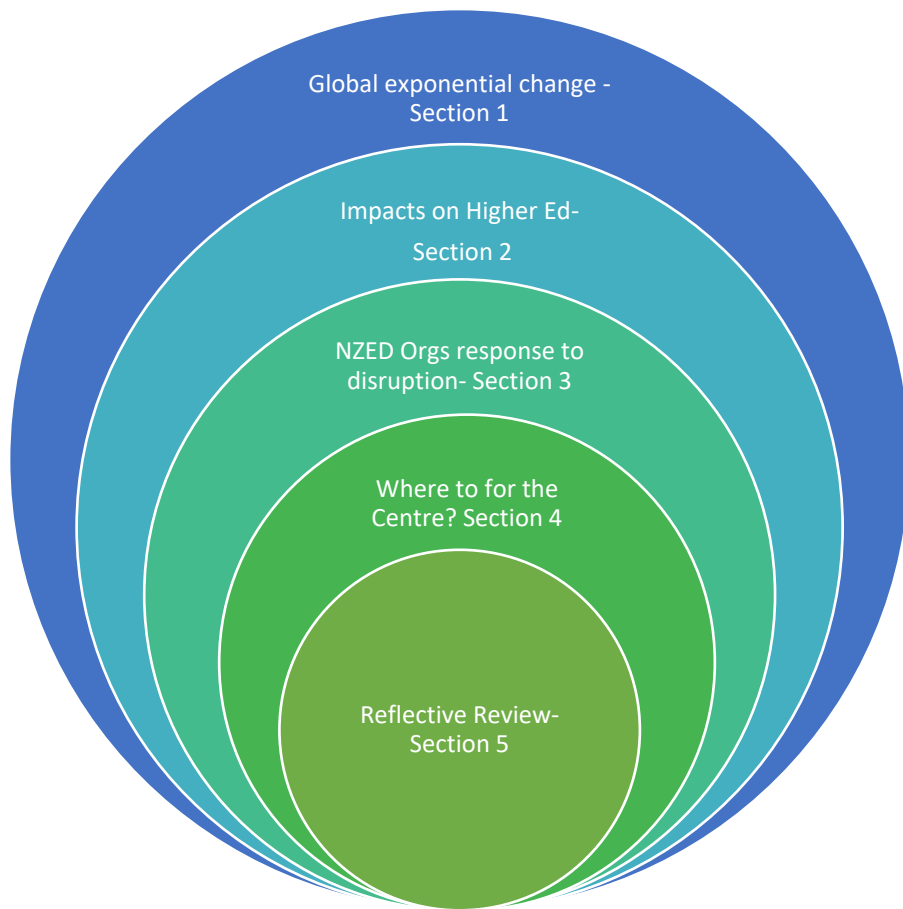


Figure 1. Structure of this MPP

Introduction

Higher education is ground zero for disruption according to a headline of a June 2014 Forbes Magazine article⁴. Author Todd Hixon argued that tertiary institutions no longer fulfil their societal promise; if you work hard and gain a good degree, it will serve as your pass to a career and middle class life. He then posed the question; if higher education no longer fulfils this promise, what now is its value? Hixon's story provides a frame for investigating what disruption means to education beyond the buzz of the word in a general sense, and how the disruption he describes may affect Otago Polytechnic, specifically the Centre for Sustainable Practice.

This work has found some strange bedfellows: Architect Bill Reed and Australian future thinker Steve Sammartino agree that language is key to change, Sammartino and New Zealand's Sue Suckling agree that legacy assets are a barrier to progress, research participants from the Department of Conservation, Spark and Kiwibank agree on how best to arrange human and other resources to drive transformation.

The increasing pace of technological evolution is highly disruptive for many organisations. Several New Zealand organisations are now exploring self-disruption as a defence strategy. These people describe the process as the need to think beyond the practicalities of delivering today's purpose so the forces of change can be considered from other perspectives, potentially those of an as yet unknown competitor. These organisations hope this 'eyes open' approach will help them act as start-ups, i.e. to look for gaps and act, even when the business case doesn't really stack up. The idea is to remove the normal constraints of business-as-usual and be willing to allow some areas of a business to be cannibalised by others, if that's the way the technology rolls. Their stories are covered in Section 3 which is designed as a stand-alone document so some concepts outlined in Section 1 are summarised again in Section 3.

Over its nine years (since 2008) of operation, the Centre has held a vision of mainstreaming sustainable practice. Through reflection and critical thinking, permanent staff (Steve Henry and Alexa Forbes) now acknowledge that such a position lacks the cutting edge needed to encourage transformation. They are also aware that mainstream, as a concept is probably

⁴ Hixon, T. Forbes magazine. (2014, June 1). Higher education is now ground zero for disruption. Retrieved from: <https://www.forbes.com/sites/toddhixon/2014/01/06/higher-education-is-now-ground-zero-for-disruption/#7c5843571f89>

irrelevant to the purpose of such a centre, which operates on the edge. The process of the MPP has supported this thinking. This MPP process has also shown that while the future development of the Centre is subject to the same disruptive forces as all other higher educational institutions, the Centre is particularly well placed to explore future-focused operations as well as curriculum. However, its future will depend on a willingness to self-disrupt from a position of understanding the revolution as the twin disruptive capacities of technological advance and environmental degradation cause exponential change to all societal systems. The Centre needs to find and drive a strong, easily articulated purpose so that it can capitalise the advantages it has already developed in supporting the development of 21st Century skills such as adaptability and creativity, (listed among the 21st Century skills described by the World Economic Forum (see Figure 16) and in operating a flexible learning environment.

The MPP project learning agreement outlines a series of outcomes and tasks including professional skills to be developed. Much has happened along the way and some outcomes and tasks have been achieved and some have not – redundancy of questions, direction changes in the face of new learning, and inconclusive answers all feature. The title of the project doesn't fit the outcomes as well as it might. These challenges and responses to them are documented in Section 5 – Reflective Review.

As the drivers of change were mapped using the Natural Step's Framework for Strategic Sustainable Development⁵ and Bill Reed's Trajectory of Environmentally Responsible Design,⁶ these tools became less useful. It became clear that while these frameworks are useful for considering complex issues, there are gaps. It is difficult in these models to consider unintended consequence or feedback loops for example, and it's not easy to build a business case from them. How is a vision to be artificially created when it's not yet articulated? Is awareness of changing circumstances and a general direction enough? This has been the modus operandi of the Centre, but no, it's not enough. Understanding as much as possible about the future became a major theme leading to a very different literature study than initially planned, especially in light of the real-world research that indicated far more interest in technological disruption than in the disruption created by environmental change. Climate change, the extinction crisis, and other environmental issues have been relegated to

⁵ The Natural Step. (n.d.). *The natural step framework*. Retrieved August 5, 2017, from <http://www.thenaturalstep.org/our-approach/>

⁶ Reed, B., Regenesys Inc., & Integrative Design Collaborative. (2006). *Trajectory of environmentally responsible design*. Retrieved from http://www.integrativedesign.net/images/Trajectory_EnvironmentallyResponsibleDesign.pdf

the status of a backdrop to the sweeping technological changes that are driving the next (third or fourth depending on who you listen to) industrial revolution and disrupting the very economic system that created them.

My realisation that technology advancement and climate change were both exponential, or following the doubling curve, resulted in a long exploration of the exponential versus the lineal – a difficult concept for humans but simply explained by Singularity University co-founder Ray Kurzweil as the difference between counting 30 lineal paces versus 30 doubling (or exponential) paces. The former would take the pacer 30 paces from where she began, the latter 26 times around the globe!⁷ In terms of exponential environmental change, carbon emissions were originally graphed by Charles Keeling – known for The Keeling Curve⁸ - who started measuring the rapidly increasing carbon dioxide levels in the atmosphere in the 1950s. Since then, NASA and several bloggers including Intmath⁹ have mapped the exponential function around carbon emissions¹⁰ using US Department of Energy data. Others have mapped the exponentiality of extinction¹¹, this example cross-referencing extinction with the exponential rise of the human population.

Most executives are well aware of technological disruption, if not its exponentiality, as shown in a report from The Economist Intelligence Unit detailing responses from 500 senior executives identifying technological progress as a mega-trend¹². Environmental disruption by contrast, happens every now and again through floods, winds or earthquake, and human causes of accelerating climate change can still be denied by sceptics, including President Donald Trump of the USA,¹³ making coordinated responses difficult at best, near impossible at worst.

For executives, the application explosion is hard to miss as web 2.0¹⁴ platforms provide paradox aplenty. Web 2.0 hosts the world's biggest hotel (in terms of rooms offered and

⁷ Berman, A. E., Dorrier, J., & Hill, D. J. (2014, April 5). How to Think Exponentially and Better Predict the Future. Retrieved June 19, 2017, from <https://singularityhub.com/2016/04/05/how-to-think-exponentially-and-better-predict-the-future/>

⁸ Keeling Curve. (n.d.). In *Wikipedia, the free encyclopedia*. Retrieved July 16, 2017, from https://en.wikipedia.org/wiki/Keeling_Curve

⁹ Bourne, M. (2008, February 9). Earth killer - composite trigonometry CO2 graph. Retrieved June 19, 2017, from <http://www.intmath.com/blog/environment/earth-killer-composite-trigonometry-co2-graph-978>

¹⁰ Climate change: How do we know? (n.d.). Retrieved June 19, 2017, from <https://climate.nasa.gov/evidence/>

¹¹ Center for Biological Diversity. (n.d.). Human population growth and extinction. Retrieved from http://www.biologicaldiversity.org/programs/population_and_sustainability/extinction/

¹² Economist Intelligence Unit. (2012) Agent of change, The future of technology disruption in business. A report from the http://www.economistinsights.com/sites/default/files/downloads/EIU_Agent%20of%20change_WEB_FINAL.pdf

¹³ Marciniak, T., & Newsweek. (2017, January 6). *What has Trump said about global warming?*. Retrieved from <http://www.newsweek.com/what-has-trump-said-about-global-warming-quotes-climate-change-paris-agreement-618898>

¹⁴ Wikipedia. (n.d.) *Web 2.0*. Retrieved August 5, 2017, from https://en.wikipedia.org/wiki/Web_2.0

bookings made) that owns no property, a taxi company that has no cars, the world's biggest retailers with no bricks and mortar, the greatest ever encyclopaedia that has no books and that everyone can access and adjust. Against the Web 2.0 and technological change scenario, the first question for the Centre and any higher education body is; how long until the world's biggest university has no campus? A serious consideration given the \$NZ61 billion tied up in New Zealand tertiary's bricks and mortar.¹⁵ The next question is, how relevant is current curriculum given the technological changes now described by the World Economic Forum as the 'Fourth Industrial Revolution'?¹⁶ Then, what about curriculum relevance given a world where skills serving an industrialised society are obsolete in a digital, technologized society? If environmental change is also exponential, the exponential tech curve, with all its own convergences is converging with an environmental degradation curve. This presents huge challenges for all sectors of society.

A key step in my study was to move away from detailed consideration of environmental impacts, beyond as a backdrop to everything, and move the focus to an understanding of what's changing and what's coming – a future focus. In its early years the Centre staff believed success relied on convincing its audiences that they could profitably react to environmental change by creating strategies to reduce individual and organisational impacts on the earth's ecosystems. Centre staff now believe that the success of the Centre relies on something different; personal transformation, relationship with nature, understanding of systems and how entrepreneurship might follow, for example. However, this has been poorly articulated so far. After further reading and research, I moved towards exploring the place of the Centre for Sustainable Practice in a world of technological disruption, against the environmental disruption backdrop, and in consideration of the need for a revolution in higher education. I used a qualitative approach to explore the New Zealand organisational response to disruption through a series of conversations with six organisations. I found these organisations deep in the work of navigating change. Several themes emerged including (particularly among the longer established organisations) genuine attempts to support their people, be they stuck in a 30-year-old corporate paradigm or way out in the realms formerly known as science fiction. None of the six organisations have a clear idea of where they'll end up, but they have all considered carefully the question of what is the business they're actually

¹⁵ Suckling, Sue. (2016, November 14). SingularityU New Zealand Summit presentation. <http://www.singularityunz.com/modules/speakers/sue-suckling>

¹⁶ Schwab, K. (2016, January 14). The Fourth Industrial Revolution: what it means, how to respond. Retrieved June 19, 2017, from <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>

in (agreed to be a key point in a changing environment) and each have designed pathways to follow that they think will keep them in good stead. Few were truly focused on environmental change, the mindset was more about doing what they can in terms of individual understanding of impact reduction, rather than confront the hugeness of the subject within their everyday efforts. All were excited, inspired and charged by their work and this produced innovative thinking and inspired others.

This work is all then brought together in an attempt to apply their learning to the Centre workplace. Ultimately, there are more questions than answers, but there is value in understanding the questions and the drivers that will inform the answers. Finally, this work charts my journey of professional development throughout the entire process including highlighting limitations of frameworks, acknowledging personal limits in scientific and mathematic knowledge, the changing relevance of early ideas and mistakes made and successes celebrated along the way.

Section 1: The drivers of change.

"The greatest shortcoming of the human race is our inability to understand the exponential function." Prof. Al Bartlett- Professor Emeritus in Nuclear Physics at University of Colorado at Boulder.

Against a background of massive change in ecological systems (biodiversity loss, the sixth great extinction¹⁷, ecosystem destruction, climate change, demand for/overuse and waste of resources), human civilisation is facing exponential growth in technology that is at the point where the upward curve can no longer be confused with a linear one. That is, while the line depicting technological advances over time has looked flat or gently rising in a linear way, it is now beginning a steep trajectory upward. Exponential change in human designed technology has most likely been happening for all of human history, but it is now, in the 21st century, that the cumulative impact of the doubling curve is affecting all sectors.

Ray Kurzweil, in his article *The Law of Accelerating Returns* explains "Our forebears expected the future to be pretty much like their present, which had been pretty much like their past. Although exponential trends did exist a thousand years ago, they were at that very early stage where an exponential trend is so flat that it looks like no trend at all."¹⁸ Author Yuval Harari in his wildly popular book *Sapiens*, explains how the cultivation of wheat from around 13,000BC enabled "Homo Sapiens to multiply exponentially"¹⁹ and that

"...the last 500 years have witnessed a breath-taking series of revolutions...The earth has been united into a single ecological and historical sphere. The economy has grown exponentially, and humankind today enjoys the kind of wealth that used to be the stuff of fairy tales. Science and the Industrial Revolution have given humankind superhuman powers and practically limitless energy. The social order has been completely transformed, as have politics, daily life and human psychology."²⁰

The exponential curve begins from such a low base, it is hardly noticed until the sharp upswing portrays rapidly rising numbers. Understanding that function, and its deceptive nature, is integral to understanding what is driving deep changes to our civilisation and our environment, and to grasping the pace of change to come.

¹⁷ Ceballos, G., Ehrlich, P. R., & Barnosky, A. D. et al (2015, June 19). Accelerated modern human-induced species losses: Entering the sixth mass extinction. Retrieved November 15, 2016, from <http://advances.sciencemag.org/content/1/5/e1400253.full>

¹⁸ Kurzweil, R. (2001, March). *The law of accelerating returns*. Pg 1. Retrieved from <http://www.kurzweilai.net>

¹⁹ Harari, Y. N., & Perkins, D. (2015). *Sapiens: A brief history of humankind*. Pg 75

²⁰ Harari, Y. N., & Perkins, D. (2015). *Sapiens: A brief history of humankind*. Pg 319

The exponential curve

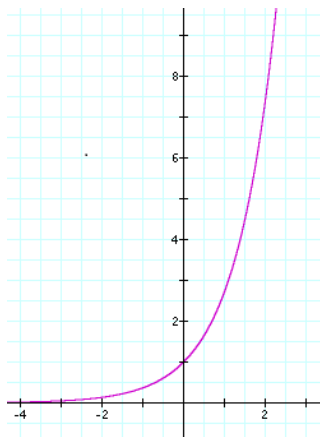


Figure 2. The exponential curve. The curve comes off a very low base which is why exponential growth it is often not recognised or even mistaken as a linear growth. Once it moves into positive numbers, the upward curve is rapid. Reprinted from <http://xahlee.info/Specia>

Figure 2 depicts the exponential growth curve beginning well below zero and appearing flat for a long time before a very steep upward gradient. Whenever there exists a relatively stable percentage growth over a long period of time, the steep gradient will be hit. The Khan academy Intro to Exponential Functions explains the variable is in the exponent – eg $y=3^x$.²¹ This explanation of the exponential curve from the Singularity Institute Africa is also helpful.

“Exponential curves start slowly and then skyrocket toward infinity. Exponential growth is simple doubling. 1 becomes 2, 2 becomes 4, 4 becomes 8, but, because most exponential curves start out well below 1, early growth is almost always imperceptible. When you double .0001 to .0002 to .0004 and .0008, all of these plot points look like zero on a graph. At this

rate, the curve stays below 1 for a total of 13 doublings. Only seven doublings later, that same line is above 100. And it’s this kind of explosion, from meagre to massive and seemingly so quickly, that makes exponential growth so powerful.”²²

Al Bartlett in a lecture based on his book, *The Forgotten Fundamentals of the Energy Crisis* (1979)ⁱ offers a useful formula. Take the number 70 and divide it by the constant percentage of growth to get the doubling time of any given situation.²³ This provides an easy calculation for considering population or house price growth, or even compounding interest on your investment. For example, a town with an average population growth of 5% can expect to double its population in 14 years ($70/5=14$). This doubling effect is the magic of compounding interest and the disaster of cumulative carbon emissions (or population growth or a 10% per year rise in house prices resulting in a doubling in seven years).

²¹ <https://www.khanacademy.org/math/algebra/introduction-to-exponential-functions/exponential-growth-and-decay/v/exponential-growth-functions>

²² Singularity Institute. (n.d.). What is exponential growth. <http://www.singularityinstituteafrica.com/what-is-exponential-growth.html>

²³ Bartlett, A. (n.d.). *Forgotten Fundamentals of the Energy Crisis*. http://www.albartlett.org/articles/art_forgotten_fundamentals_part_3.html (accessed 7 April 2017)

The mega trends

As available resources and ecosystem services decline, demand for them is increasing. This is our environmental situation at its high level. The Natural Step²⁴ articulates this using the metaphor of a funnel. This funnel provides the backdrop for my mega trends map (Figure 3) which shows what's generally increasing and decreasing and how technological development converges with environmental disruption.

On the increasing side of the funnel the main drivers of change affecting the powerhouses of the modern economic system (in place since the last industrial revolution) include the availability of big data and information, the spread into populations of internet availability and capacity, the potential for platforms to replace institutions and increasing globalisation. On the decreasing side are costs of highly technical computing, the marginal costs of many services, the price of access to the world's information and the predictability of markets and economic systems. These big drivers are forcing many industries and economic functions to the wall – this has already happened to many businesses in the various media and music industries and is causing change right through to the daily exchange of products and services. As a result, these trends are changing the very way societies operate.

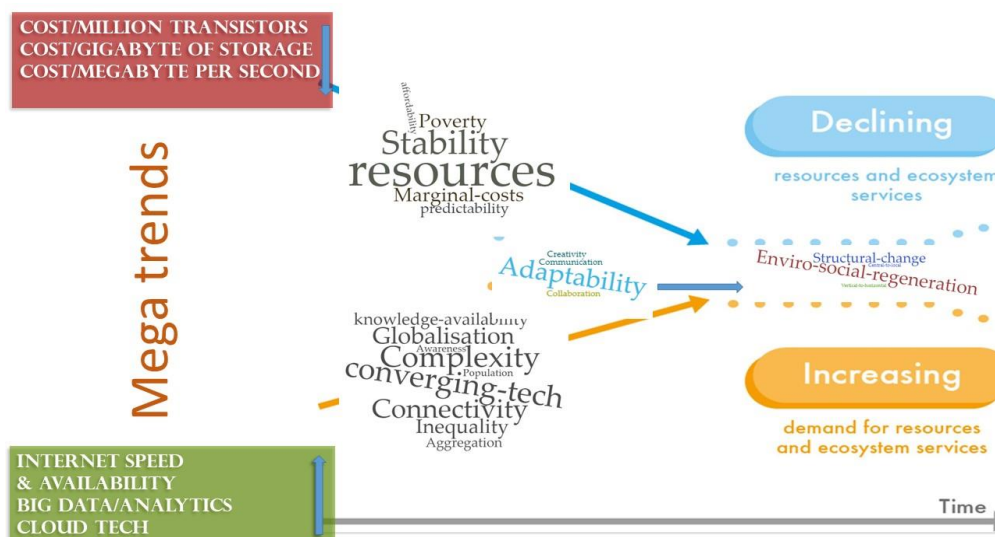


Figure 3. The global mega trends mapped against globally declining resources and increasing demand for them. Adapted from *The Natural Step: funnel metaphor*. Robert, K.,(2010) & *The Natural Step*. Retrieved 5 August, 2017 from <http://makelifegettingbetter.blogspot>

The following diagram (Figure 4), Bill Reed's Trajectory of Environmentally Responsible Design offers a way of thinking about how to approach action from a responsible design

²⁴ The Natural Step Canada. (n.d.). Understanding the problem. Retrieved July 16, 2017, from <http://www.naturalstep.ca/understanding-the-problem>

perspective in order to not only do less harm, but to look to restore, or better yet regenerate environmental systems.

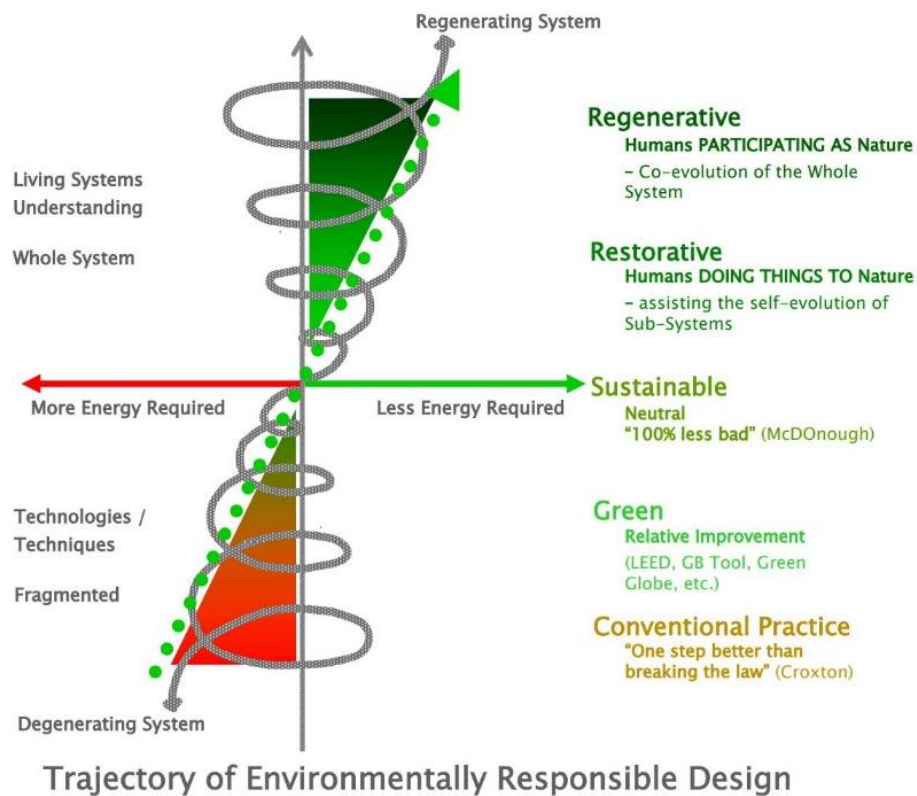


Figure 4. The Trajectory of Environmentally Responsible Design is a useful tool for mapping 'business as usual' and envisaging what an action, or situation looks like in a green state, sustainable state, restorative state or regenerative state. Reprinted from Reed, B., Regenes Inc., & Integrative Design Collaborative. (2006). Trajectory of environmentally responsible design. Retrieved from http://www.integrativedesign.net/images/Trajectory_EnvironmentallyResponsibleDesign.pdf

Bill Reed designed this trajectory approach as a way of thinking about and improving the construction industry. It is also useful for mapping any issue to create a potential trajectory. In the following table (Figure 5) I've mapped the current general approach of economic progress as conventional and imagined a potential trajectory from environmental and human degradation through to regeneration. This approach can map future thinking towards regeneration in terms of any issue.

Conventional	Green	Sustainable	Restorative	Regenerative
<i>Focus: Economic Growth</i>	<i>Focus: Economic Growth</i>	<i>Focus: Sustainable Profits</i>	<i>Focus: Circular Economy</i>	<i>Focus: Thriving</i>
Degraded ecosystems	Minimising impacts through efficiency of resource use: waste reduction, triple bottom line accounting, emissions offsetting	Strategic systems thinking to design for long term sustainability	Positive societal and ecological impacts	Humans resonate as part of nature
Industrialised: resources and waste are costs. Costs externalised	Technical, piecemeal, non-strategic approach	Key objectives, eg profitability eliminates current and future risks/costs	Socially just, culturally rich and ecologically restorative systems	Non anthropocentric - entire ecosystem considered
Industrial system pushes animals and humans to unethical and unsustainable point	Small improvement focus rather than systemic change	Cyclical design eliminates waste that eco services can't process	Carrying capacity of the biosphere systematically increased	No separation between humans and ecology
Social impacts not broadly considered	Universal Basic Income attempts to preserve middle class	Remove barriers for people to meet their needs	People's needs increasingly met	Impacts positive and negative equally distributed
Impacts on other species not considered	Nature protected as something separate	Nature is a separate entity to be managed, protected – valued for service	People reintegrated with nature, other species needs recognised	Humans not necessarily dominant
Short term profits define success	Short term profits design success	Full lifecycle of products are considered	Virtual reality makes more of the world accessible. No longer limited by senses	
Technology enhances business and increases profitability	Technological advance relied on to solve environmental issues	Technological advances capitalised towards sustainability	Technology supports solutions to 'wicked problems'	
Public policy is siloed, avoidant and incremental	Public policy grapples with issues	Ministry for the future manages human/technology relationship	Benefits of disruption accrue to the many	
Technological advances create super- elite class		De extinction repopulates wild places		Co evolution of the entire system
 Time				

Figure 5. Imagining economic trajectory from conventional to regenerative using the principles of Bill Reed's Trajectory of Environmentally Responsible Design. Adapted from Reed, B., Regenes Inc., & Integrative Design Collaborative. (2006).

To sustain or to disrupt

Clayton Christensen's 1997 book *The Innovator's Dilemma*²⁵ in which he coined the term 'disruptive technology', separates new technology into two categories; one that sustains incumbent organisations and one that disrupts them. Christensen's argument laid the base understanding of disruptive innovation as opposed to sustaining innovation. He says that incumbent organisations facing disruption will nearly always lose out to the new entrant and will rarely survive the disruption.²⁶ Kodak is a well-known example: The company dominated the film market for more than a century and invented the first digital camera. The company senior executives failed to follow up on the 'film-less' camera because of the potential for damage to its film market. Kodak concentrated its efforts on producing better and better film, and developing low resolution film-less cameras for phones only. This left the company open to total disruption from those not so invested in film production. Kodak had an aggressive digital strategy, but it was based around its core business – film. As digital cameras gained quality and popularity, the market for film evaporated. This led to the eventual bankruptcy of a 128-year-old company.²⁷

Christensen defines disruptive innovation as that which creates a new way of doing things that completely replaces the old, in the way that the mass produced automobile completely replaced the horse and cart. You can see this theory in operation every day - incumbent carmakers in competition with technology companies that are looking for new ways of solving transport problems, online book store Amazon driving hard into the supermarket space, the entire finance industry under serious threat from an algorithm that cuts out the transactional middlemen through a public, distributed ledger. Technology, in this digital age, is paving the way for new entrants in every sector and the resulting disruption to those sectors are converging. Web 2.0 has provided the platform for the small operation to seriously threaten the established one with very little investment and these small operations can quickly disrupt the incumbent.

²⁵ Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Boston, Mass: Harvard Business School Press.

²⁶ Christensen, C.M. (2012, October 23) Disruptive innovation – key concepts. Retrieved April 13, 2017, from <http://www.claytonchristensen.com/key-concepts>

²⁷ Osborne, D. (2012, January 20). *The moment it all went wrong for Kodak*. Retrieved from <http://www.independent.co.uk/news/business/analysis-and-features/the-moment-it-all-went-wrong-for-kodak-6292212.html#gallery>

The four key elements of the theory of disruption are identified in a research piece from MITSloan who ask the question of 77 executives; How Useful Is The Theory of Disruptive Innovation?²⁸

1. That incumbents in a market are improving along a trajectory of sustaining innovation.
2. That they overshoot customer needs.
3. That incumbents have the capability to respond to disruptive threats but fail to exploit it.
4. That incumbents end up floundering as a result of the disruption.²⁹

Figure 6 from this research piece illustrates the four elements of the theory.

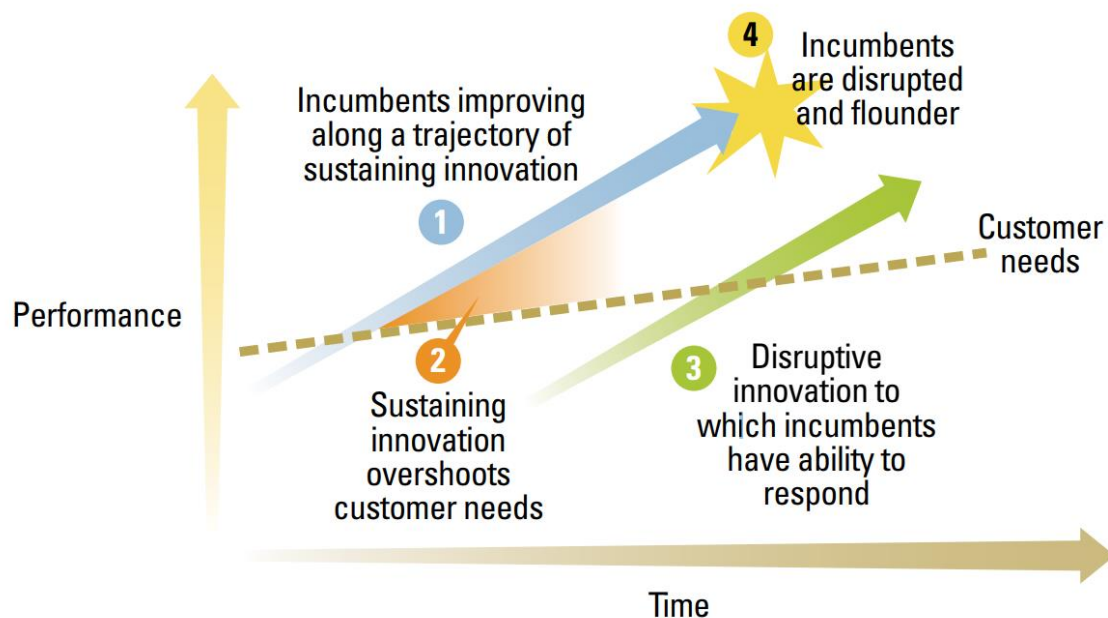


Figure 6. This figure provides pictorial representation of the four elements of the theory of disruptive innovation. King, A., & Baatartogtokh, B. (n.d.). *How useful is the theory of disruptive innovation?* (Vol.57, No.1). Retrieved from MITSloan Management Review website: http://ilp.mit.edu/media/news_articles/smr/2015/57114.pdf

²⁸ King, A., & Baatartogtokh, B. (n.d.). *How useful is the theory of disruptive innovation?* (Vol.57, No.1). Retrieved from MITSloan Management Review website: http://ilp.mit.edu/media/news_articles/smr/2015/57114.pdf

²⁹ King, A., & Baatartogtokh, B. (n.d.). *How useful is the theory of disruptive innovation?* (Vol.57, No.1). Pg 4. Retrieved from MITSloan Management Review website: http://ilp.mit.edu/media/news_articles/smr/2015/57114.pdf

The following diagram (Figure 7) shows that from where we stand as 21st century humans we can easily confuse the exponential curve with lineal progress. The impression is that we are on the same progression we've been on since the industrial revolution, but in fact, the upward flight of exponential change is upon us. The deception or disappointment segment is interesting too. The exponential curve, from a base of well below one, seems like nothing is happening for a very long time (.001 - .002 is still zero in our minds). Exponentiality only really becomes visible once it hits whole numbers. This is disappointing if you're a small company start-up with a new application and just not getting the numbers you need to continue – many start-ups never hit the tipping point that shoots them from the 'disappointment' to the 'amazement' mode. The deception section also typifies the incumbent position; the new entrant is dismissed, ignored or not noticed at all. But once the curve flies upwards, there is amazement, surprise - or chaos. These are often described as tipping points, for example the slow growth of the mobile phone and then the 'seems like it was all of a sudden' tip into everyone owning one, or the 'came from nowhere' celebrity who's been working at her craft for years prior to 'overnight' success. 3D printers is another example of this, the technology has been on an exponential curve for 30 years, stuck in the trough of disappointment, but actually doubling off an incredibly low base.

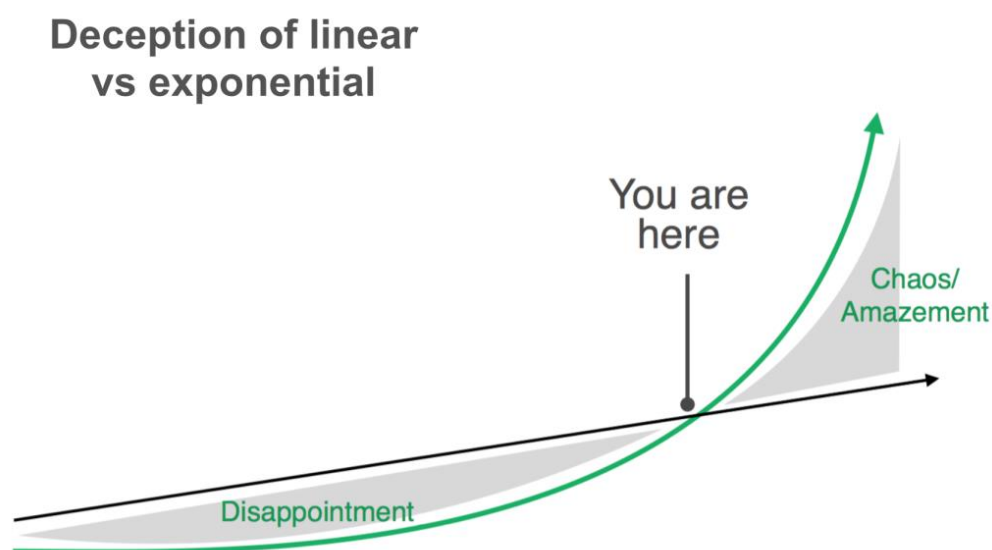


Figure 7. This figure explains how we humans tend to misunderstand the exponential curve, where we might be on it and how we might mistake it for linear trajectory. Reprinted from Evolution partners <http://www.evolutionpartners.com.au/wp-content/uploads/2014/11/linear-vs-exp>

Technological exponentiality is often explained with Moore's Law³⁰. Gordon Moore was the co-founder of Intel and he made an observation in 1965 that continues to hold more or less true. His law was the observation that the number of transistors in an integrated circuit doubles approximately every two years. That's the doubling effect, the exponential nature in action. Kaila Colbin explained it as follows during her keynote speech at SingularityU NZ Summit.

“You can see this in the price of GFLOPS (Flops are a measure of computing power – GFlops are giga Flops). In 1961, one GFLOP cost \$8.3 trillion. By 1984 it was down to \$42.8 million, 1997 - \$4200, 2007 \$52, 2015 \$0.08c. That's exponential.”³¹

Moore's Law, although coined around the price of computing performance is taken to apply to all exponential technologies.

³⁰ Wikipedia. (n.d.). Moore's law. Retrieved July 16, 2017, from https://en.wikipedia.org/wiki/Moore%27s_law

³¹ Colbin, K. (2016, November). *Introduction to exponentials*. Keynote presented at SingularityU New Zealand Summit, Christchurch. Retrieved from <http://www.singularityunz.com/modules/speakers/kaila-colbin>

The Big Shift

The Shift Index from Deloitte’s Centre for the Edge, maps, measures and describes what Deloitte calls The Big Shift³². The authors say business is being fundamentally altered by macroeconomic trends that are “unleashing flows of information, people and capital”.

“Long-term trends, driven by the liberalization of public policy and the exponential cost-performance improvement of digital infrastructure—computing, storage, and bandwidth—are fundamentally altering the business environment across all industries. This is what we call the Big Shift.”³³

This infographic from Report Two of the Shift Index series³⁴ (Figure 8) summarises how exponential advances in technology, three core digital improvements, have driven and will continue to drive exponential innovation across every sector. It also outlines the exponential impacts of the convergence of the improvements of core technologies. The core digital technological improvements responsible for driving immense change are the exponential decrease in price of the cost per million of transistors, the cost per gigabyte of storage and the cost per megabyte per second. In short, price, performance and speed has driven and continues to drive change to the very heart of our economic and thus social systems.

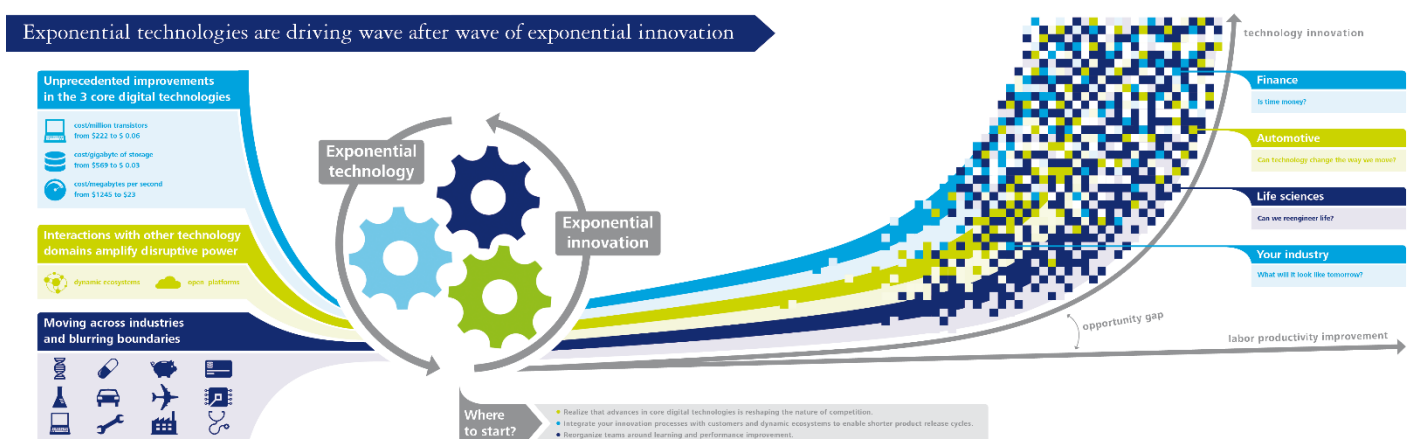


Figure 8. The technological advances on the right of this diagram has enabled the exponential innovations on the right. Deloitte University Press, Shingles M., Briggs B., & O’Dwyer J. (2016, February 24). Social impact of exponential technologies. Retrieved from <https://dupress.deloitte.com/dup-us-en/focus/tech-trends/2016/social-impact-of-exponential-technologies.html>

³² Bertoen, W., & Oonk, M. (2017, 6 January). The big shift. <https://www2.deloitte.com/nl/nl/pages/center-for-the-edge/artikelen/the-big-shift.html>

³³ Bertoen, W., & Oonk, M. (2017, 6 January). The big shift. <https://www2.deloitte.com/nl/nl/pages/center-for-the-edge/artikelen/the-big-shift.html>

³⁴ Hagel, J., Brown, J. S., Samoylova, T., & Lui, M. (2013, October 4). *Exponential technologies are driving wave after wave of exponential innovation*. Retrieved from <https://dupress.deloitte.com/dup-us-en/industry/technology/from-exponential-technologies-to-exponential-innovation.html>

At this moment, the convergence of many exponential curves - artificial intelligence, biotech, alternative energy systems, alternative currencies, tech food systems, big data – is affecting all sectors of human activity with associated societal consequences. The nature of the exponential function means development in these sectors will continue to accelerate, causing huge disruption to all sectors including government and society. But there is also huge opportunity for solving ‘grand challenges’ as social good equals good business according to Marcus Shingles, Bill Briggs and Jerry O’Dwyer in their Deloitte University Press article, *Social Impact of Exponential Technologies*.³⁵ “The technology needed for organizations to catalyze significant positive social change—while at the same time pursuing commercial ambitions—has never been more accessible.”

The article talks about the considerable ‘white space’ companies can target such as consumer foods enabled by biotechnology and education industry partnering with entertainment business to leverage virtual reality for learning experiences.

Opportunities for problem solving are explored in detail in this diagram from Frank Diana³⁶ (Figure 9) which maps enabling technology, or as he describes them, foundation technologies and how they provide the base for the accelerated development of technology that provides the things that make innovation go faster such as robotics and nano-technology. The grey line graphs the disruptive scenarios that those innovations make possible and gives us some idea of the impact and future direction of disruptive technological change – and the opportunities.

³⁵ Deloitte University Press, Shingles M., Briggs B., & O’Dwyer J. (2016, February 24). Social impact of exponential technologies. Retrieved from <https://dupress.deloitte.com/dup-us-en/focus/tech-trends/2016/social-impact-of-exponential-technologies.html>

³⁶ Diana, F. (2015, February 23). *The business evolution imperative: disruption [Enterprise Insights IT-enabled transformation for the world's best companies]*. Retrieved from <http://sites.tcs.com/blogs/enterpriseinsights/business-evolution-imperative-disruption/>

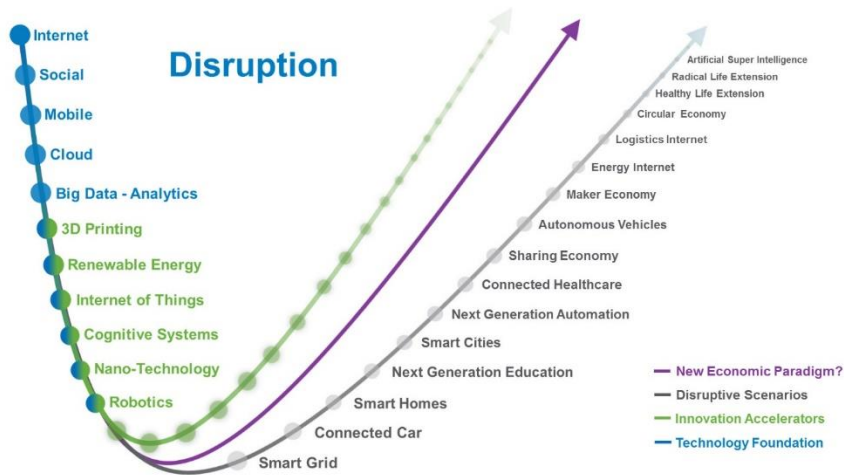


Figure 9. Enabling technology drives innovation. Internet, social, mobile, cloud and big data technology are the enablers of a new economic paradigm which isn't yet defined. Diana, F. (2015, February 23), Tata Consultancy. The business evolution imperative: disruption [Enterprise Insights IT-enabled transformation for the world's best companies]. Retrieved from <http://sites.tcs.com/blogs/enterpriseinsights/business-evolution-imperative-disruption/>

Diana's next diagram (Figure 10) shows how the enabling foundation technologies are accelerated by merging innovations and how these can work together to create previously unimagined future scenarios and all at an exponential rate. For example, number two (black lines) shows how the combination of mobile tech, internet of things, and robotics could combine to support healthy life extension and connected healthcare.

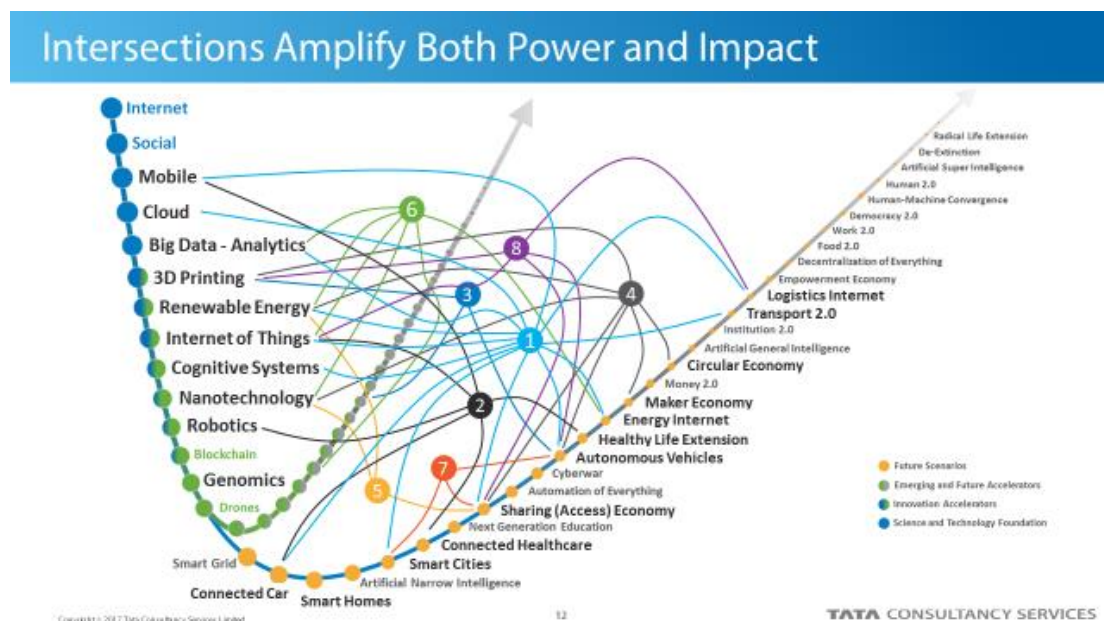


Figure 10. Amplification of foundations. This shows how technology amplifies and enables resulting in accelerators of change. Diana, F., & Tata Consultancy. (2016, November 22). Reimagining the future - a journey through the looking glass [Powerpoint, Slide 12]. Reprinted from <https://frankdiana.net/2016/11/22/reimagining-the-future/>

Six (or seven) 'D's of Exponentiality

Given the difficulty of recognising an exponential curve before the 'chaos and/or amazement' sets in, i.e. before the upward sweep of change causes disruption, it's useful to consider the telling signs of exponentiality. The 6Ds Exponential Framework comes from the book *Bold: How to Go Big, Create Wealth and Impact the World* by Peter Diamandis and Steven Kotler. The authors believe the 6Ds are key to understanding and recognising the growth of exponentially advancing technologies. "If the goal is to avoid Kodak's errors (if you're a company) or to exploit Kodak's errors (if you're an entrepreneur) then you need to have a better understanding of how this change unfolds..."³⁷

In this diagram (Figure 11), Diamandis has arranged the 'Ds' as an exponential sequence.

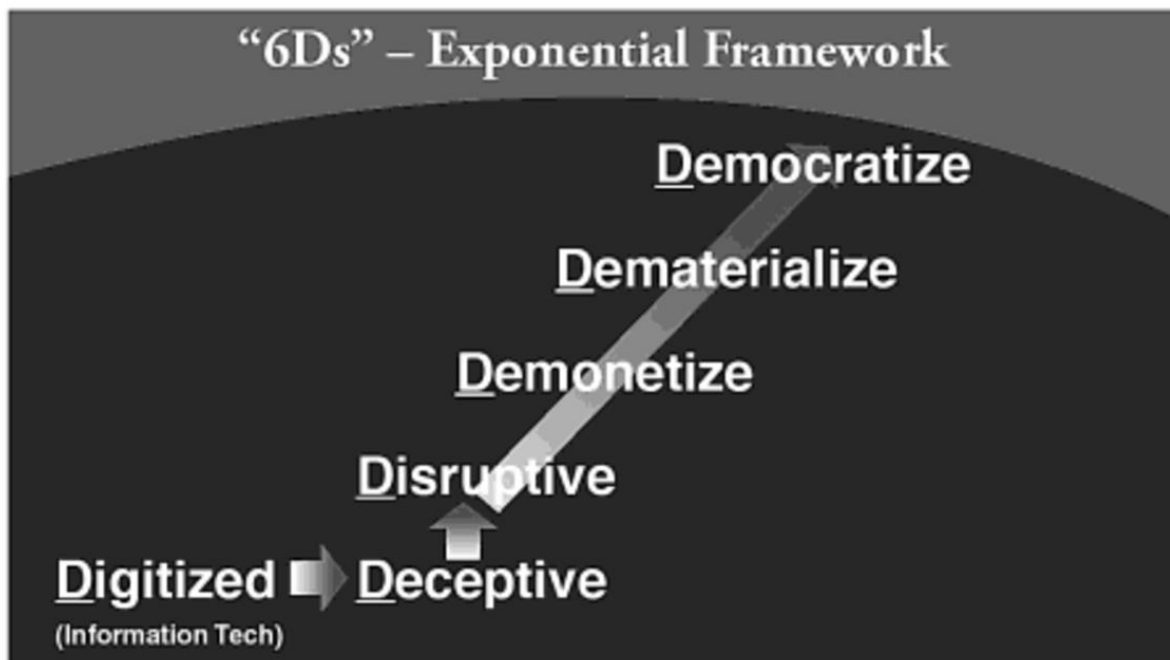
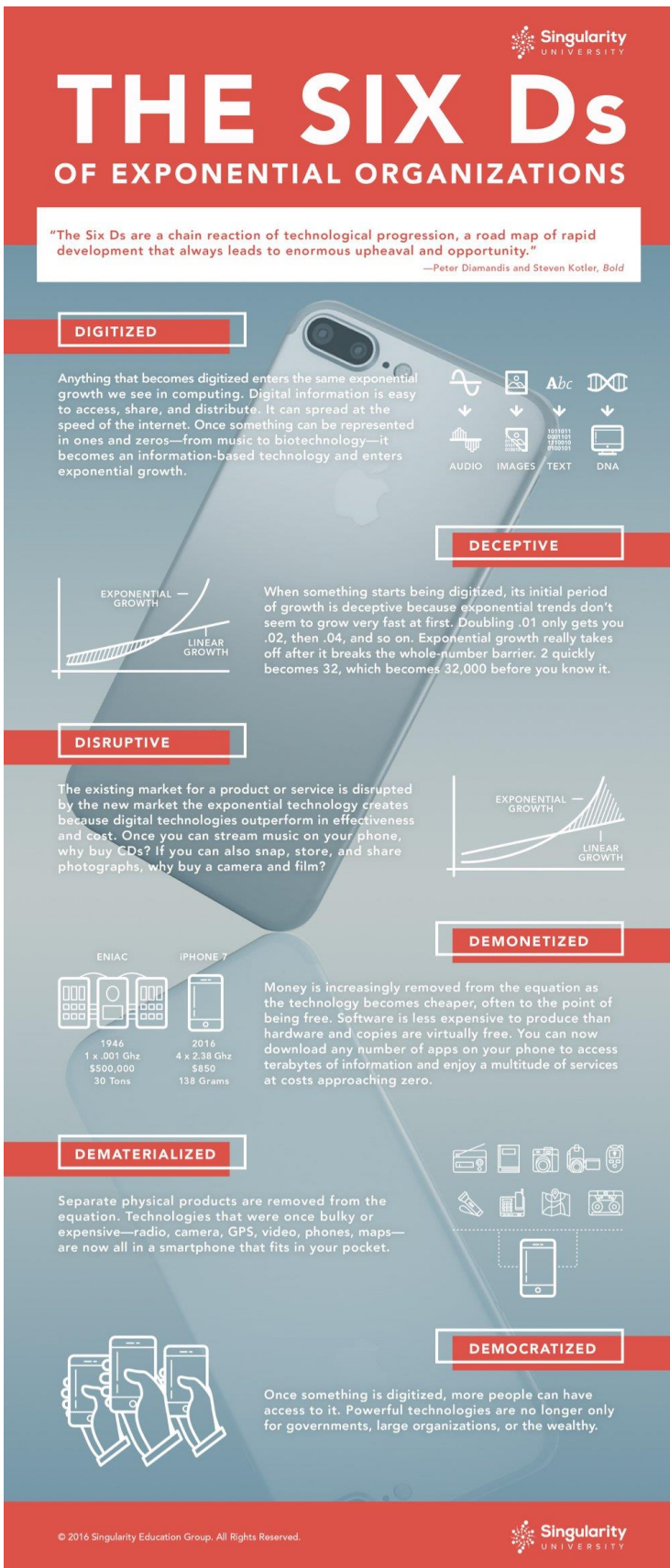


Figure 11. The 6 Ds of exponential technology as they range up the exponential curve. Diamandis, P. H., & Kotler, S. (2015). *Good-bye linear thinking...hello exponential*. In *Bold: [how to go big, create wealth, and impact the world]* (p. 8). New York, NZ: Simon & Schuster Audio.

The next image comes from Singularity University (Figure 12) and explains each point of the sequence. Singularity's Nathan Calhoun, speaking at the SingularityU NZ Summit in November 2016, added a seventh, Decentralisation, to address a new, in his view, final stage of the sequence.³⁸

³⁷ Diamandis, P. H., & Kotler, S. (2015). *Good-bye linear thinking...hello exponential*. In *Bold: [how to go big, create wealth, and impact the world]* (p. 8). New York, NZ: Simon & Schuster Audio.

³⁸ Calhoun, N. (2016, November 14). *Global grand challenges, SingularityU NZ Summit*, [Lecture notes].



1. **Digitised** – anything that can be, will be.
2. **Deceptive** – doubling comes of such a low base we often don't notice until the change hits hard and people think it's come from nowhere.
3. **Disruptive** – existing market disrupted because digital outperforms.
4. **Demonetised** – it becomes free or close to, as the marginal costs sink like a stone. Again think encyclopaedia, on line courses.
5. **Dematerialised** – we need less stuff – think of smartphone – no need now for a camera, a flashlight, a watch, a diary, an encyclopaedia....
6. **Democratised** – available to anyone.
7. If we accept Nathan Calhoun's addition (as described above, on page 26) we would include: **Decentralised**- where power moves from centralised points to individuals.

Figure 12. This diagram shows the chain reaction of progression once digitisation occurs. Reprinted from Singularity Education Group <https://singularityhub.com/2016/11/22/the-6-ds-of-tech-disruption-a-guide-to-the-digital-economy/>

Section 2: Drivers of change: Higher Education

Against the background of disruptive technological change, many technologies throughout history have faced extinction taking their production companies with them – the typewriter, the floppy disc, the fax machine just to name a few relatively recent examples. The difference now is the exponential rate of disruptive technological change and the impacts on entire industry sectors. Education, particularly higher education, is facing its own disruption now.

Higher Education: Ground Zero for Disruption

In his *Forbes* article, Higher Education Is Now Ground Zero For Disruption, published Jan 6, 2014, Todd Hixon said higher education was in trouble because the ‘entire system had ridiculous costs’, was based in an ‘antiquated business model’ and this was only accepted because of the ‘extraordinary value we see in education’³⁹. Hixon justifies his cost allegation comparing higher education costs with medical costs and CPI increases as shown in Figure 13.

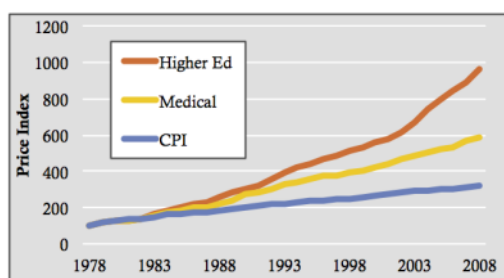


Figure 13. Hixon, T. (2014, June 1). Higher education is now ground zero for disruption. Reprinted from <http://www.forbes.com/sites/toddhixon/2014/01/06/higher-education-is-now-ground-zero-for-disruption/#554148305bd9>

He warns that higher education as a product makes no sense anymore, and its social license to operate is waning. This is because it no longer provides the lifetime pass to upper middle class life that it used to, and is no longer a guaranteed pathway to a job. He notes that the rise of first year graduates having to work for free shows their qualifications aren't considered valuable.

“Clients of law firms often refuse to pay for first-year lawyers, arguing that they add no value. Unpaid internships for recent graduates have multiplied in place of paid training

³⁹ Hixon, T. (2014, June 1). Higher education is now ground zero for disruption. Retrieved October 20, 2016, from <http://www.forbes.com/sites/toddhixon/2014/01/06/higher-education-is-now-ground-zero-for-disruption/#554148305bd9>

programs, indicating that businesses find recent graduates unprepared for productive work,”⁴⁰ says Hixon.

Unbundling of services has been part of the economic landscape since 2003 when Apple launched iTunes, allowing the sale of individual songs. Since then we’ve seen unbundling of software, media, TV, telcos and other industries. A serious unbundling of education is next according to many commentators including Ryan Craig in his book, *College Disrupted* (2015)⁴¹, and Jeffrey Selingo in his book *College (Un)bound* (2015)⁴². So far, unbundling is evidenced by the rapid rise of multi-sourced learning, Massive Open Online Courses (MOOCs), adaptive learning, informal assessments and micro credentials. Hixon in his Forbes article says “...we are now at a point where the economic stakes are so high that they will drive change.”⁴³ U.Lab founder Otto Scharmer echoes this theme. U.Lab is grounded at MIT but offers transformation across systems and personal lives to people all over the globe. Scharmer offers *Seven Principles for Revolutionising Higher Education*. In a huffingtonpost.com article of that title published in 2015, he says: “The current crisis in higher education has three characteristics: it’s overpriced, out of touch (with society’s real needs), and outdated (in its method and purpose).”⁴⁴ U.Lab has grown from a recognition of the key change drivers and, in February 2015 had 28,000 registered participants from 190 countries. Scharmer says the solution to the failures in higher education are emerging:

“It’s empowering (putting the learner into the driver’s seat of profound personal, professional, and societal renewal), and it’s transformational (providing new learning environments that activate the deepest human capacities to create — both individually and collectively).”⁴⁵

While these commentators are discussing mostly the United States higher education system, (acknowledging that Scharmer’s U.Lab operates globally) the discussion is similar around the world. At the 18th Toulon-Verona International Conference at the University of Palermo in 2015, researcher Yossi Raanan from the School of Business Administration at the College of

⁴⁰ Hixon, T. (n.d.). Higher education is now ground zero for disruption. Retrieved October 20, 2016, from

<http://www.forbes.com/sites/toddhixon/2014/01/06/higher-education-is-now-ground-zero-for-disruption/#554148305bd9>

⁴¹ Ryan, C. (2015). *College Disrupted: The Great Unbundling of Higher Education*. Palgrave Macmillan. ISBN: 978-1-137-27969-9

⁴² Selingo, J.J. (2013). *College (Un)bound: The Future of Higher Education*. Amazon Publishing. ISBN-10: 1477800744

⁴³ Hixon, T. (n.d.). Higher education is now ground zero for disruption. Retrieved October 20, 2016, from

<http://www.forbes.com/sites/toddhixon/2014/01/06/higher-education-is-now-ground-zero-for-disruption/#554148305bd9>

⁴⁴ Scharmer, O. (2015, February). *Seven Principles for Revolutionizing Higher Ed*. Retrieved from

http://www.huffingtonpost.com/otto-scharmer/ulab-seven-principles-for_b_6697584.html

⁴⁵ Scharmer, O. (2015, February). *Seven Principles for Revolutionizing Higher Ed*. Retrieved from

http://www.huffingtonpost.com/otto-scharmer/ulab-seven-principles-for_b_6697584.html

Management Academic Studies in Israel also dipped deep into this idea as he presented his academic paper: Is higher education at risk of being disrupted?⁴⁶ He describes Disruptive Innovation as:

“An innovation that does not continue the natural evolution of a product or service towards improvement (according to any measure). It is an innovation that radically changes the nature of the industry and replaces the once established players and market leaders with new players and leaders, creating a new order in the industry.”⁴⁷

This idea is based on Clayton Christenson’s ‘The Innovator’s Dilemma’⁴⁸ as described in Section One of this document.

The US tertiary system is under stress, as is the global system, and similar conditions are driving change in New Zealand. In Australasia, the future of higher education institutions has been questioned in a report from Ernst & Young University of the Future: ‘A Thousand Year Old Industry on the Cusp of Profound Change.’⁴⁹ (2012). This report paints a bleak or at least rocky road ahead as costs rise, funding sources dry up and the social contract between graduates and commerce breaks down. While these problems surface, there are also drivers of change that will increase the need for education – particularly the growing need for retraining as millennials face rapidly advancing technological change and the need for life-long learning. As this generation and the next move towards models of consumption that are greatly reduced (compared to today) through technology enabled ‘access not ownership’ platforms and dematerialisation of stuff, more disposable income should find its way into education. In the Ernst & Young report referenced above, author Justin Bokor sounds a serious warning.

“We’ve seen fundamental structural changes to industries including media, retail and entertainment in recent years – higher education is next. There’s not a single Australian university that can survive to 2025 with its current business model.”⁵⁰

⁴⁶ Raanan Y, (2015) Is higher education at risk of being disrupted? ISBN 9788890432750 18th Toulon-Verona International Conference University of Palermo Excellence in Services Palermo(Italy) Conference Proceedings August 31-September 1, 2015

⁴⁷ Raanan Y, (2015) Is higher education at risk of being disrupted? ISBN 9788890432750 18th Toulon-Verona International Conference University of Palermo Excellence in Services Palermo(Italy) Conference Proceedings August 31-September 1, 2015

⁴⁸ Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Boston, Mass: Harvard Business School Press.

⁴⁹ University of the future: a thousand year old industry on the cusp of profound change. Ernst & Young Australia and Oceania (2012). [Http://hdl.voced.edu.au/10707/228059](http://hdl.voced.edu.au/10707/228059). Retrieved from <http://hdl.voced.edu.au/10707/228059>.

⁵⁰ University of the future: a thousand year old industry on the cusp of profound change. Ernst & Young Australia and Oceania (2012). [Http://hdl.voced.edu.au/10707/228059](http://hdl.voced.edu.au/10707/228059). Retrieved from <http://hdl.voced.edu.au/10707/228059>.

Awareness of this is high in the upper echelons of the system in New Zealand, as evidenced by New Zealand Qualifications Authority (NZQA) chair Sue Suckling’s extraordinary presentation at SingularityU NZ Summit. (2016). In her presentation, Suckling outlined the drivers of change in New Zealand education (Figure 14) and stated that “the day of the qualification is over, so how do we verify what we’ve done and share it?”⁵¹ Suckling outlined five key drivers, summarised below:

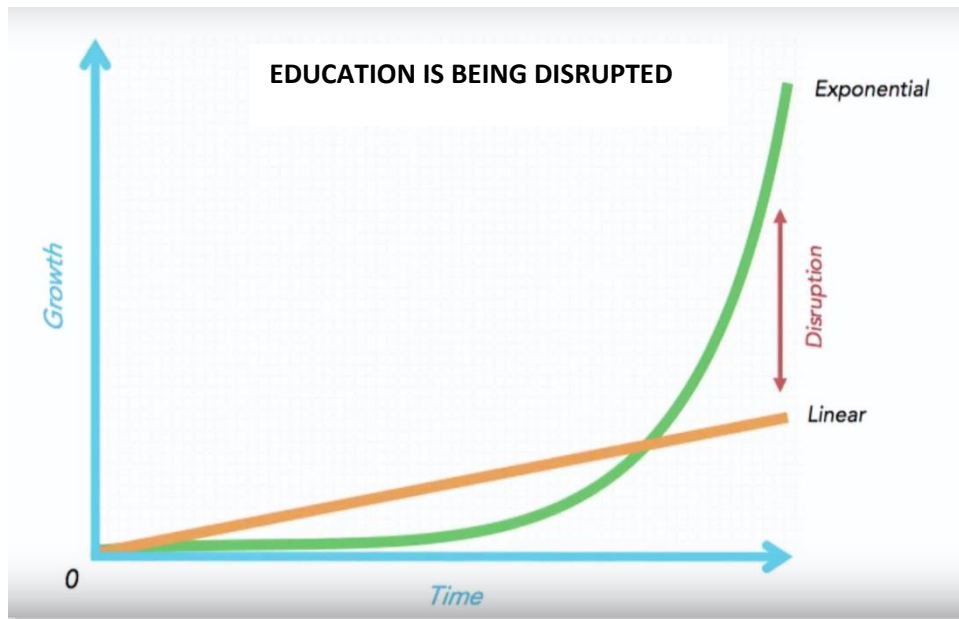


Figure 14. SingularityU New Zealand Summit. Sue Suckling presentation, reprinted from <http://www.singularityunz.com/modules/speakers/sue-suckling>

1. Future of jobs
 - a. Artificial intelligence (AI) is able to pass exams. AI can outperform humans in many areas. There is no point in training people for jobs that AI can do and the system currently doesn’t offer training for the new jobs, such as cyber security. She also points out that global firms such as Ernst & Young, are rethinking qualifications as entry criteria, looking now for other attributes or verifications.
2. Borderless education
 - a. This is now fully enabled by digitisation. Suckling cites Australia’s Deakin University where one in four of their students “don’t go near the bricks and mortar”. Talking about MOOCs with 25 million people enrolled but few completing, Suckling ponders that “maybe we no longer need completion.”

⁵¹ Suckling, S. (2016, November). Future of education. *Singularityu*. Symposium conducted at SingularityU New Zealand Summit, Christchurch. Retrieved from <http://www.singularityunz.com/modules/speakers/sue-suckling>

She says people enrol for career benefit. Suckling cites Udacity and IBM Watson joining forces to offer a nano-degree in Artificial Intelligence with results that find graduates high paying jobs. “I’d rather go there, than go to any of our polytechs or universities in New Zealand right now.”

3. Digital natives, the people that Suckling says will drive the tipping point into change.
 - a. Kids aged 13 years (in 2017) expect to be connected at all time. “The norms for this group are very different than those for even 20 years old.” They expect customisation, fun, relevance, integrity around sustainability, access not ownership and innovation.
4. Demonetisation
 - a. Allowing people to create different education models to suit their own audiences. “In New Zealand this is manifested particularly in Iwi education groups such as Manaiakalani Trust and Te Rūnanga o Ngāi Tahu.” Suckling explains that these trusts have invested to allow their young people to participate in a way appropriate for their culture.
5. Transference of power to the individual.
 - a. “A young person can now work out how to build a robot by watching YouTube and buying stuff from Ebay. Platforms such as Makeaspace or hackathons allows this education without any input from the education system structure.”

Suckling asks a series of questions including: What is relevant in a qualification? Is it knowledge of a subject? Is it an assessment of collaboration or competency or character? Is it a record of participation? She says “verification will be on the blockchain... If it’s blockchain, you don’t need us (NZQA)”. Suckling says the change of paradigm from a highly regulated approach to permission-less education (Figure 15) means a loss of control, which is frightening for many; parents who want the best for their children and believe the best is a university education, students who aren’t sure, and institutions with \$NZ61billion, tied up in property assets.

REGULATION VS PERMISSIONLESS INNOVATION

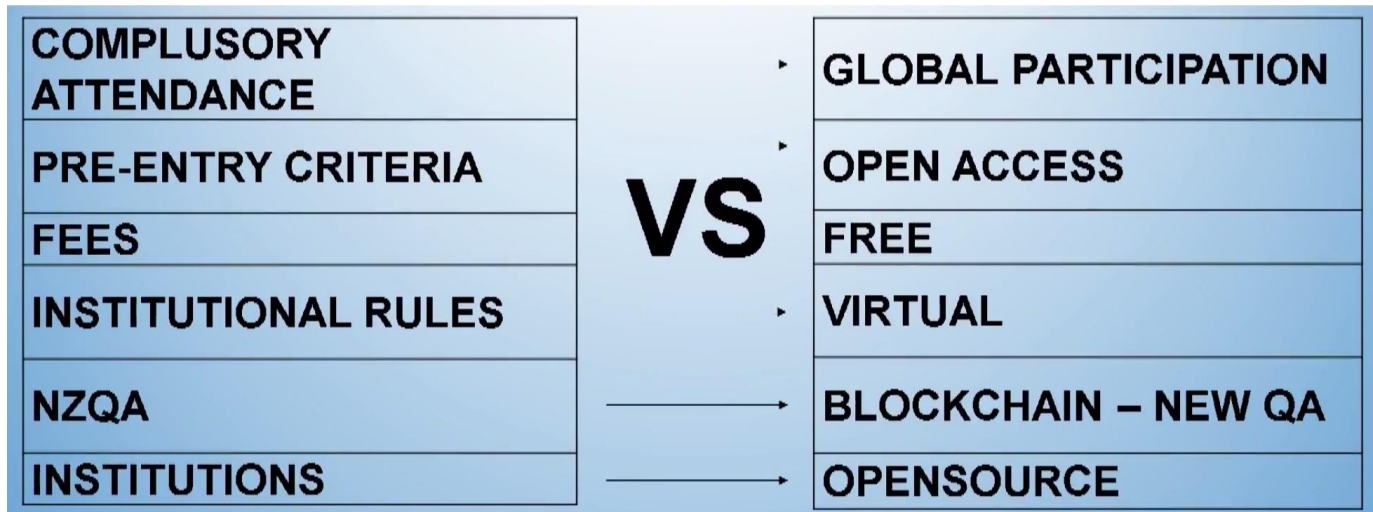


Figure 15. SingularityU New Zealand Summit. Sue Suckling presentation
<http://www.singularityunz.com/modules/speakers/sue-suckling>

Further down the layers of the hierarchy, people within the system are concerned as jobs seem a little less secure and courses a little harder to fill, but do not understand what’s driving the change that’s beginning to bite. No one is talking about it says Suckling.

“We’re trying to engage in this. We’ve got business leaders who don’t think it’s a good idea that we’re thinking about digitising a written exam let alone entering a conversation about rethinking qualifications... We have to transfer that power and have the business people, the politicians and the kids, putting the pressure on us to get out of the way.”⁵²

Revolution not evolution

There are commentators who believe that nothing short of revolution will drag the system from an old model to a new one. Steve Sammartino, an Australian futurist was particularly harsh in his critique when talking to Tommy McCubbin on Future Sandwich Podcast⁵³ about his book, *The Lessons that School Forgot*.⁵⁴

⁵² Suckling, S. (2016, November). Future of education. *Singularityu*. Symposium conducted at SingularityU New Zealand Summit, Christchurch. Retrieved from <http://www.singularityunz.com/modules/speakers/sue-suckling>

⁵³ McCubbin, T. (8 June 2017) Surviving Amazon. Future Sandwich Podcast. Retrieved June 15, 2017 from <https://soundcloud.com/tommy-mccubbin/surviving-amazon>

⁵⁴ Sammartino, S. (2017). *The lessons school forgot*. Wiley.

“The first thing school forgot to tell us is that school was not for us, it was for them, the industrialists who needed compliant industrial factory workers, problem is, it’s obsolete, the thing we need now is to create our own future. I think we’re going to have companies with exactly zero employees, so it’s not going to be what job can you get, but what value you can add.”

Sammartino says the skills needed in the 21st Century workforce are vastly different from the rote learning required for the efficient factory and office workers that provided the heft for an industrialised society. He says the system isn’t simply outdated, it’s obsolete. On the Future Sandwich podcast episode ‘Relearning Education’⁵⁵, Sammartino reminds us that schools were established following the industrial revolution to provide the new industrialists with a workforce appropriate to that era.

“Free public schools were financed by the wealthy industrialists of the day... they needed to train illiterate farmers’ sons and daughters in the three R’s – reading (w)riting and (a)rithmetic to create compliant industrial factory workers...”

Sammartino says that being on a conveyor belt, the factory line needed people to know their part, and neither cheating nor collaboration were allowed because they didn’t fit the requirement for people to do exactly the right thing at the right time on the conveyor belt. “Rote learning allows you to be a cog in the industrial machine,”⁵⁶

Dr Ken Robinson reframed our thinking about education with his TED talk in 2006. He said the entire system was in need of an overhaul. In 2010 he followed up with a new talk even more emphatic, calling for a revolution of the system.

“Every education system in the world is in the process of reform... And it is not enough, because that is simply improving a broken model... What we need is not evolution, but a revolution in education.”⁵⁷

In this second talk, Robinson talks about a crisis of human resources where people endure work they don’t enjoy because they’ve failed to find their true talents and says this crisis is just as severe as the climate crisis.

⁵⁵ Sammartino, S. (2016), Relearning Education. Retrieved from <https://soundcloud.com/tommy-mccubbin/relearning-education>

⁵⁶ Sammartino, S. (2016), Relearning Education. Retrieved from <https://soundcloud.com/tommy-mccubbin/relearning-education>

⁵⁷ Robinson, K., Ted. (2006) Do schools kill creativity? Retrieved from https://www.ted.com/talks/ken_robinson_says_schools_kill_creativity/transcript#t-28055

“...I think there are many possible explanations for it [this crisis]. And high among them is education, because education, in a way, dislocates very many people from their natural talents. And human resources are like natural resources; they're often buried deep...”⁵⁸

Robinson believes in the diversity of human talent and the need for customising and personalising education while moving away from linear directions. “We have built education systems on the model of fast food... it is impoverishing our spirit and energy in the same way fast food is impoverishing our physical bodies.”⁵⁹

Sammartino doesn't see current technological solutions such as MOOCs as a solution. He says these are just digitising and democratising what we already have. “Very few teach the skill sets we need which are more about creativity, entrepreneurship and the ability to solve interesting problems.”⁶⁰ He says people need to understand systems thinking; how a system is and how it will change. “Then they'll be adaptable, they won't see themselves as part of a system, but as inventors and curators of systems,”⁶¹

A big issue for tertiary institutions is legacy infrastructure. Sammartino says part of the difficulty is that once a big infrastructure has been developed, the organisation is more invested in the infrastructure than it is in the customer. This is a weakness that makes heavy infrastructure dependent organisations vulnerable, including tertiary and government institutions. He sees developing nations like Estonia making big curved jumps over the developed nations. “Developed economies are wrangling their old infrastructure and modernising, but new economies will go straight to new.”

Sue Suckling too refers to the legacy infrastructure - \$NZ61 billion-worth - in NZ tertiary institution property. “It's a brave person who thinks this isn't important,⁶²” she said in a presentation to SingularityU NZ Summit. Suckling believes it is the digital natives (those aged 13 and under in 2017) who will force change. She says this group are currently told by parents that they need to qualify because parents still hold qualifications in high regard. It is

⁵⁸ Robinson, K., Ted. (2010) Bring on the learning revolution. Retrieved from https://www.ted.com/talks/sir_ken_robinson_bring_on_the_revolution/transcript

⁵⁹ Robinson, K., Ted. (2010) Bring on the learning revolution. 3' 16" Retrieved from https://www.ted.com/talks/sir_ken_robinson_bring_on_the_revolution/transcript Ken Robinson

⁶⁰ Sammartino, S. (2016), Relearning Education. Retrieved from <https://soundcloud.com/tommy-mccubbin/relearning-education>

⁶¹ Sammartino, S. (2016), Relearning Education. Retrieved from <https://soundcloud.com/tommy-mccubbin/relearning-education>

⁶² Suckling, S. (2016, November). Future of education. *Singularityu*. Symposium conducted at SingularityU New Zealand Summit, Christchurch. Retrieved from <http://www.singularityunz.com/modules/speakers/sue-suckling>

fear from parents and educators that holds the current system in place, but not for long. Suckling says the now 13 year olds will rebel, telling their parents that the system is a nonsense. “The era of qualifications is over, and so is the likes of NZQA...The blockchain will keep the record that cannot be tampered with. So how do we quality assure?”

Suckling sees a future where learners choose their own participation, where and when they want through virtual institutions. She sees learners doing and learning what they want through nano degrees and social learning with friends across the world. Those friends, and others they may work with, will rate them which will serve as verification. Worried that the NZ Productivity Commission’s New Models of Tertiary Education report⁶³ is ‘just tinkering’, Suckling says the problem is that our education system is so highly regulated and there’s little engagement with the issue. “NZQA is the big handbrake, but it's trying to engage, but our business leaders don't think it's a good idea to digitise an exam let alone restructuring quals. Kids need to put pressure on us to go the other way.”⁶⁴ Suckling refers to organisations operating successfully outside of institutions such as the Mind Lab, Future Tech programme and others. The rise of such organisations, also Enspiral in Wellington, Udacity – a MOOC that grew out of free computer science classes at Stanford University and U.Lab, the MIT online disruptor, are following a classic disruptive model – catering for a section of the market that the incumbent hasn’t viewed as important – and could well scale to the point of forcing incumbent institutions into redundancy.

While the system of higher education is facing disruption, continuing, life-long higher education is more than ever required as enabling technologies such as Artificial Intelligence (AI) and platforms such as the blockchain disrupt traditional employment. As jobs disappear and new ones arise, the Adaptability Quotient (AQ), a concept that became a theme at November’s SingularityU Summit, will become more important than the Intelligence Quotient (IQ) or the Emotional Quotient (EQ) and life-long learning will take on new meaning as people wake up to the value of frequent retraining. The World Economic Forum says a new set of skills is needed for the jobs of the 21st Century. Website editor Jenny Soffel reports that today’s job candidates need skills developed through social and emotional

⁶³ New Zealand Productivity Commission. (2017). *New models of tertiary education: Final Report*. Retrieved from www.productivity.govt.nz/inquiry-content/tertiary-education

⁶⁴ Suckling, S. (2016, November). Future of education. *Singularityu*. Symposium conducted at SingularityU New Zealand Summit, Christchurch. Retrieved from <http://www.singularityunz.com/modules/speakers/sue-suckling>

learning to succeed (Figure 16). “The gap between the skills people learn and the skills people need is becoming more obvious, as traditional learning falls short of equipping students with the knowledge they need to thrive...”⁶⁵

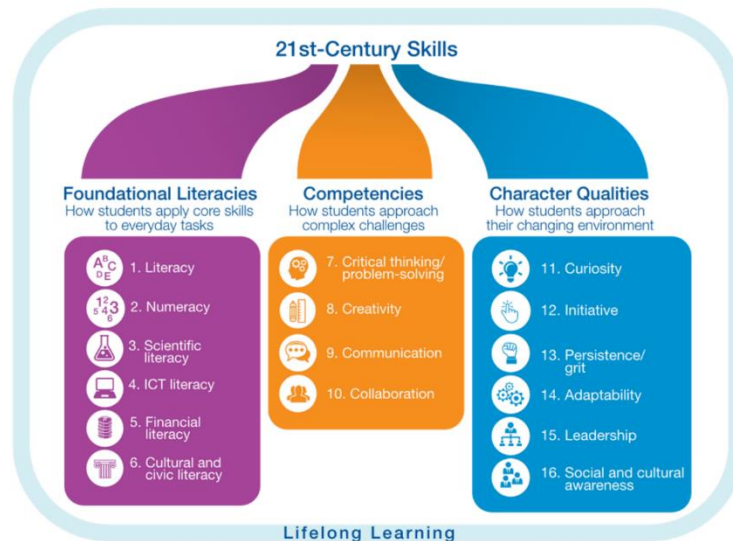


Figure 16. 21st century skills reprinted from:
<https://www.weforum.org/agenda/2016/03/21st-century-skills-future-jobs-students/>

In the World Economic Forum’s New Vision for Education: Fostering Social and Emotional Learning Through Technology⁶⁶, the forum looks at how to develop the 21st Century skills people need and whether technology can facilitate them.

⁶⁵ World Economic Forum, & Soffel, J. (2016, March 10). *What are the 21st-century skills every student needs?*. Retrieved from <https://www.weforum.org/agenda/2016/03/21st-century-skills-future-jobs-students/>

⁶⁶ World Economic Forum. (2016, March 10). *New vision for education: fostering social and emotional learning through technology*. Retrieved from <https://www.weforum.org/reports/new-vision-for-education-fostering-social-and-emotional-learning-through-technology>

The following (Figure 17) simply maps the squeeze produced by tertiary education trends using the TNS Funnel Metaphor.

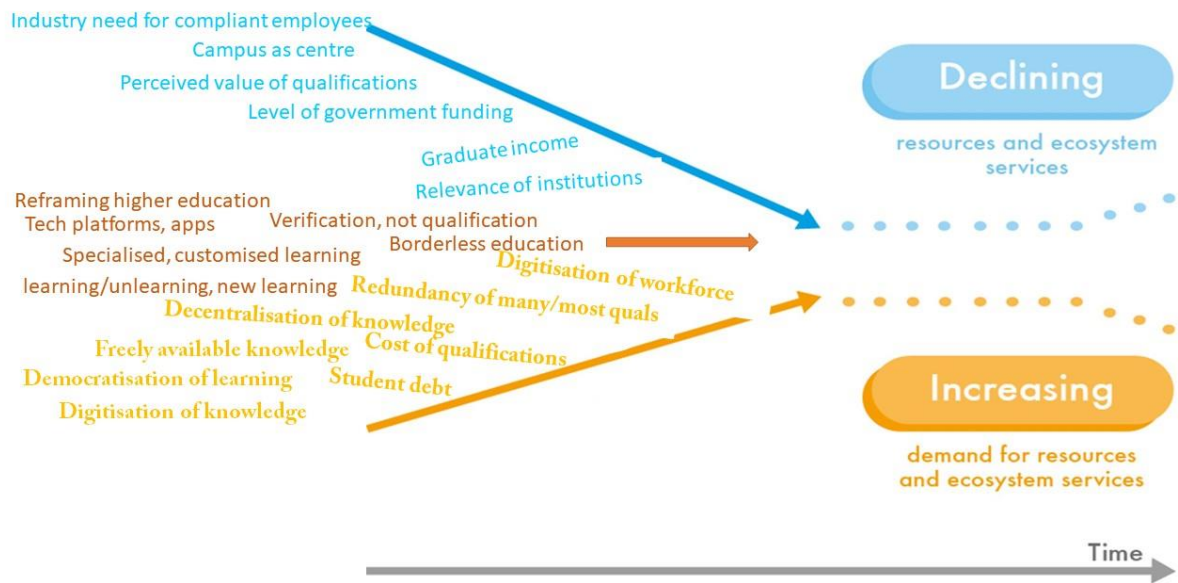


Figure 17. Drivers of change in Higher Education. Adapted from *The Natural Step*.

Section 3: Ready for disruption – the New Zealand organisational response

In the previous sections, I've discussed the mega trends forcing change in many sectors and then considered how this is affecting higher education around the world. This next section summarises qualitative research I undertook in an attempt to understand how other New Zealand organisations were responding to disruption in their sectors. This research is relevant because it highlights the culturally relevant New Zealand approach to global forces and will inform how the Centre can think about change and find its own ways towards future relevancy.

Methodology

Each participant took part in an interview either in person or by video-conference using Skype or Zoom. Questions were designed as conversation starters that would allow free-ranging comment but within parameters that ensured themes could emerge, if they existed. All but one of the interviews was recorded and transcribed. A technology failure in the interview with Traci Houpapa meant this interview was recorded only in note form. I wanted to understand how these participants felt about disruption in terms of their organisation, what it meant to them and how they distinguished between or felt about technological disruption as opposed to environmental disruption – mostly in terms of climate change or environmental degradation. Participants were included throughout the process – invited to review and amend their transcripts and then finally to review and sign off the final summary. This report has been written as a stand-alone piece designed for a general audience.

Disruption and us

Sustaining ‘business as usual’ while preparing for the eventuality of a completely different model brought about by technological disruption is a dilemma faced by organisations across the globe. Exponential change is already laying waste to music and print media industries with sectors such as finance, telecommunications and education next in the firing line.

Against this setting, many New Zealand organisations are experimenting with how to respond as they face the innovator’s dilemma⁶⁷. The innovator’s dilemma is, as a Deloitte article described, ‘the tough choice any company faces when it has to choose between holding onto an existing market by doing the same, yet slightly better (sustaining innovation), or capturing new markets by embracing new technologies and adopting new business models even though they may not work as well (disruptive innovation).⁶⁸ The term is attributed to Harvard Professor Clayton Christensen who identifies and explores the concept in his 1997 book, *The Innovators Dilemma*.⁶⁹ The Harvard Professor explained that a disruptive innovation is one that creates a new market and value network, eventually entirely disrupting and causing the demise of the incumbent model, for example Kodak. This compares with a sustaining innovation, which is limited to refining products or services, in response to existing customer demand, i.e. improvements that provide returns for the company and better service for existing customers. He says it’s next to impossible to do both.

In January and February of 2017, six individuals from a diverse set of New Zealand organisations took part in my study where I considered their responses to disruption – technological and environmental. The research aimed to map a view of the general awareness of disruptive, exponential change among New Zealand organisations and to capture responses and the key themes that emerged.

Representatives from the Department Of Conservation (DOC), Spark, Pledgeme, Kiwi Bank and Snapper were engaged in the research conversation as was Traci Houpapa representing a portfolio of organisations including Federation of Māori Authorities and Landcorp. These organisations were selected for their understanding of and willingness to embrace potential disruption and to find ways to self-disrupt while knowing that disruption could completely

⁶⁷The innovator's dilemma - wikipedia. (n.d.). Retrieved April 25, 2017, from https://en.wikipedia.org/wiki/The_Innovator%27s_Dilemma

⁶⁸ Disruptive and Sustaining Innovation. (2017). Retrieved April 27, 2017, from https://www2.deloitte.com/il/en/pages/strategy/articles/disruptive_vs_sustaining.html

⁶⁹ Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Boston, Mass: Harvard Business School Press.

overturn existing models of operation. They also self-selected by making themselves available for the hour-long interview. The participants weren't waiting for disruption to hit them, possibly terminally, but rather, they were attempting to self-disrupt and work with the inevitable innovator's dilemma.

Their selection was also based on a perceived high awareness of the idea that there is a convergence of many technologies on an exponential growth curve, and that this is causing ripples and ructions in their worlds. They also understand that this awareness is not necessarily widespread and that many people, even among their own organisations, are entirely unaware of the massive changes that are already irrevocably underway. All are making attempts at self-disruption, with varying degrees of success and all have come to similar places in their thinking. While well aware of the deep environmental issues faced, also capable of disruption, this change tends to be viewed as incremental rather than disruptive. All were entirely willing to discuss mistakes and failures, owning them as vehicles of learning. While none of the six people interviewed had much sense of where things were going in the longer term, they were deep in the work of steering their metaphorical ships through the storms of change.

This report first introduces the organisations and spokespeople, then identifies and discusses the five key trends that emerged.

The organisations and the people

Disruption at the **Department Of Conservation** first occurred 22 years ago when a viewing platform collapsed at Cave Creek on April 28, 1995, an event that nearly wiped out the organisation, according to the department's Director of Threats, Allan Ross.

Ross is part of the Research and Development Group at the department's head office. The title is actually more about threatened species support and ecosystem management than other threats, but he's also responsible for transformation. After a career in the field including as Regional Conservator, Ross is now based in Wellington as part of the National Office. He points to Cave Creek as a turning point in the organisation's history and says the department has faced disruption several times since – mostly through internal action. In 2012 transformation was part of his title, until it became clear to him that transformation comes from innovation across the entire organisation, not someone with a title and two staff to do “this ‘ere transformation”.

Kiwibank was born of a vision to disrupt the hold Australian banks had over the New Zealand capital sector. Politician Jim Anderton fought for its establishment and the vision is still to become New Zealand's main bank. Digital Advisor Peter Fletcher-Dobson is well aware of the disruption that is crashing through the finance sector and those of all trusted intermediaries such as lawyers, accountants, bankers and brokers. His work is to foray into the unknown while ensuring the existing business continues towards its vision. This requires not only a great understanding of the digital future of banking, the potential of the blockchain (distributed database that can maintain records in blocks that cannot be retroactively altered) and the functions it can support, but also a strong handle on human resources and responses to exponential change.

Anna Guenther is Chief Bubble Blower at **Pledgeme**, the startup willing to take on New Zealand financing with plans to get beyond fundraising into equity. Pledgeme began as Anna's student project. She wrote the business plan as part of her Master's Commerce degree at Otago University, then decided to put it into action. She's a local arrowhead into the world of technology-led business and while she'd dislike the description, her work may grow from being a mere annoyance to the banking sector into a serious disrupter.

Snapper is a ticketing service for bus transport. Based in Wellington it is a tech company established in 2008 to provide ticketing for NZ Bus. Charlie Gavey is Scrum Master and

she's focused on making access to public transport, be it buses, taxis or anything else, a seamless customer experience through mobile applications, as part of Snapper's Ticketing As A Service (TAAS). Snapper provides end-to-end ticketing to bus services in New Zealand, and overseas offers software as a value add, to help regional authorities extend the life of their existing ticketing systems. The service includes everything from working with partners getting the hardware on the buses for instigating Snapper card, all the way through to reconciliation and financial reporting back to the public transport operators.

The exponential curve and rise of mobile technology has been the driver of Snapper's offering in Wellington, but life's not easy pulling old school transport companies into the new realities of ticketing-as-a-service. It's also not easy building a system that has the potential to cover all areas of public transport (think taxis, trains, ferries, maybe even rideshare) and is flexible enough to migrate to fully mobile systems (Paywave from your device).

Spark is the telco that's been bashed about by others and itself as it has moved from public to private ownership, been forcibly split in half and has since faced the rigours of technological disruption. Danielle George is the General Manager of Human Resources – a position she's held for eight years, since before the 2014 rebrand⁷⁰. She now leads the charge into a new telco culture staying well ahead of the technology that underpins a telco and digital services company. The overriding issue for Spark is simple. Increasing commoditisation of parts of the business means the money it can charge customers continues to drop. It's a hard place to be when the opportunity is to try and be the lowest cost operator.

Traci Houpapa is a leading professional director and a Member of the Order of New Zealand. Her portfolio of directorships includes chair of both the **Federation of Māori Authorities** (FOMA) and **Landcorp**. Her approach comes from a philosophical base rather than solely a strategic approach. She says that by merit of commitment to our communities and philosophical principles the companies in her sphere will be disruptive. "If we carry on doing the same thing, we'll get the same result. So we can't continue with status quo."

All use their mission statements as compasses, indicating the importance of a clear sense of purpose when navigating change.

⁷⁰ Danielle George resigned her position at Spark in March 2017 to take up a role at Kiwibank.

Key themes:

From the transcripts, the main ideas and actions taken were listed and sorted into general groupings of ideas following a Thematic Analysis method⁷¹ which included familiarisation of the data then searching collated data for themes, reviewing then naming the themes before writing them up. The data set was very small, but the themes apparent.

1. Disruption is relentless, affecting everyone and every sector.

For all six participants, there was no question that their individual sectors were subject to serious disruption, either directly through technology or indirectly through rapidly changing business environment or incident. For Landcorp, the recognition of environmental limits was driving strategic change such as capping dairy conversions in some areas. Technological disruption was no longer the preserve of digital companies but had spread widely into all sectors because of the rapid rise of new technology. The thinking was also that disruption was probably now a permanent part of the organisational landscape and resources needed to be directed into this area if organisations were to thrive or even survive.

At Spark, just three years ago, worst-case scenario assumptions were modelled around how money would be made in the highly competitive, constantly changing, teleco sector. This modelling assumed a 21% reduction in how much could be charged for services, but in fact, that reduction turned out to be closer to 70%.

Danielle George, GM Human Resources of Spark said change has been incredibly quick and highly disruptive.

“Significant parts of our business are getting commoditised faster than the length of this interview. The telco industry is changing so fast and revenue streams are disappearing. We used to make money through home phone lines, now people don't have one. Who rings people anymore? People rarely text so you don't make money out of your texts anymore. The rate of data use is growing but customers want more for less so there are no dollars to pay for technology transformation. Phone plans constantly go down in price which means we are constantly rethinking how to survive.”

⁷¹ The University of Auckland. (n.d.). About thematic analysis - The University of Auckland. Retrieved August 14, 2017, from <https://www.psych.auckland.ac.nz/en/about/our-research/research-groups/thematic-analysis/about-thematic-analysis.html>

Spark is into its second round of disruption, the first began with the appointment of Simon Moutter in September 2012. George says the first time Spark embarked on an attempt to disrupt themselves, everything changed. *“It went to the core. How we did business, how we organised ourselves, how we made decisions and how we did things as a consequence. How we think about our customers...”* Now they are into their second round of self-disruption, it’s easier to bring the board along, there’s more tolerance and a greater level of acceptance of the changes and challenges being faced. *“The way people do things now, it’s not just about technology. It’s about where we live, how communities operate and how they buy services.”*

George doesn’t see any flattening off of the exponential curve.

“I don’t see a point where it’ll ever stabilise. I think if you look at what Amazon is starting to do to supermarkets for example, once that journey starts I haven’t seen anyone be able to stop it. You can survive and flourish, but you’ve got to absolutely realise what’s going on.”

Future thinkers around the world have popularised this view. Inventor, futurist and transhumanist Ray Kurzweil is at the radical end of the spectrum setting a platform for understanding exponential growth and the ensuing disruption. He sees exponentiality more as human evolution – and advocates no slowing or levelling of a process that he says has been underway for all existence. This from Kurzweil’s 2005 TED talk:

“The evolution of our species took hundreds of thousands of years, and then working through interaction, evolution used, essentially, the technology-creating species to bring on the next stage, which were the first steps in technological evolution. And, the first step took tens of thousands of years — stone tools, fire, the wheel — kept accelerating. We always used then the latest generation of technology to create the next generation. Printing press took a century to be adopted; the first computers were designed pen-on-paper — now we use computers. And we've had a continual acceleration of this process.”⁷²

Kurzweil’s main message is that progress in technology is exponential, not linear.

“Many — even scientists — assume a linear model, so they'll say, "Oh, it'll be hundreds of years before we have self-replicating nano-technology assembly or

⁷² Kurzweil, R. (2005, February). The accelerating power of technology. Retrieved from https://www.ted.com/talks/ray_kurzweil_on_how_technology_will_transform_us/transcript?language=en#t-494000

artificial intelligence." If you really look at the power of exponential growth, you'll see that these things are pretty soon at hand. And information technology is increasingly encompassing all of our lives, from our music to our manufacturing to our biology to our energy to materials."

Move forward 12 years and Kurzweil's ideas of exponentiality don't seem as fictional as they did at the time and Professor Al Bartlett's 1969 admonishment about our inability to understand the exponential function,⁷³ is ringing true for those trying to understand, and work with, the sheer speed of change.

The younger organisations enabled by the exponential curve of technological change that threatens the older, more naturally accept their own disruption as part of the territory, as the exponential curve surges upward.

To stay on track, participant Charlie Gavey of Snapper asks herself the question posed by a speaker at Singularity Summit – a question that resonated with her; *"what does an organisation hold true, that if it were no longer true, the organisation would be at risk?"* She looks at her company's position in the transport industry and keeps in mind that nothing is unchanging in the sector.

"The transport industry feels like it's at that tipping point of changing fundamentally. Transport is undergoing enormous change. For Snapper to assume the transport industry and the role of public transport within it will continue to look the same, that would be a bad move."

Participant Anna Guenther of Pledgeme is guided by her mission statement – 'Helping Kiwis fund things they care about' – and sees a point in the future when people won't need a platform like Pledgeme to fund what they care about. This doesn't worry her, because the mission statement doesn't lock the business into the platform. There is opportunity to find ways other than the platform Pledgeme to help Kiwis fund things they care about.

At Kiwibank, there's a similar attitude to staying true to purpose while the business model may change. They're guided by their purpose 'Making Kiwis better off' and realise they may not have to be today's idea of what a bank is, to be relevant.

⁷³ Bartlett, A. (1969) Arithmetic, Population and Energy, retrieved from http://www.albartlett.org/presentations/arithmetic_population_energy.html

Peter Fletcher-Dobson was involved in the print media in the UK as disruption hit that sector hard and sees a similar disruption readying to hit the finance sector.

“That [print media sector disruption] was when the internet was designed for the transfer of information and content. It’s now swiftly moving to a point where assets and value can be transferred without intermediaries. This is a real step change. I believe that combination of computational power, APIs (Application Programming Interface) connecting software around the world, AI, internet of things and blockchain... are already coming together.”

In their Harvard Business Review article, Alex and Don Tapscott explain that the global financial system is an antiquated paper based system (dressed up in digital wrapping) rife with problems that add costs through fees and delays. They explain that the Blockchain could be a solution to this logjam.

Blockchain was originally developed as the technology behind cryptocurrencies like Bitcoin. A vast, globally distributed ledger running on millions of devices, it is capable of recording anything of value. Money, equities, bonds, titles, deeds, contracts, and virtually all other kinds of assets can be moved and stored securely, privately, and from peer to peer, because trust is established not by powerful intermediaries like banks and governments, but by network consensus, cryptography, collaboration, and clever code. For the first time in human history, two or more parties, be they businesses or individuals who may not even know each other, can forge agreements, make transactions, and build value without relying on intermediaries (such as banks, rating agencies, and government bodies such as the U.S. Department of State) to verify their identities, establish trust, or perform the critical business logic — contracting, clearing, settling, and record-keeping tasks that are foundational to all forms of commerce.⁷⁴

Participant Fletcher-Dobson of Kiwibank demonstrates agreement with the literature when he states that the blockchain, along with Fletcher-Dobson’s four other technological advances (above), will change the world incredibly quickly, far quicker than the information base internet did.

⁷⁴ Tapscott, A., & Tapscott, D. (2017, March 1). How Blockchain Is Changing Finance. Retrieved from <https://hbr.org/2017/03/how-blockchain-is-changing-finance> Paragraph 3

“Over the next 5 – 10 years these will completely turn over industries where you’ve needed to have that trusted intermediary right in the centre. So lawyers, banking, accounting are all facing 10 times the disruption that happened to the print industry and it’s going to happen much faster – because the growth of the internet took 15 – 20 years then the mobilisation took 5 – 10 years so this next stage may be only 3- 5 years, it’s Moore’s Law⁷⁵. It’s exponential. That’s where banking is at the moment.”

Fletcher-Dobson says banks are not used to change. *“Banks sit in the middle of people who have capital and those that don’t. They’ve been around 400 years since the first branch opened in Venice. Pretty much the model has not really changed since.”* The advent of the contact centre was the sector’s first big technological change. It allowed banks to save money by taking questions and business out of the expensive-to-run branch, and switch them to a contact centre that could run 24/7 in a building anywhere in the world. *“The internet was the next change. The response was ‘oh great, we can take the contact centre model and pretty much put it on the internet,”* says Fletcher-Dobson. In an ironic demonstration of the sector’s lack of insight into the relevance of the internet, or the speed of change, Kiwibank launched in 2002 without internet. But some in that organisation are wide awake now and the idea is to do their own disruption rather than have others do it to them.

“The analysts are now pretty clear that at the really conservative end you are going to lose 15 – 20 % of your revenues and up to 40 - 60% to FinTech and disruption. To get us to de-risk our biz we are embracing FinTech, for two reasons: 1. To get close to the opportunity to derisk the disruption and 2. to start disrupting ourselves.”

While Kiwibank is predictably at the forefront of thinking about technological change, DOC isn’t widely regarded as subject to technological disruption, but burgeoning information technology and digitisation challenges the department in many ways. For Allan Ross, it’s a matter of watching, prioritising and stretching precious resources while constrained by the lack of agility and resourcing inherent in government departments. *“For example, genetic work, genetic manipulation. Identification of different species- inventory by DNA analysis, pest control by manipulation of the genetics. Trying to decide whether you’re dealing with*

⁷⁵ “Moore’s law refers to an observation made by Intel co-founder Gordon Moore in 1965. He noticed that the number of transistors per square inch on integrated circuits had doubled every year since their invention. Moore’s law predicts that this trend will continue into the foreseeable future. Although the pace has slowed, the number of transistors per square inch has since doubled approximately every 18 months. This is used as the current definition of Moore’s Law.” Moore’s law. (n.d.). Retrieved April 25, 2017, from <http://www.investopedia.com/terms/m/mooreslaw.asp>

separate species or not and how should we respond,” he says, outlining prioritisation challenges.

Ross says science is moving fast around DNA, and choices need to be made about things like manipulating DNA in species to make them less or more viable, or the ability to display data spatially; GPS, GIS. *“It starts with collecting data and understanding the questions well enough to decide what information will support answering your questions. What info do we need to collect to do that? How do we collect data? How do we store it?”* Then there are challenges in the capacity to analyse.

“We’re quite weak in getting the value out of the data we collect. We collect measurement data as best we can, but maybe we haven’t got as much analytical ability as we’d like to think. We might get good quite good value by investing more in that. We do keep data, but it gets dated quickly.”

Part of the challenge is balancing the multitude of apps and potentials with the department’s actual mission. What actually adds quality while reducing costs and saving time or helping species? Also to be considered are Virtual and Artificial Realities, for example Virtual Tourism. What impact will this have on DOC visitor numbers? Will it reduce visitor numbers? Is that a good or bad thing? Where are the opportunities? Similarly, at Snapper, matching potential applications with real benefit to customers at a price that the company can afford is tricky according to Charlie Gavey.

“People have an expectation that they shouldn’t have to carry a separate card. People will ask, why can’t I just use my mobile phone? They have an expectation of an equal offering for IOS and android. An app isn’t something people see as an amazing customer service offering, there is not huge points for getting this right, people expect it to be right. Then there’s the constant change of mobile.”

Gavey says a future focus is essential.

“If our service offering is focused on helping customers do what they try to do today, we’re not going to be well positioned to help customers do what they try to do tomorrow. Part of that is being careful our focus doesn’t stay too narrow. We shouldn’t define ourselves as helping our customer get on a bus necessarily. We have to look at the bigger picture of what the customer is trying to do, which is to get from A to B,” says Gavey.

2. Disrupt or be disrupted. Adapt or Die.

All participants in the study continually search for ways to make change happen ‘within’ their organisations as opposed to ‘to’ their organisations. As Anna Guenther of Pledgeme eloquently put it; *“Don’t become a Kodak! Don’t lock yourself in a room and listen to people saying ‘yes’.”* For Traci Houpapa of the Federation of Māori Authorities, disruption and change are constant. *“Disruption needs to be seen as a friend, a catalyst towards better decisions.”*

Despite their relative youth, or because of it, Pledgeme and Snapper too are aware of the constant need to look to the next leap forward. Snapper CEO Miki Szikzai, has written a presentation called ‘Adapt or Die’ and his colleague and research participant Gavey is well aware of the need to maintain an innovative culture in the organisation. *“The AGILE idea of responding to change and being able to iterate on what you are doing is really big here. Snapper has a culture of not being afraid to challenge each other,”* she says. Part of the Snapper response to escalating change is to empower people to act. They’re working on a holacratic model, which comes from a study by Frederic Laloux, *Reinventing Organisations*⁷⁶. Gavey says holacracy is much faster than the traditional hierarchical model.

“Holacracy removes those steps that you might have to take within a traditional organisational structure and says, ‘if this is within your domain and the authority you’ve been given, if you see this change, then you have the authority to pull the levers you’ve been given within the constraints’. This gives people confidence to respond to change... So, the terms like domain or authority might be new but the idea of encouraging people to challenge their assumptions and not be afraid to try something different or throw away something that we’ve started when we’re clear it’s not the right path, is where we are anyway.”

Anna Guenther, Pledgeme Chief Bubble Blower says the regulation they used to fight, now pretty much protects their business model for the time being because regulation is hard and slow to change which meant they were ahead of the game – for a while.

“I think if we get to a point that people don’t need a platform, a point where they can crowdfund things for themselves, then we would need to find a new way to deliver our mission – to help Kiwis fund things they care about.”

⁷⁶ Laloux, F. (2014). *Reinventing organisations*. Belgium: Nelson Parker.

Guenther says the whole transaction of money space is going to be flipped in the next few years and Pledgeme will look for their place in that.

“I think it’s change or see yourself out being of a job in ten years. I don’t think it’s a day to day thing. A friend once said: ‘They’re the dinosaurs and you’re the righteous asteroid.’ I don’t know if I want to be a righteous asteroid. How’s that asteroid gonna fare?”

3. There really is chaos and amazement and it’s messy

Deception of linear vs exponential

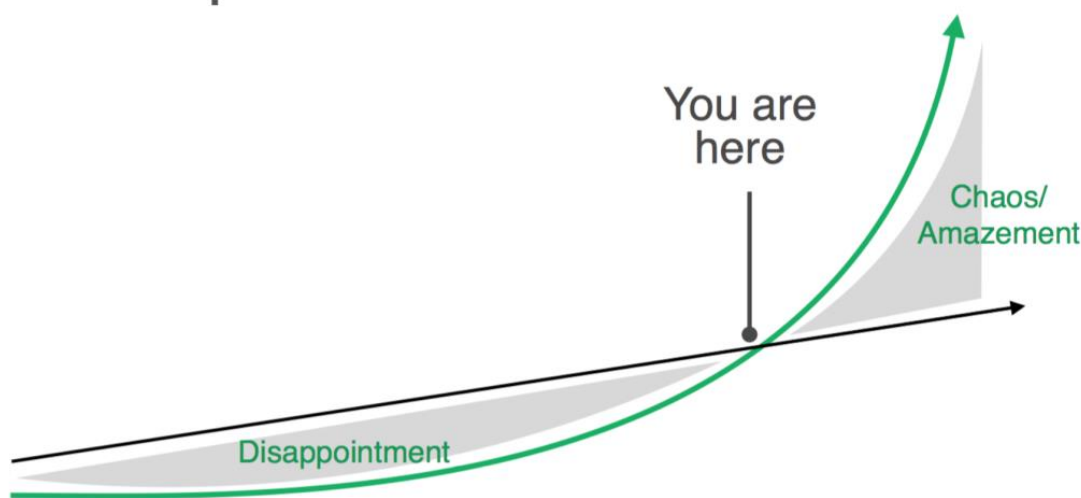


Figure 18: explains how we as humans tend to misunderstand the exponential curve, where we might be on it and how we might mistake it for linear trajectory. Reprinted from Evolution partners <http://www.evolutionpartners.com.au/wp-content/up>

At the Singularity University New Zealand Summit held in Christchurch in November 2016, several speakers referred to the above graph and agreed that while exponential growth in technology was difficult to identify, digitisation and change through technological development was right now at the point of crossing the linear path, to begin its steep upwards trajectory. The difficulty is that most people, thinking in a linear way, do not see the upward sweep of the curve they’re on.

The ‘disappointment’ segment of the graph (sometimes referred to as the ‘valley of despair’ by those whose innovations haven’t tipped into exponential growth), happens when promised change or improvement doesn’t immediately present and people go back to their normal or old way of being.

The ‘chaos and amazement’ segment is where the six New Zealand participants find themselves as they recognise the curve. Learning by trial and error, but excited by the opportunity. George from Spark, Ross from DOC and Gavey from Snapper all noted the need to keep moving on a trajectory of culture change, which Ross noted was as relevant as adaptation to technological systems change. Ross would have liked to have seen a programme of transformation driven harder and longer through his organisation. *“We have suffered from it not being a complete system and if it isn’t a complete system with an A to Z there are lots of holes for people to revert back to their old culture.”*

Leaping headlong into change has led to painful and not always helpful experiences, particularly for organisations into their second or third round of self-disruption. They have learned to divide along cultural lines to help drive change in a way that has allowed business-as-usual to continue while ensuring innovation is resourced and able to take place. Kiwibank Digital Advisor Peter Fletcher-Dobson thinks about this as a three-horizon model – optimise, evolve, reinvent - to allow for innovation of both the sustaining and disruptive kinds, even though if disruption is achieved, the entire organisation and its future could look very different. *“We put 75- 85% of our resource (people and investment) into optimising business and pretty much running it. Another 10% or so into evolving it – still the same business model but do it better. Then you put 5% into the future, new technologies, completely looking at how money works or even moving into other verticals. We run all these three horizons at the same time.”* He says the days of big programmes, of three to five year roadmaps are over and that the struggle for his and other organisations is that there are many people within them still desperate for the linear vision. *“Now the Holy Grail for organisations is just about flexibility. You can’t predict the future, you can only prepare for it. I reckon that’s taken three years for us to really grasp.”* Spark works with a similar idea to ensure that the future thinkers are resourced to catch any disruptive innovation wave they may find or develop. George explains. *“When we disrupted ourselves a few years ago, we created our Ventures Unit, which was essentially your growth revenue streams, the way out west, forward-thinking piece. We did it on the belief system that as an organisation we didn’t have a history of doing growth particularly well in our incumbent business units.”* George notes the challenge is not just about the potential to constrain thinking, but more about the fact that when the pressure came on to meet targets or imperatives, the first place that funding or energy would be pulled from was the potential growth areas or progressive thinking spaces.

Fletcher-Dobson notes the same issue. *“In the past everything was in the one box so you’ve got optimising, evolving and reinventing, all in the mothership. What’s happened is that the optimising always trumps the reinvention because it’s always more mission critical - you’ve got to hit the business plan. That becomes the priority so you deprioritise the future focus thing and withdraw resources from it.”*

Most participants are happy to admit mistakes are made. At Spark, George says that they were trying to create a new way of thinking about customers, but it didn’t work well. *“There was very little appetite within the business to take it up. It was too far away. The intent was good.* However she says there was value in raising the conversation and notes that the disruptive area of the company cannot be subject to the same performance measures as other divisions. *“You need a leadership team that is up for that...”* Kiwibank’s Fletcher-Dobson is also happy to identify and learn from mistakes, many of which step from pulling out of initiatives too early to put the focus back on a current, seemingly more pressing problem. *“There is a view that when we get today’s problem sorted we will be in that perfect place where we are optimised and now have the luxury to reinvent. Of course you never get to that perfect place so you have to be reinventing for tomorrow at the same time as you’re running the business today.”*

George says the thinking at Spark is improving and they are becoming more flexible and more able to move quickly on things they know will work. They’ve increased the speed of being able to say no, but also the speed of being able to say yes. She also notes that risk increases success while if the risk is too little, the project may just limp along. *“There’s no perfect formula but genuinely it appears to be more true, when you’ve put more skin and risk in the game, that could be brand, reputation, investment, time, money, they’ve largely been well worth it.* Gavey of Snapper says care must be taken to not get too invested in a single path. *“You don’t inscribe your assumptions in granite at the start of a project, you need to be constantly willing to reflect and pivot,”* said Gavey.

Ross’s experience as a Regional Conservator in the previous system gave him insights into the issues of attempting to instigate change. This experience led him into a national role to try to support the change he could see was necessary. *“I realised some things were not national priority. I was frustrated at how to make my own choices with a lack of system so I moved from that job into national office to help build those prioritisation systems. I was kind of realising the limitations of the business model and the need to be in that system supporting*

systems around getting the best national benefit.” He says that what was missing was the management skills, subtlety and alignment of systems, messaging and leadership behaviours. He notes that change needs comprehensive delivery or people will stay in their old culture and pay lip service by using the bits that don’t work as an excuse to slip back – this risks losing the benefit of expensive development work. “We try hard around implementation, thinking we’re changing culture. But because we’ve built the system in bits, you look across to the other bit you haven’t changed and they [those resisting change] say hang on, that’s a nonsense.” George at Spark agrees that culture change has to be followed with closing loops and picking up any slippage. “I do believe you’ve really got to be clear on what you’re trying to achieve and repeat, repeat, repeat. Particularly for that first 12 months, because it’s in that first 12 months that it’s so easy to slip back into bad habits.” While there’s an element of uncertainty, the mindsets created were bringing an upside; new energy, creativity and a different sort of fun at work. “It’s tough, but in some ways it feels easier because you feel like you are more owning your destiny rather than just responding. So there’s a level of energy that comes to the organisation.”

Ross from DOC says it’s very difficult to anticipate the end game. *“You drift into something and you gradually learn, it’s really hard... Generally you see so far, do so much, put it out there and learn by your mistakes and gradually get it better and hope you survive all the nonsense in the meantime. Only sometimes do you have the luxury to plan the long term before you put it out there.”*

4. Partnerships – essential but not so easy

Partnerships are increasingly important for all of these organisations, particularly the more established. However, it’s difficult to establish alignment and reciprocal value, and this can be costly. Finding suitable partnerships is key to success but it means finding others who share similar values and who are prepared to work towards a shared outcome. And then, how much are you willing to let go?

For Houpa from Landcorp and the Federation of Māori Authorities (FOMA), the importance of partnership is fundamental. *“People tend to think that the only important partnership for Iwi is with the Crown because of the Treaty. FOMA is about partnering with whomever, whenever. Whatever entity shares the same philosophical approach is worth partnering with. It’s about the underlying philosophy and values more than the entity itself.”* She says at FOMA it’s about creating an ecosystem of what’s next and cites an example from

Whakatu. *“When Miraka couldn’t get dollars from banks, they sent people out to find money and they hooked up with Vietnamese capital. People were surprised at this, but what they don’t understand is that we will go anywhere and partner with anyone if we can marry the philosophies.”* Houpapa says the reason Māori are predisposed to this philosophical position is because they can’t realise the capital gain from their own lands. *“Māori freehold is worth 25% less than general freehold. So we have to look elsewhere for capital. We would need to change the status of these assets to be able to change this.”* Partnerships has been a challenge too for DOC. The department enthusiastically embraced partnership opportunities following a 2000 directive. Then Director General Al Morrison called for a new, partnership model at the same time the department centralised around its Wellington hub. DOC had decided that it couldn’t do the conservation job on its own and a specialist partnership team was introduced, designed to go beyond the old community partnership model into the world of commerciality and international philanthropy. Ross says it didn’t really work as expected. *“Initially the new partnership staff set off like a bunch of mad buggers and set up all sorts of random projects.”* A lack of context led to some ill-conceived projects that had leverage but didn’t bring the conservation gains hoped for. It took DOC a long time to get partnership right, and they’re still working on it. There were lessons, often painful, along the way. *“We got a paint sponsorship, but the sponsor required we repaint everything soon, so we repainted everything before we needed to repaint everything. So cost benefit wise, it took us backwards. Naively put together, it didn’t meet the value it should’ve.”* Partnerships at DOC had become a stand-alone thing instead of being well integrated into the needs of the organisation and its strategic direction. Ross said it took many circles of navel gazing to understand that partnerships weren’t an end in themselves but instead were about conservation gains and leverage. *Partnerships were organic, but some were ill-conceived, then we had to suffer the financial and other consequences.”*

At Snapper, they enter partnerships to break down the enormity of some of the tasks. For example, in New Zealand they partnered with retail network provider Activator Eftpos so people can reload their Snapper card at any store that uses Activator Eftpos terminals. In Dublin they worked with a ticketing provider to roll out that provider’s version of the app including all the software that links the application through to back office systems. *“What the customer sees is a very simple app,”* says Gavey. *“A big thing is that these tech advances change customer expectation, then customer expectations drive more tech innovation. It’s a snowball effect.”*

5. Environmental disruption generally less front of mind than technological.

Thinking about technological change as a force of disruption was part of everyday life for most of the participants while environmental disruption was more a background issue not specifically considered on a daily basis. While awareness and acceptance of environmental disruption as an issue was high, responses were generally vague and not strategic. The exception was Houppa in her role as chair of Landcorp, New Zealand's largest farmer. Landcorp is highly committed to working towards much greater environmental sustainability; understanding that the tolerance of New Zealanders to poor practice is waning fast. The company is reducing its exposure to dairy by capping conversions and working with an environmental reference group it has established. *"We're deeply committed to doing what's right in terms of environmental management and that whole sustainability strategy. We have a role in regional and national leadership for the sector. Have taken on board the advice and constructive work of the environmental group."*

Guenther from Pledgeme doesn't see her business more or less affected than any other by potential disruption from environmental factors, but does note the growing number of climate change focused projects getting funded through Pledgeme. *"We've had climate change researchers get funded. We've had companies that are working to reduce waste get funded, single blade wind turbines get funded... This might be an assumption on my part, but it seems people working on climate change think about community a lot and have communities around them so when they go out to fund things they have communities to support them.* She sites Blueskin Energy in Dunedin, which wanted to build a wind measurement tower and raised \$10,000 through their crowd. Guenther says the project was completely community driven and supported and this was shown in the wide range of rewards offered by the crowd - everything from blues lessons to home killed chickens. Completely community driven and supported. *"Then we had AFFICK which is a solid hair care business – solid shampoo bars to reduce waste. They got shouted out by Brittany Spears, people want to support that work."*

At DOC, Ross doesn't see climate change as mostly disruptive but says the department is considering its position. *"Climate change exhibits through a series of natural processes - floods and slips etc. We manage those anyway, and just have to do at faster pace. We didn't need a separate major programme around climate change and...we simply couldn't afford to be on the cutting edge."* However he says the department now realises the time has come to create a more formal response. *"We're trying to get budget together to get a modeller to*

incorporate climate change as a factor in the various models and systems we run. At the moment it's quite ad hoc...” According to George, Spark takes a similar view but doesn't yet see the need for a formal response. *“For us it's more about a consciousness around how we can build and develop to reduce our environmental footprint. This is definitely a consideration in design.”* Kiwibank has a slightly different position because for banks, according to Fletcher-Dobson the consideration is risk exposure as a result of lending out on properties and seeing sea rise and increasing damage from storms and winds. *“We're not actively thinking about it. I can't think of anyone that does. Regulatory in our finance service environment is about anti-money laundering, regulations, that's the thing that obsesses our risk people more than global warming.”*

The term 'disruption'

Language emerged as an important part of this study as participants reacted to the term 'disruption' to describe the sheer rate of change affecting the participant organisations. In some interviews this followed into analysis of other buzz words and similar difficulties in being specific about what they meant. The word disruption, while accurate and valid for many of the participants, wasn't always considered helpful. Some found it overused, incorrectly used and others found it to be too negative to be useful. Pledgeme's Guenther and Snapper's Gavey really disliked it. *“In the start up community, it can be mocked,”* says Gavey. *“To use disrupt in a start-up pitch might get you laughs. So many apps claiming to disrupt, but their industry is not necessarily ripe for disruption. I think when we use the word disruption at Snapper we are talking about the disruption that's happening around us and how we need to adapt.”* Guenther is even more disparaging. *“I got asked to speak at an event about disruptive technologies – I was like aagh, I just vomit at the name of the session. What I say instead of disruption now is improvements, like, how is this going to improve?”* At Kiwibank however, they use the word a lot, particularly digital disruption. *“I've been trying to lose the term because it's so loaded now and everyone has a different view on what it means. We have a department area called transformation – we've had a transformation programme. This has become the overused, been used as a noun. Then simplification – we fell in love with that word. Simplification, Transformation, Disruption are the three words we've used the most. Ross from DOC finds the term 'disruption' frightening, angry and thinks it creates dysfunction. They use the word 'transformation'. Transformation is a more controlled thing that has a pathway through, more orderly. Innovation, the level below, is more incremental. We use this as a term.”* At Spark there's also a sense of the word being

loaded. *“I guess we’ve become judgemental what is disruption and what is not. From my perspective it’s still really valid. It’s so easy in New Zealand to stop looking at the outside and become so swallowed up by what’s going on in the inside that if you don’t articulate something like disruption, I think you run into trouble. It’s so easy to slip behind,” says George.*

The word ‘sustainability’ found no favour in the six research subjects either. Houpapa’s comment sums up the general response. *“Everyone’s saying we need to be disruptive and more sustainable, but that’s really boring. No-one knows what is meant by these terms.”*

Whether or not the participants and their organisations use the term disruption, many feel they are constantly in a process of self-disruption. According to the literature, self-disruption of an organisation is difficult because disruptive innovation is necessarily messy, it’s quick and dirty, it lacks refinement and initially may not work very well. Who wants to fund that? Not many according to a recent McKinsey report *The Case for Digital Reinvention*⁷⁷.

The report notes that only around 9% of incumbent companies have invested in attempting their own disruption. They’re far more invested in digital distribution and marketing yet the report says that digital disruption is already shaving 45% off incumbents’ revenue and 35% off their earnings (EBIT).

And it claims we ‘ain’t seen nothing yet’ because “digital technologies and processes have penetrated only about 35% of the way into the average industry meaning that merely a third of a typical company’s products and operations that could be digitized have been.”⁷⁸

These New Zealand organisations, by this measure are part of a small minority, fully prepared to recognise the revolution in front of them, take a hands-on approach to their future, no matter what it may hold and freely talk about the failures along the way. In the next section, I will consider how the approach of these uniquely New Zealand organisations may help us consider the future of the Centre.

⁷⁷ Bughin, J., LaBerge, L., & Mellbye, A. (2017, February). *The Case for Digital Reinvention*. Retrieved from <http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-case-for-digital-reinvention>

⁷⁸ Bughin, J. (2017, March 27). *Think digital is a big deal? You ain’t seen nothing yet*. Retrieved from <http://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-strategy-and-corporate-finance-blog/think-digital-is-a-big-deal-you-aint-seen-nothing-yet>

Section 4: Where to for the Centre for Sustainable Practice?

To disrupt or not?

The organisations interviewed had several reasons for acting in ways that are considered self-disruptive. For Spark and Kiwibank it is because they believed market forces and technological change left no other option. For DOC a disaster (Cave Creek) threatened organisational extinction and forced them to look at themselves differently in the context of all sorts of new expectations and changes in the world. For Pledgeme and Snapper, it's just modern business – if you're not working to understand what could turn your company on its head, you're not doing your job. For FOMA, it is more driven by the necessity of the particular Māori situation. The issue for Spark, Kiwibank and DOC is that their work in the area of disruption, could make business as usual entirely obsolete and the as-yet-unanswerable question is, can they survive that obsolescence, or might they even cause it? This too is the ultimate question for the Centre. This is the thinking that needs to be brought to the Centre. Staff need to consider what the exposed segments within its remit might be. For example, the exposed segment that Pledgeme chased was the need for people to raise money for projects that couldn't attract funding from traditional financial services. In this case, the disruptive potential now seems evident (although not so at the time); financial services had long ignored that particular area of funding demand while busily providing increasing services to its top customers. This had left a classic disruptive gap for the opportunists; the start-up.

So, if the Centre is to operate in the disruptive space, its staff needs to take purposeful steps to look for those gaps. Staff note demand, albeit small at this point, for:

- increasing need for meaning-making in the workplace
- finding an individual's place in the solutions to the global grand challenges⁷⁹
- understanding whole systems as part of solution creation
- group learning and harvesting the diversity of experience as a result
- developing 21st Century skills as highlighted by the World Economic Forum

The Centre is in a position to attempt cheaper, simpler and smaller products. It's diminutive size and proven ability to deliver courses and programmes without a central hub is a strength in terms of Christensen's 'different value proposition'. In *The Innovators Dilemma* (1997)

⁷⁹ Singularity University. (2017). Global grand challenges. Retrieved August 10, 2017, from <https://su.org/about/global-grand-challenges/>

Christensen says “Disruptive technologies bring to market a very different value proposition than had been available previously... Products based on disruptive technologies are typically cheaper, simpler, smaller, and, frequently, more convenient to use.”⁸⁰ Self-disruption is likely to be a useful skill for the Centre and expertise gained has potential benefit for the wider Otago Polytechnic – as long as the wider model remains viable.

According to Performance.ey.com, a global entity of Ernst & Young, there are two ways to approach self-disruption. The first is a full transition to a new business model – this takes the view that the new model is truly disruptive and will therefore entirely replace the old model - the second is to run a parallel model that maintains both the existing and emerging platforms. A Performance EY article published in 2016 covers two case studies drawing the conclusion that both approaches can work as long as transformation to smart, connected platforms can be made. The article states: “Companies in all sectors, geographies and stages of growth are shifting toward strategies centred on being a smart connected business. Those who do this well will develop an information advantage about customer needs, make faster and more accurate decisions, and will become innovative disruptors rather than competitive prey.”⁸¹

⁸⁰ Christensen, CM (1997) *The Innovators Dilemma When New Technologies Cause Great Firms to Fail* ISBN 0875845851, Harvard Business Review Press: 1st edition pg xv

⁸¹ Kanazawa, M., Basili, S., Khurana, S., & Nagasandra, G. (2016, February). Performance 8.1 Becoming a smart connected business: how to disrupt industries and delight customers. Retrieved from <http://performance.ey.com/wp-content/uploads/downloads/2015/11/EY-Performance-Smart-Connected-Business.pdf>



Figure 19. Reprinted from <http://performance.ey.com/wp-content/uploads/downloads/2015>

The infographic (Figure 19) summarises the performance.ey.com case studies.

Given the rapidly changing technological environment and the inherent risks of legacy infrastructure and disruption, there is a convincing case for any organisation to make a solid attempt at self-disruption – at the very least to ensure they understand where competitive threats may come from. The consequences of not becoming smart, connected and able to delight our customers are dire, particularly for higher education institutions. Recent layoffs at our neighbours, Otago University, provides stark evidence of this.

Hollowing of the middle

Among the many things to consider in planning for a successful future for any higher education institution is its position within the market. This is being affected by another systemic change, a phenomenon known as the ‘hollowing of the middle’.

In the OECD Observer, P Hollinger says the hollowing of middle is evidenced in collapsing middle classes where many are pushed into lower living standards while a few become richer.⁸²

This ‘hollowing’ is seen also in other sectors such as news media where mass media is distributed by the global giants and there is hyper local media with small, well defined audiences, but little in between. Futurist Steve Sammartino talks of the melting of the bell curves on Tommy McCubbin’s Future Sandwich Podcast. He says the middle ground is being lost in all sectors. “Everything in business in that middle ground is being lost, it’s that

⁸² Hollinger, P. (2012). A hollowing middle class. Retrieved from http://oecdobserver.org/news/fullstory.php/aid/3660/A_hollowing_middle_class.html

melting of the bell curve. Even in pricing we see it. It's Louis Vuitton or Costco..."⁸³ This middle ground loss also applies to where people will live according to Sammartino. "That middle suburban ring will be lost,"⁸⁴ he says, predicting that people will live either right in the middle of cities, or in highly desirable settlements near beauty spots within a couple of hours of a city where they can commute in driverless cars in which they can work or be entertained during their commute.

This hollowing is happening in education too. Economist Magazine questions the value of business schools that aren't quite elite. 'Trouble in the Middle', an article which appeared in the Briefing section of the print edition of the The Economist (October 2011), says that two thirds of business schools lost enrolments in 2011.⁸⁵ The article quoted a study that measured the value of the business programmes by comparing the cost of the qualification with the average salary the graduate can command. The article draws the conclusion that "schools at the ends of the spectrum look more appealing". Elite business schools "still look like a fair deal", while schools with "names that send a less sexy signal may be in trouble". Those at the lower end still offered a good deal because they are very much cheaper.

Web 2, the second wave of commercial internet, was the "era of the long tail"⁸⁶ according to an article by Philip Evans and Patrick Forth of The Boston Consulting Group.

"Small became beautiful... Minuscule enterprises and self-organizing communities of autonomous individuals surprised us by performing certain tasks better and more cheaply than large corporations. Hence Linux, hence Wikipedia. Because these communities could grow and collaborate without geographic constraint, major work was done at significantly lower cost and often zero price."

Hyperscaling is the third wave where "big – **really** big - is becoming beautiful."⁸⁷ Once again, the middle ground is disappearing.

⁸³Sammartino, S., & McCubbin, T. (2016, December). *Cities never sleep* [Video file]. Retrieved from <https://soundcloud.com/tommy-mccubbin/cities-never-sleep>. From Podcast: Future Sandwich

⁸⁴Sammartino, S., & McCubbin, T. (2016, December). *Cities never sleep* [Video file]. Retrieved from <https://soundcloud.com/tommy-mccubbin/cities-never-sleep>. From Podcast: Future Sandwich

⁸⁵The Economist. (2011, October 15). Trouble in the middle. *The Economist*, p. Briefing. retrieved from <http://www.economist.com/node/21532269?zid=316&ah=2f6fb672faf113fdd3b11cd1b1bf8a77>

⁸⁶Evans, P., & Forth, P. (2015). *Navigating a world of digital disruption*. Retrieved from <http://digitaldisrupt.bcgperspectives.com/#>

⁸⁷Evans, P., & Forth, P. (2015). *Navigating a world of digital disruption*. Retrieved from <http://digitaldisrupt.bcgperspectives.com/#>

Right technology

In a world where technology is of uber importance, Michael Flavin offers valuable insight in his paper ‘Disruptive Technologies in Higher Education’⁸⁸. Also quoting Christensen’s Theory of Disruptive Innovation, Flavin’s work focuses on technology use of students and the significant, but probably wasted investment that higher education systems around the world put into bespoke technology. This paper notes the low uptake of learning tech compared with the adaptation to learning of well used and well understood existing technologies offered by well-established brands. He notes in his introduction that his study “identifies a contradiction between learning technologies made available by HEIs [Higher Education Institutions], and technologies used in practice.”⁸⁹ Flavin’s research highlights the use of existing tools used for learning as opposed to those designed by higher learning environments. For example Wikipedia.

“The pilot survey findings for Wikipedia indicated its ubiquity... It is noteworthy that the use of Wikipedia is not prevented by its perceived unreliability, as it is a readily available tool to serve a purpose, and hence has a role within an Activity Theory framework.”⁹⁰

In his conclusion, Flavin says:

“There is no evidence arising from the surveys or interviews to suggest that a wide range of technologies is being used to support learning and teaching in higher education. Instead, a narrow range of technologies is being used to undertake a wide range of tasks, with the use of Wikipedia and Google being particularly common. As Christensen's theory predicts, people prefer to use technologies that are free and easy to use. If technologies are kept simple, people are more likely to use them.”⁹¹

This reinforces the idea that there’s no real need to do things in a way that is necessarily fully formed or better. It’s enough to meet customers at a level they find appropriate in the space

⁸⁸ Flavin, M. (2012) Disruptive technologies in higher education, *Research in Learning Technology* Vol. 20 , Iss. sup1, 2012. Retrieved from <http://www.tandfonline.com/doi/full/10.3402/rlt.v20i0.19184>

⁸⁹ Flavin, M. (2012) Disruptive technologies in higher education, *Research in Learning Technology* Vol. 20 , Iss. sup1, 2012 Introduction. Retrieved from <http://www.tandfonline.com/doi/full/10.3402/rlt.v20i0.19184>

⁹⁰ Flavin, M. (2012) Disruptive technologies in higher education, *Research in Learning Technology* Vol. 20 , Iss. sup1, 2012. 3.1 Retrieved from <http://www.tandfonline.com/doi/full/10.3402/rlt.v20i0.19184>

⁹¹ Flavin, M. (2012) Disruptive technologies in higher education, *Research in Learning Technology* Vol. 20 , Iss. sup1, 2012. 4 Retrieved from <http://www.tandfonline.com/doi/full/10.3402/rlt.v20i0>.

they want to be in. When it comes to technology, how do our learners want their on-line information delivered? Is it through Moodle⁹² or would they prefer a Facebook page?

Language, the killer app

Bill Reed in his presentation From Sustainability through Regeneration: Whole and Living System Design, summarises Confucius on language – “If we hope to repair what is wrong in the world, we had best start with the ‘rectification of names’. The corruption of society begins with the failure to call things by their proper names and its renovation begins with the reattachment of precise concepts.”⁹³ Then he asks his audience what they think is meant by the word ‘sustainable’ taking a quick poll on what it means. Everyone who contributes has a different answer. Reed points out how the word is not at all specific and the concepts it represents are in need of rectification. Like Bill Reed, Sammartino believes the first thing to be well aware of is use of language. “Language is the human killer app. That’s our operating system... If we change the language, then the content of the book of life changes”⁹⁴

Professor of Environmental Biology at the State University of New York and Citizen of the Potawatomi Nation Robin Wall Kimmerer told Krista Tippett in her On Being podcast that language is central to our exploitation of nature. She says the inability of the English language to adequately express the relationship between humans and other earth inhabitants is an issue that prevents us from understanding the sentience of other beings and so enables rampant consumerism. “The language of “it,” which distances, disrespects, and objectifies, I can’t help but think is at the root of a worldview that allows us to exploit nature. And by exploit, I mean in a way that really seriously degrades the land and the waters, because, in fact, we have to consume”.⁹⁵ She says the language of sustainability is limited.

“If something is going to be sustainable, its ability to provide for us will not be compromised into the future. And that’s all a good thing. But at its heart, sustainability, the way we think about it, is embedded in this worldview that we, as human beings, have some ownership over these, what we call, resources, and that we

⁹² Moodle is a learning management system used by many learning institutions including Otago Polytechnic

⁹³ Reed, B. (2011) From sustainability through regeneration: whole and living system design, 1’03” retrieved from https://www.youtube.com/watch?v=BFzEIIrZG_U

⁹⁴ Sammartino, S. (2016), Relearning Education. Retrieved from <https://soundcloud.com/tommy-mccubbin/relearning-education>

⁹⁵ Wall Kimmerer, R., & Tippett, K. (2016, February 25). *The intelligence in all kinds of life*. Retrieved from <https://onbeing.org>

want the world to be able to continue to keep — that human beings can keep taking and keep consuming.”⁹⁶

Wall Kimmerer prefers the notion of reciprocity as an expansion that better acknowledges our role not to just take from the earth but to be part of a mutual flourishing. “Reciprocity is that not only does the earth sustain us, but that we have the capacity and the responsibility to sustain her in return. So it broadens the notion of what it is to be a human person, not just a consumer.”⁹⁷

Changing expectations, changing skill needs

A major consideration for all higher education is the general loss in value of knowledge stocks in the days of being able to find all that you could possibly want to know for free. The Big Shift, a Deloitte future thinking initiative that hosts a shift index is talking about business when it points out that participating in, and harnessing knowledge flows is becoming more important than holding knowledge.⁹⁸

“The old ways of doing things are generating diminishing returns. Companies are having a harder time making money—and increasingly, their very survival is challenged. Executives must learn ways not only to do their jobs differently, but also to do them better.”⁹⁹

This is equally important for higher education.

According to several commentators, Millennials spend differently from previous generations and have different expectations than customers from other generations. This generation is likely to become the Centre’s biggest customer group. Forbes contributor Micah Solomon offers six insights into Millennials as customers.¹⁰⁰ These can be summarised as:

- a demand for (excellent) self-service
- an authentic, personalised experience

⁹⁶ Wall Kimmerer, R., & Tippett, K. (2016, February 25). *The intelligence in all kinds of life*. Retrieved from <https://onbeing.org>

⁹⁷ Wall Kimmerer, R., & Tippett, K. (2016, February 25). *The intelligence in all kinds of life*. Retrieved from <https://onbeing.org>

⁹⁸ The Paradox of Flows (n.d.). Retrieved from https://dupress.deloitte.com/content/dam/dup-us-en/articles/3407_2016-Shift-Index/DUP_2016-Shift-Index.pdf

⁹⁹ The Paradox of Flows (n.d.). Retrieved from https://dupress.deloitte.com/content/dam/dup-us-en/articles/3407_2016-Shift-Index/DUP_2016-Shift-Index.pdf

¹⁰⁰ Solomon, M. (2015, November 14). Entrepreneurs NOV 14, 2015 @ 01:44 PM The Year Of The Millennial Customer: Is Your Customer Experience Ready? Retrieved June 28, 2017, from <https://www.forbes.com/sites/micahsolomon/2015/11/14/2016-is-the-year-of-the-millennial-customer-heres-how-to-be-ready/#117b9b115ffc>

- value alignment with the brands they support
- technology that works
- social decision-making around consumption
- collaboration and co creation with brands.

At SingularityU New Zealand Summit, NZQA chair Sue Suckling referred to the 21st Century skills presenting the World Economic Forum diagram¹⁰¹ referred to in Figure 16. These skills are not at this point among those that are easily acquired for free because they still require supervised ‘doing’ that is ‘done with others’. They are also skills that are as yet beyond the capacity of Artificial Intelligence. Suckling argues that expertise in subject matter is not a 21st Century skill because subject matter is increasingly freely available. “We need foundation literacies but otherwise we need to develop competencies of collaboration and creativity,” says Suckling.¹⁰² Others at Singularity would have added the increasing need for Adaptability and even a measurable Adaptability Quotient that will become more important than either IQ or EQ.

The Centre in context

Considering the Centre in the context of the huge changes described above, from environmental, through to technological, from positioning, to language use and through to learner expectations and all the other drivers of change, many questions arise.

- If we accept that self-disruption is a helpful way forward, are we prepared to ruthlessly cannibalise our own business where necessary – as Amazon did when it launched its Kindle realising that e-books were inevitable?
- If we accept the ‘hollowing of the middle’ theory, where do we see the market position of the Centre?
- Given the huge technological advances, what exponential technologies must we harness, what will be the enablers, to drive our purpose, build our markets and attract learners and talent?
- If we consider Flavin’s assertion that people adapt existing platforms for their own use, how might we use existing platforms as our learners do?

¹⁰¹ Soffel, J., World Economic Forum (2016, March 10). *What are the 21st-century skills every student needs?.* Retrieved from <https://www.weforum.org/agenda/2016/03/21st-century-skills-future-jobs-students/>

¹⁰² Suckling, S. (2016, November). Future of education. *Singularityu*. Symposium conducted at SingularityU New Zealand Summit, Christchurch. Retrieved from <http://www.singularityunz.com/modules/speakers/sue-suckling>

- If we accept Suckling’s view of the world, how might we remove those shackles of regulation and legacy infrastructure that no longer serve us, and move to verify rather than qualify, become truly borderless, provide open access and free knowledge?
- If we accept our learners will increasingly come from the Millennial generation, are they or should they be those from the emerging entrepreneur class which is increasingly experimenting with exponential tech?
- How does our ‘being’ show our credentials in any of these areas?
- Given the views around language and a growing need for specificity, how do we get ours right – to drive change, and find markets?

Back to a Clayton Christensen principle – as written in a 2012 New Yorker magazine interview with Christensen.

“In industry after industry, Christensen discovered, the new technologies that had brought the big, established companies to their knees weren’t better or more advanced—they were actually worse. The new products were low-end, dumb, shoddy, and in almost every way inferior. The customers of the big, established companies had no interest in them—why should they? They already had something better. But the new products were usually cheaper and easier to use, and so people or companies who were not rich or sophisticated enough for the old ones started buying the new ones, and there were so many more of the regular people than there were of the rich, sophisticated people that the companies making the new products prospered.”¹⁰³

This raises further questions such as:

- What business is there that the Centre leaves for competitors, because it’s not worth us doing, or because we can’t do it well enough?
- Where are we ‘over-delivering’ to a small segment of the market?
- What does the Centre have access to that is cheap and easy to access that can be worked with?
- What are our competitors not doing that we could?
- What services can the Centre provide cheaply, even though that provision could threaten the viability of the more expensive end?

¹⁰³ MacFarquhar, L. (2012, May 14). When giants fail. *The New Yorker*. Retrieved from <http://www.newyorker.com/magazine>

- What can we find that is ‘better than nothing’ like that first, scratchy, but incredibly cheap Sony transistor radio, or the first nasty phone camera?
- Where is the ‘white space’ as described by the people from Deloitte’s Big Shift?
- How can we find Frank Diana’s ‘intersections that can amplify power and impact’?
- If we accept Diana’s amplifications, what technologies will come together to enable next generation higher education?
- How do we structure ourselves for true self-disruption. Do we try a non-hierarchical system such as Laloux’s TEAL organisation?
- And finally, the killer question, how do we do what we have to do today while reinventing for tomorrow?

Christensen concluded that “the only way a big company could avoid being disrupted was to set up a small spinoff company, somewhere far away from headquarters, that would function as a start-up, make the new low-end product, and be independent enough to ignore what counted as sensible for the mother ship.” This is what is happening in at least three of the organisations interviewed for this study. But Christensen goes on to say, “truly independent spinoffs like these were rarely created. Why would you hire an entirely new staff—a new marketing department, for instance—when you already had a crackerjack marketing department that would keep costs down and margins up?”¹⁰⁴ The self-disrupters interviewed in this study are attempting to do exactly that. They’re creating independent spinoffs away from orthodoxy and expert advice. The Centre sees itself somewhat in this position, but more because of its actual distance from the mothership and so perceived lack of connection to it. Its actual processes are not independent because it operates within the same NZQA system, and same administration as every other programme area in the organisation.

Christensen gave advice also on education (as well as everything else) and explained to the New Yorker magazine how recorded lectures could potentially disrupt even the elite schools.

“...recorded lectures and online learning were much cheaper than teachers in a room, so they had the potential both to bring otherwise unavailable courses to underfunded schools and to disrupt not-underfunded schools, like Harvard. Few people at the not-underfunded schools agreed with him—they couldn’t imagine that an online course

¹⁰⁴ MacFarquhar, L. (2012, May 14). When giants fail. *The New Yorker*. Retrieved from <http://www.newyorker.com/magazine>

could ever be as good as the old-fashioned kind. They didn't realize that a low-end product didn't need to be as good as a high-end one to drive it out of a market.”¹⁰⁵

To answer these questions, we could, as Simon Sinek¹⁰⁶ would suggest, start with ‘why’.

Why are does this Centre exist? For what purpose?

- Is the ‘why’ to drive a purposeful awareness of change and the personal transformation that will inspire and support capacity for action?
- Is its purpose to model what sustainable development in a tertiary institution might look like and to lead the mothership towards an unbundled future?
- Is it to drive transformative change and positive environmental and social impact?
- Is it to promote forward-looking strategic thinking with awareness of the constraints of the Holocene era?
- Is it to support the drive towards the exponential solutions needed to address the Grand Challenges facing the world?
- Is it to support and inspire individuals and/or organisations to look up, understand this big picture and equip themselves with the skills needed to look after their future fitness?
- Or is it something else entirely?

In the context of many of the thinkers cited in this work, we can identify some broad strengths and weaknesses of the centre which may help defining the ‘why’.

If we take on board Steve Sammartino’s view that the future of education isn’t about getting people job ready, but more about finding abilities to add value and generate revenue, then the Centre is weak in supporting learners in their own revenue generation.

If we look at Todd Hixon’s concern about looking after students after they’ve graduated, the Centre makes some attempt to generate a community of practice, but this is weak and unsupported in any formal way with lots of early enthusiasm, but only a few diehards staying regularly involved.

If we consider the issues of legacy infrastructure, the Centre is strong through its ability to operate from anywhere.

¹⁰⁵ MacFarquhar, L. (2012, May 14). When giants fail. *The New Yorker*. Retrieved from <http://www.newyorker.com/magazine>

¹⁰⁶ Sinek, S. (2009, September). *How great leaders inspire action*. Retrieved from https://www.ted.com/talks/simon_sinek_how_great_leaders_inspire_action

If we consider the WE Forum 21st Century skills summary, the Centre is strong because of its intimate, transformational, community building delivery model.

If we consider the wider Otago Polytechnic the Centre operates under, what are the conditions of its license to operate? How can it be integrated into and supported by the wider institution? How can it be suitably resourced?

If the Centre's role is raising awareness, resilience and ensuring our learners have the skill sets needed to be part of and contribute to an exponentially changing world, how do we think of doing this within the current constraints of the higher education system and NZQA compliance?

Digesting this, the clear important steps for the Centre to undertake are:

- To find clarity of purpose
- To understand this purpose in terms of the wider Otago Polytechnic strategic direction, positioning and resourcing
- To understand its role in alleviating the great environmental squeeze that underpins all human activity
- To articulate the business it is *actually* in
- To ensure its offering is not available for free elsewhere
- To consider what it can offer for free and the value of what is paid for
- To consider what it can do to offer product that is low-end, rough and ready and also what it can offer in the elite space. Or at least consider a desired position in the market that's not 'in the middle'
- To pay close attention to developing specific, clear language that suits identified audiences

Using its own tools to map strategy

The Centre has considered itself variously over the past nine years in the business of:

- mainstreaming sustainability
- transforming mindsets
- supporting regeneration of people and environment.

It's direction now is not so clear. The Centre facilitates learners to use a variety of frameworks to map systems and build strategy. Below I have mapped some of the drivers of change as an argument for trying different approaches that could disrupt current systems

using the funnel metaphor (Figure 20). These map the ‘Why’ rather than the ‘How’.

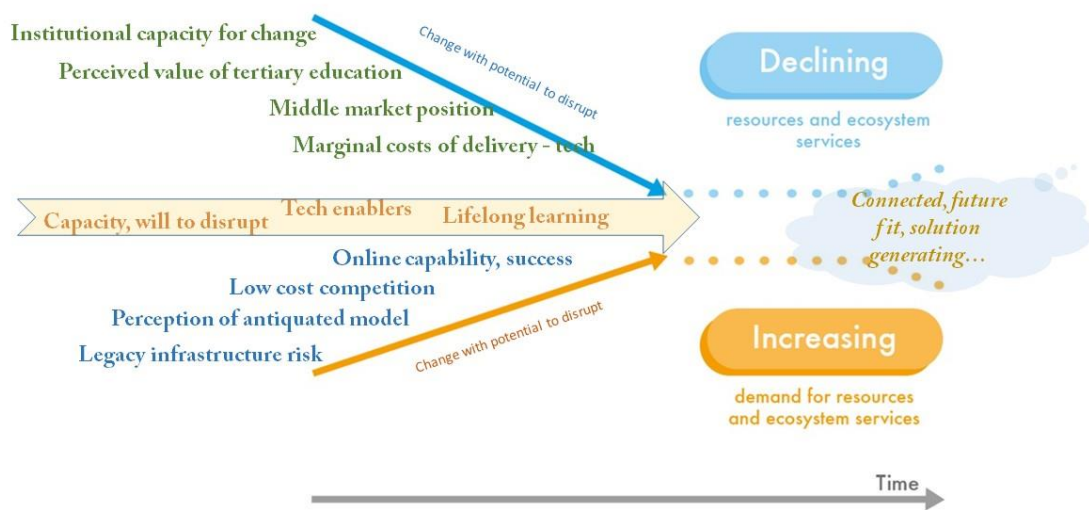


Figure 20. Drivers of change – disruption based on TNS Funnel model

Strategic direction mapping using the TNS ABCD model could provide action steps in a simple form (as illustrated in Figure 21) *after* questions posed above have been at least partially answered.

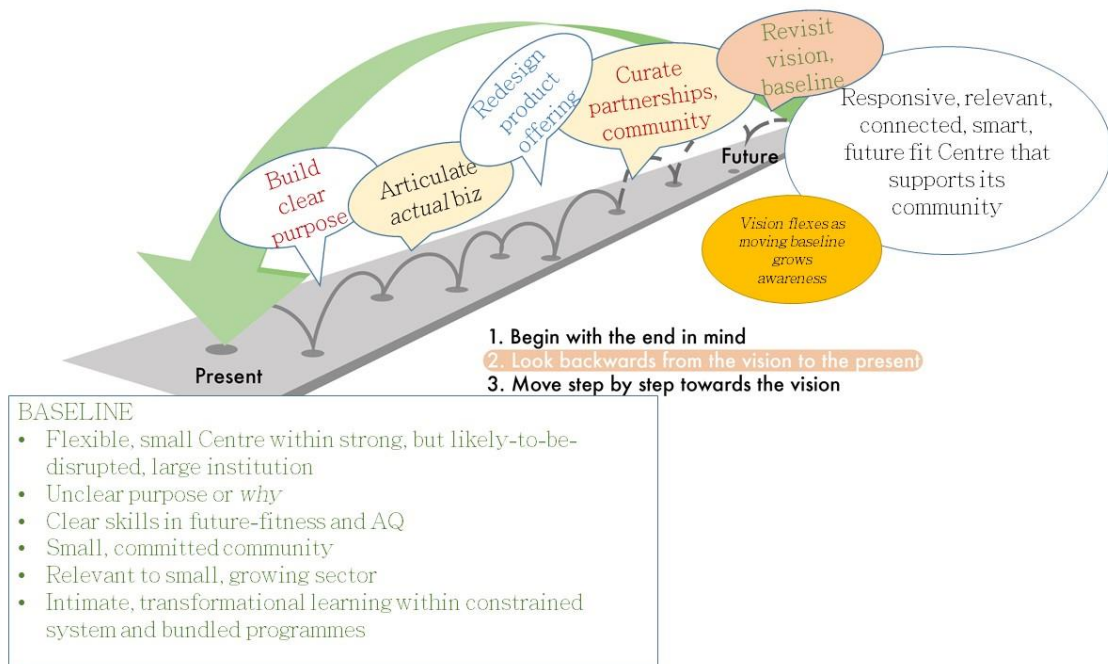


Figure 21. ABCD strategic direction based on TNS ABCD model

The Five Level Framework in Figure 22 can be used to simply articulate the big issues outlined in this study:

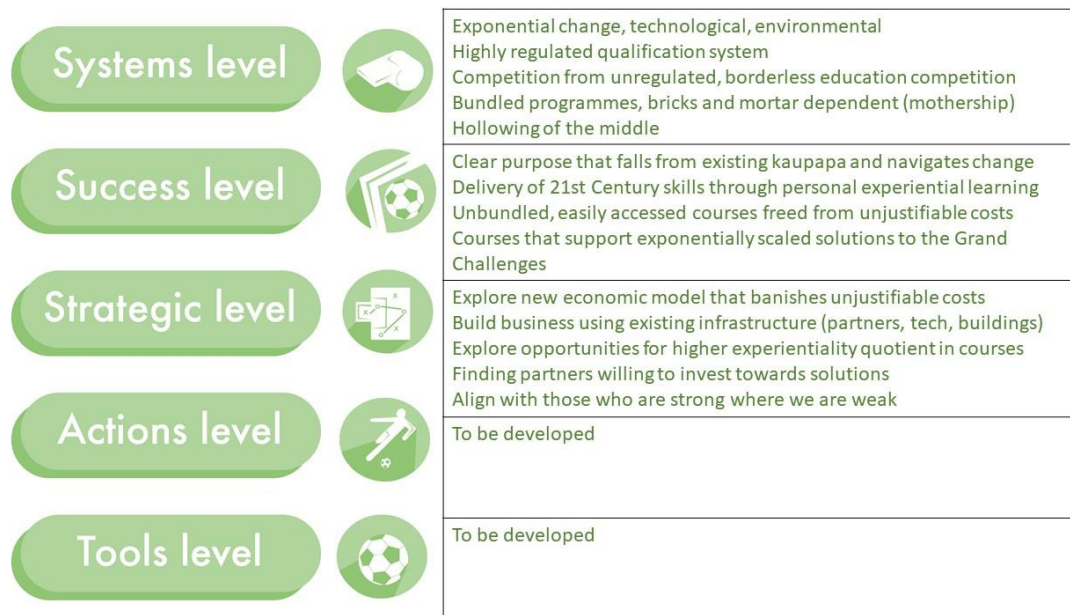


Figure 22. Five level framework strategic planning based on TNS five level framework

Each driver of change could have its own ABCD process. Each step in the ABCD, its own Five Level consideration. Finally, it's always useful to note strengths and weaknesses.

Strengths

- High skills in facilitating soft, 21st C skills
- Awareness of the need for AQ and EQ.
- Transformation, personal and professional is fundamental to its programmes and deeply embedded in its kaupapa
- Learners design their own curriculum supported by the discipline of communicating their work. Vulnerability and diversity are encouraged, orthodoxy challenged
- Small, flexible, & willing to fail fast, succeed faster. Able to work like a startup
- Well versed in future thinking and supporting frameworks
- Academic skills in science, communication, organisational change
- Ability to develop and support community by holding diverse individuals through shared experience
- Well connected with Otago Polytechnic and the future focused skills already there
- Well connected with the Grand Challenges as outlined by World Economic Forum, Singularity U, The Natural Step and current with the international responses to them

- Well connected nationally and internationally with future thinkers
- Able to operate as borderless, bricks and mortar-less

Weaknesses

- Little proven ability to derive sustained income outside EFTS funding
- Technological applications and platforms are not fit for purpose
- No clear purpose or direction
- Entirely dependent on mothership (Otago Polytechnic) and legacy infrastructure
- Inefficient administration model
- High marginal costs per student (in terms of facilitator time)
- Limited in-house capability/resource around tech, marketing, platform mobility, efficient administration

While these frameworks are helpful in terms of understanding the Centre, its markets, drivers and ability to operate, they are by nature, linear – start at the beginning move through to the end then cycle back to the start (which is now in a different place). However, we are in an exponential world – what does this mean for the Centre?

Get exponential

Christiana Figueres - the former United Nations climate chief and a key architect of the 2015 Paris Agreement – gives us insight on the urgency of this work. If human survival is to continue into the next century, solutions need to get exponential.

“We are very clearly living in an era of exponentials, linear growth in anything is just a thing of the past. We understand that very clearly in communications technology...and many of those advanced areas. The same is going to be true in energy... in transport... and in the building sector. The progress will be exponential not linear. If the progress were linear, I would say frankly that we [humans]don’t stand a chance anymore, but we know and can see the progress is exponential and that is why we still have the chance to correct our course by 2020.”¹⁰⁷

What is the Centre’s role in this global, potentially insurmountable challenge?

¹⁰⁷ Ryan, K. (Interviewer), & Figueres C. (Interviewee). (2017, July 7). *Nine to noon* [Radio broadcast]. Wellington: RNZ. 25.23 – 26.15

Section 5: Reflective review

In Course 1, I reviewed and reflected on who I *was*, what I *knew* and what I *could do* referencing several key influencers and texts. I wanted to understand my next stage of professional development through self-understanding and critical reflection on my past as well as designing a project that would be interesting, future focused and useful.

By Course 3, my project was going in quite a different direction to that which was initially envisaged, and even to that outlined in Course 2.

Initially, my project had a local government focus with an envisaged output of a useful new course in governance for sustainability, but as I learned more, I glimpsed what I didn't know and began to take a much wider view of the big picture of technological and environmental disruption.

While I have taken that wider view in Course 3, and completed most of what I outlined in my learning agreements, my outputs are less than I'd originally hoped, but I've learned more than I thought I could. My topic has swayed to a slightly different place, and I'm not sure the benefits are as much as I'd initially hoped - at least in the first instance. Basically, as warned it could do by my academic mentor, the project got too big, or was always too big, and it has only been worked down to a manageable size by limitations to my own efforts and the limitations of finding willing research participants. In the research section, I now understand my approach wasn't good enough to attract the numbers of people I wanted and to dig far enough into the questions I needed answered. I have also learned how difficult it is for people to give time. Throughout this period, I had to sit with how much I didn't know and accept that much of my initial thinking was deficient in many ways. The deep learning in that was how my thinking would *always* be deficient when trying to cover a big and completely new topic. The biases and lens through which I look at the world are always biases and lenses and will always channel thinking to a limiting point. Recognising the biases is difficult, but helpful. This realisation has led to professional improvement – it has made easier the acceptance of things not being quite how I expected or wanted – a perverse and wonderful outcome has been less frustration and more tolerance of my own inabilities and hopefully those of others as well. While my thinking has changed considerably my themes and drivers outlined in my review of learning remain basically unchanged (although my view of disruption has widened and deepened considerably). This likely also indicates not much movement in the lenses and biases. I wonder if this overall project could have been more

successful if I had worked on it with others? Would a collaborative approach narrowed down the huge subject into more manageable bite sized pieces and would a broader range of lenses and biases revealed more useful information?

A future focus

In July 2015 I went to the ITP symposium¹⁰⁸ hosted by Otago Polytechnic. I loved the future thinking that was showcased - Dr Henk Roodt in dairy research, Professor Sam Mann in sustainable computing, Dr Ganesh Nana with his wonderful demographic information that got me thinking about the coming need for lifelong learning, and Dr Hossein Sarrafzadeh sounding the warning that we were ignorant about the cyber security we needed to be capable of... His warning so timely and still we've pretty much ignored it as a nation and a culture. I had no idea people around me were thinking in this way and it was mind-blowing. Then a learner from Texas who was fascinated by bitcoin and the blockchain introduced me to exponential technology. My exploration of change became wider while my output became smaller. The big shift for me was that my exploration took me to the technology side of the exponential equation more than the environmental.

My new plan, still anchored in my themes, was to look further into the impacts of technological disruption and see how these related to environmental disruption, how others were responding and what lessons there might be for our Centre specifically and Otago Polytechnic generally. Understanding the impact of the exponential function on technological development was a big ask for a non-tech, non-maths person like me, and it took a deep dive down a rabbit hole to get some understanding. The bitcoin purchase was a valuable motivator.

As I worked out my learning agreement, I did a huge amount of reading on organizational redesign, Iwi and indigenous perspectives, government policy and all sorts of literature that I planned to dive back into for Course 3. While I did revisit some key texts, like Christensen's *The Innovator's Dilemma*, I never got back to many of those I identified in the agreement. I headed off down other routes and used other people's sweeping histories such as Harari's *Sapiens* and *Homo Deus* to find context. The neurons were firing in unexpected, random directions.

¹⁰⁸ ITP Symposium (2015)

http://metros.ac.nz/wp-content/uploads/2015/07/ITP_Symposium_Programme_SansContactDetails.pdf

So, Course 3 started with taking a broad look into past and future – change, change makers, what had happened and where we were going as humans. I found that much more change was going on than I had had any idea of. I too had failed to understand exponential function. I was astounded by the exponential curve and how we as a species sat at the pivot point of at least two curves (environmental and technological change), and probably many others. What I had (throughout my life) thought of as an inexorable lineal march through time, was probably more likely to be a long slow doubling off a very low base that started when humans walked out of Africa. But because it wasn't a linear journey, we as humans, were now at the point of that curve becoming rapidly steeper and steeper. Possibly more rapidly than our minds can likely cope with, and the consequences could be monumental – monumentally good and monumentally bad. This curve was now, as it likely had always been, driven by technological development – probably starting with the ability to harness fire as energy all those thousands of years ago.

This moved my study from a sustainability focus to a change focus, and suddenly it was incredibly demanding because I knew so little. I also discovered somewhere before presenting my learning agreement that Higher Education was actually in a dire place, ripe for serious disruption, and I hadn't even known – even though I worked in this sector, what's more my colleagues too seemed blissfully unaware. How had I missed that? This got my attention. If I was studying for work, which I was, this needed serious investigation. In the end I had to work with what I managed to read, listen to, and understand and much of this differed from what I planned to do.

Yuval Harari's *Sapiens, A Short History of Humankind* postulated that humans had been having serious impacts on the ecosystems of the planet since 45,000 years ago when they pretty much forced the extinction of nearly all the large mammals and possibly caused a climate change in that era – this was a big aha moment. *We've always been entirely irresponsible in terms of our environment!* Looking at environmental literature was becoming unsatisfying. It wasn't about environmental hand wringing, I increasingly learned, but much more about disconnection from nature – starting with language. The English language refers to almost everything apart from humans and some domestic animals as 'it'. As humans, we saw ourselves, as the bible says, as having dominion over all. Here was a serious problem, and Harari articulates it so well when he talks about our discussions with other species moving from taking place directly, to taking place through a god or gods. (This is a discussion for another project!)

As I read about climate change and the thinking behind the UN Climate Change accord, I came to the realization that the only chance we really have of maintaining the nice comfy Holocene environment that humans can live in, is if we can get exponential about the solutions. I was looking for scientific evidence of the ecological issues being exponential, and while I did find this around carbon and other changes, I realised my science knowledge was seriously lacking. This was an issue and continued to be one right through the process. I couldn't learn what I needed to in the time available and couldn't understand much of what I was looking for. I had to turn my attention to the tech. This was easier for me. So while I really wanted to map the exponential curves and had the picture in my head, I couldn't get there. Then I started thinking about what we could do at the Centre for Sustainable Practice to get exponential about solutions to the huge environmental and social issues, and soon figured that helping businesses add value through sustainability (read energy efficiency) wasn't it.

At the Centre, we (staff) were expanding our thinking about our future and looking towards rebranding, restructuring our offerings and generally shaking things up. The idea was that maybe we could try to self-disrupt and perhaps become a pilot programme that could eventually benefit the entire Otago Polytechnic. What I didn't understand at that time was the true meaning of disruptive innovation and how the goal of piloting disruption for the rest of the institution was actually a contradiction in terms. Even if, by some quirk, the Centre managed to achieve fully disruptive innovation, it would create a very difficult situation with the Polytechnic as the disruptive innovator (the Centre) would begin to take over the incumbent. The idea was laughable, but it occurred to me that this was a product of non-specific language and too quick analysis at too high a level.

I couldn't see a pathway this way, although it was exactly what some of my research participants were telling me – that unless you're prepared to dislodge parts or even all of your own organisation, self-disruption isn't the option. I wasn't sure how to overcome this problem, and ultimately didn't manage to. I tried to take a middle ground, using our own tools and frameworks to strategically plan a future through systems thinking and back-casting, all the while keeping a canny eye for where disruptive competitors could emerge hoping to find ways to identify and use these gaps in our own planning.

The language

My career history mostly includes working with language and once again, I have become very interested in the terms of sustainability, disruption, transformation. In 2015 I started to notice a building antipathy towards words like sustainability. For some years, sustainability had been the buzz word on every strategists lips and that somehow seemed to cause it to lose its proper meaning. Very quickly no-one seemed to know exactly what was meant when people talked ‘sustainability.

I had a brief look at the etymology.

sustainable

/səˈsteɪnəb(ə)l/ 

adjective

adjective: **sustainable**

1. able to be maintained at a certain rate or level.
"sustainable economic growth"
 - conserving an ecological balance by avoiding depletion of natural resources.
"our fundamental commitment to sustainable development"
2. able to be upheld or defended.
"sustainable definitions of good educational practice"

Figure 23. Reprinted from Google dictionary Retrieved April 15, 2017

The meanings seemed fusty and uninspiring. The word in its true meanings simply doesn't serve well the constant change that exists always in natural activity and there was nothing exciting in the pivot point indicated by ‘conserving an ecological balance...’ The word had become increasingly non-specific and inaccurately used, often in spurious claims of sustainability that were neither helpful nor true in terms of a principled approach. I started thinking about our Centre and its name – Centre for Sustainable Practice, and its mission, to ‘*mainstream sustainable practice*’. It occurred to me that the Centre, for one thing, will never mainstream anything. It is, by design, on the edge – nowhere near mainstream. Poor language use meaning nothing useful. What do we mean ‘*for*’ Sustainable Practice? And what is Sustainable Practice anyway?

Figure 24. Mickey Mouse version of sustainability, so named for its similarity to Mickey Mouse’s ears, shows a still often-used view of sustainability that assumes firstly that society and economy are somehow separate from the environment and secondly that there is some fictional ‘sweet spot’ between environment, society and economy. It is another great example of poor language use. Confucius via Bill Reed again, ‘...renovation begins with reattachment of real meaning to precise concepts...’ It makes much more sense if we pay attention to what the words actually mean and how they must accordingly be contextualized.

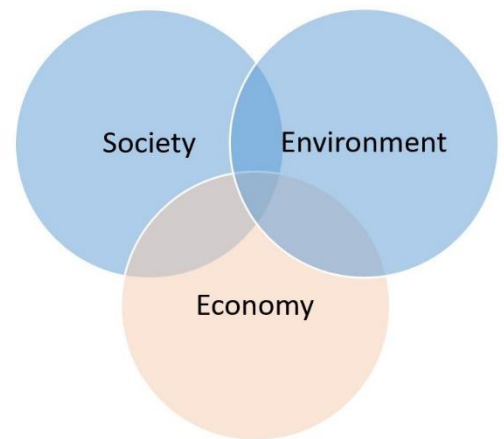


Figure 24. Mickey Mouse version of sustainability

I now use Eco in place of environment – this is the Greek word for home and here refers to planet Earth and its atmosphere. Ecology for society or social – this is the word for knowledge of home and Economy in its true sense, management of home. Ecology/society can only exist within home and economy is a function of the management of home. I am now clear on the language I’m using and place in nested circles as in Figure 25 for exactness of context and so we can see how they actually interrelate.

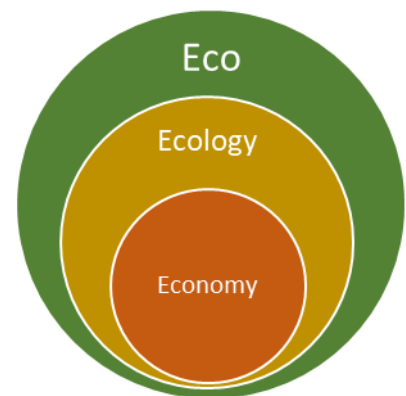


Figure 25. Eco, or home, encompasses ecology, or knowledge of home, while economy is a function of ecology – management of home

My work had now drilled down into some fundamental definitions which became useful as I undertook the interviews with research participants and included a question about the language of sustainability and disruption. The more I consider language and its application in the world of change and exponentiality, the more important it becomes. This is a key learning in my professional practice. Be very careful with language and ensure meanings are well understood.

Goals, revision, failure and success

My revised projected called for:

- An investigation of futurist thinking so forces driving change in the systems of our learning model could be mapped.

- An overview of exponential technological development and how it coincides with environmental and maybe social change.
- Research that would show how others are responding in this space.
- Potential to develop the Centre as an autonomous test project that could model self-disruption for the wider polytechnic.

My learning outcomes were to

- Develop clear, big picture, critical thinking – systems thinking with a future focus
- Build research skills
- Work with disruption as a creative, rather than threatening force, within our Centre
- Learn to use a range of tools to simplify complex issues
- Improve reflective skills and communication skills

I experienced varying levels of success with these goals and outcomes. My study of futurist thinking has led to me becoming regarded as a futurist thinker – with my new specificity of language, I would never refer to myself as this – maybe a futurist learner. Evidence of this is provided in the appendix as a range of PowerPoint presentations presented. Guest speaking engagements have included:

- Guest lecturer on the Otago University MBA programme
- Guest lecturer to University of Georgia undergraduate business students
- Speaker at the Fit for the Future conference
- Speaker at the Natural Step AGM in Auckland
- Speaker at a Queenstown Chamber of Commerce Ladies Morning
- Speaker at a Capable NZ staff meeting at Otago polytechnic.

The research component of my project (appendix 3) was designed to try and get a sense of what other organisations in New Zealand were doing in response to disruption. We're a small country, but at the mercy of the same forces as everyone else and highly interconnected. I wanted to know what are some of our New Zealand organisations were thinking in terms of change, disruption and/or transformation? I planned to talk to about a dozen organisations across corporate, Iwi, startup and government sectors. I ended up talking in depth to only six people from mostly the corporate and startup worlds. My expectations and plans for this research was problematic on quite a few levels and I realise now some serious flaws in my approach. First, it was really hard to find people to talk to. Many simply never answered my requests. Those I did talk to was because of contact being made through others. I used

LinkedIn as my main source of finding people, but then needed to find others to make the introductions. I wanted people to talk ‘on the record’ as had always been my journalistic approach. I didn’t have the credibility of a news organisation to support this and secondly, 12 – 15 people was way too many to a) secure interviews with and b) have the time to interview then process those interviews in accordance with my ethics requirements. The amount of time that it took to set up interviews, conduct them, transcribe them, then interpret, collate make changes as requested, get sign off for, was huge, more people would have been even more huge.

All of this meant some big holes, and I didn’t realise these holes until too late. Certainly some, such as local government and higher education facilities could have been filled had I known I had a hole. For example, I’d listened to Sue Suckling speak at Singularity U, had connected with her and had hoped for an interview. By the time I realised this wasn’t going to happen, it was really too late to find someone else. So I wasn’t able to further explore the ideas she’d raised in her talk (which I have extensively referenced in another section.) Iwi too is a hole. I made several approaches to different people, none of which were fruitful so really the only Iwi view in my work relies on a very short interview with Traci Houpapa. I really wanted to explore the Iwi approach given how often they’d faced disruption and how their language connects them so strongly to the natural environment so this was a big disappointment. I realise now my approach was western-centric, asking for people to speak freely and on the record with no previous history of trust. Of course, that wasn’t going to work in an Iwi environment and I should have known better. In addition, gambling on one person from a sector accepting an interview wasn’t clever either. I should have included a quantitative piece; it wouldn’t have been so nuanced, but would have given me something solid to work with.

Still, on the upside I had some amazing conversations with some very clever people and did find some common themes.

In terms of potential for our Centre, much has been achieved. It’s not as direct or as absolute as I may have thought possible in the early stages of the project, but I think I have worked out the questions that need answering and done the thinking that will help us navigate the trends. We have already carried out work alongside and informed by this project. It has resulted in redesigning our flagship qualification – the Graduate Diploma in Sustainable Practice, and work on evolving the Adding Sustainable Value programme. We are now well aware of the

drivers of change in our world of higher education and are working on how we might position ourselves to adapt as needed.

We are also working to create our own community of practice and explore the potential of developing as a TEAL¹⁰⁹ organisation. This work is slow, experiential and exciting, but not likely to provide a model for the rest of the institution just yet! Again, another arrogance where my approach really wasn't right.

Hopefully, in experimenting with our own workplace, we can provide useful future focused context for the wider Polytechnic that may support people as technological impacts bite into government funding, student expectations and the disappearance of some jobs and reimagining of others. I learned through my research that we need to be gentle with other humans, not all will move as we think they should. Peter Fletcher-Dobson told me how up to 80% of his staff would be unable to make the shift required. His response was to equip the 5% who would *really* shift with the tools to do so and keep them far away from the 80%. Then the other 15% are charged with the task of making the 80% go faster through improvement and incremental change.

Working within the OP system as a rookie programme leader at the Centre for Sustainable Practice, I've observed the difficulty our CEO Phil Ker has in trying to drive change through his institution. Phil has a clear vision, but has a Titanic to turn. A Titanic bound by its own systemic constraints and that of others. Like Pledgeme and the financial institutions, the Polytechnic is protected through those constraints, but for how long. Pledgeme teaches me that our mission should guide us, not our platform. Our Centre has operated on the edge of this Polytechnic system, offering an unusual, self-transformative approach for driving regenerative change. Off campus and disconnected in many ways, but highly connected in terms of digital and creating a committed community, the Centre has sensitive antennae acutely attuned to change, and offers a unique view away from the pressures of day-to-day internal institutional relationships. We need to find our mission.

[Improvements in my own professional practice](#)

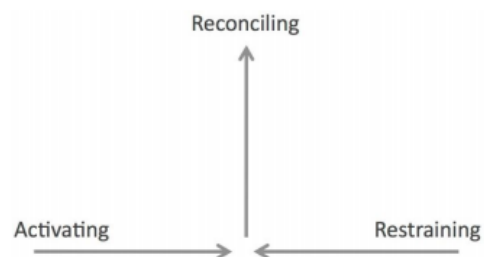
I don't separate my personal and professional lives to a great degree. I try to do work that I love generally, and trudge through the difficult bits in the same way I would through a pile of dirty dishes attempting to zenify any resentment. So improvements in my professional

¹⁰⁹ A non hierarchical organizational structure articulated by Frederick LaLoux in Reinventing Organisations

practice through this process have also greatly improved my personal life. For that, I am very grateful.

I've become more tolerant. Exposing my own failures makes it easier to accept those of others. I've learned to take a wider view. I've absolutely loved delving into technology and futures thinking and this has been a huge gift personally in terms of relating to my 2nd year university student son, and a plethora of nieces, nephews and godchildren. I've also taken up studying Te Reo, inspired by the process of this MPP. Another huge gift. I sense the way forward offered by indigenous culture and language (how that language articulates relationships between all inhabitants of the globe, from mountains to rivers to creatures) and while that didn't get covered in the detail I'd hoped in my research or final report, it is a personal output for me and an area I'll continue to work within. I've learned a bit about big picture thinking and how difficult it is to suspend, or even recognize, judgement. This has greatly extended my ability to think critically. Slow down, let the seed establish roots and then look to see what plant will grow. I have changed my mind so often, I wonder why I bother forming opinions at all sometimes! I've realised the great utility in this space of another framework – the law of three from Bill Reed's Regensis¹¹⁰.

The law of three can be depicted in the following way:



Each force has a different source and a different quality or characteristic.

Figure 26. *The Regenerative Practitioner's Law of Three*, <http://www.regensisgroup.com/wp-content/uploads/2016/05/A.6.2.2-Law-of-Three-5-12-16.pdf>

I first met this idea when studying Political Science and the theory of thesis, antithesis and synthesis¹¹¹ and it's good to meet up with it again.

¹¹⁰ Reed, B. (2013) Retrieved from: <http://www.regensisgroup.com/wp-content/uploads/2016/05/A.6.2.2-Law-of-Three-5-12-16.pdf>

¹¹¹ Wikipedia. (n.d.). Thesis, antithesis, synthesis - Wikipedia. Retrieved July 20, 2017, from https://en.wikipedia.org/wiki/Thesis,_antithesis,_synthesis

I have improved research skills by finding my limits and extending them through this process. By figuring out what was wrong with my research, I know how I'd do it differently next time.

I have a much fuller understanding of disruptive change and how it might impact us. I have an understanding of how some organisations are responding and have tried to make this accessible to anyone who is interested through a report written for accessibility and mainstream publication. I've learned that these organisations are fine with not really knowing where they are going and I was delighted by the fact that they're pretty happy with that. I don't know, as I'd hoped to know by now, how we might model self disruption to adapt to changing conditions, but I think I do know the questions we need to answer to make a less painful way clearer, and I have a much better understanding of the tools that will be useful on the journey. I haven't done well in identifying partnerships that might be supportive. This needs a whole other piece of work and will take time building up trust and moving away from competitive models.

In terms of change to my professional practice – some key big picture learning:

- Language – exact, careful
- Time – everything takes much longer than I think. There are two time factors that have to be considered. First, things are changing faster than we can comprehend. Second we need to go slow to go fast. We need to take the time to understand.
- Wholeness and transparency. Bring everything to the table. Time is too short to hold back and we need to be clear around what we know and what we don't know.
- Confidence. No fear around thoughts and instincts. No fear about being wrong.

Next - Improvisation at the Centre

Unpredictable change in musical performance is often described as jazz. The key response to that change, particularly as part of performance, is improvisation. Improvisation is using what is at hand, in the case of the Centre, adaptability, connections, cooperation, and academic and facilitation skills, to create something new.

Steve Henry has been a huge support throughout this project to date and our work to evolve the centre will continue, informed by this project. I think our next move as a Centre is to work on answering the questions posed in my report. There are two ways we need to operate

1. Fail fast, succeed faster – try stuff without fear.

2. Go slow around our big picture and around our partnership development.

These two seem mutually exclusive but I don't think they are. Our work needs to carefully plan forward direction that pulls us away from the walls of change, and supports others to join us in a journey of inter-connected learning, community of practice and self-transformation. This is the slow bit. The fast bit is about trying stuff that we think will support this overall objective. I think this is how we'll make our work will be useful, relevant and strong enough to survive whatever hits our current system. A fuller understanding of the interconnectedness of everything and our place as educators within a universal system is where success will lie. The conclusion I've reached is that despite disruptions from seemingly all quarters, transformation towards a vastly improved societal and economic system, based in a shared human belief in the interconnected goodness of the world and probably the universe, comes from within each individual. This is the place of authenticity that our educational response will need to come from. We need to design our own systems that exponentially support individual transformation towards collective transformation to a new and better system that is well adapted to the environmental change that is now inevitable.

[Appendices and attachments](#)

Attachment - Appendix 1 Interview transcripts.pdf

Attachment – Appendix 2 Presentations.pdf

Attachment – Appendix 3 Summary of research.pdf

Acknowledgements

Sincere thanks to my mentor and friend Steve Henry, who hates to be called my boss. Steve has supported my entire journey in this area since our meeting in 2008. His visionary, incisive intellect has challenged and fed me every step of the way. Finding the way forward for our Centre is his dream as well as mine.

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