IMIRS

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Perspectives and Insights that transcend news headlines

Sustainable fashion: three brands that are changing the game

How to take advantage of career pivots in a world of unknowns

Consumerism's disruption of healthcare and the aging experience

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ISSUE 2
LOOKING BEYOND

A FEW WORDS

Hi there,

Thank you for opening the second edition of Institution for Management and Innovation Review by Students (IMIRS). We had an amazing time putting together our first issue, *Emerging Trends and Innovations*, last year, and we are excited to share the diverse and interesting contributions from fellow students and guest writers again. Many industries today face profound disruptions -- whether it be from climate change, new technology, or evolving consumer behaviour -- to their deep-rooted ways of doing business that have driven their growth to date. IMIRS is a platform for fellow graduate students to highlight what we have noticed in some of the organizations as they manage and innovate on these trends and issues.

When our team was brainstorming the theme of this issue earlier this year, we noted that the world becomes even more connected and aware, it feels increasingly difficult to stay current on every headline. As each breaking news is broken by another and it is so easy to move onto the next sensational story, we hope this issue delivers thoughtful pieces that look beyond the headlines we're all guilty of glossing over.

We sincerely hope you enjoy this issue's selection of articles. Also, thank you for making this issue possible, team! Whether you have contributed an article, given us your time and effort or encouraged us, you made this issue possible.

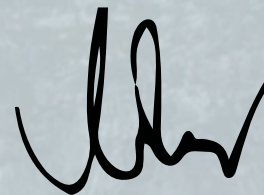**Jesse Hudecki & May Lim**
Managing Editors
Institute for Management & Innovation Review by Students (IMIRS)

FROM THE DIRECTOR'S DESK

This issue of IMIRs represents an impressive array of perspectives from IMI's best students! Sustainability, broadly speaking, continues to be the key theme across all the terrific articles, as is innovation. To highlight a few of inspiring and thought-provoking articles, Brianna Coft's lead article breaks the design process down for those of us wishing to make improvements around us and argues that innovation can only be effective when the designer takes a people-centred approach to the innovation process. David Fu provides a vivid account of the leaps that he has had to take as an entrepreneur and presents a proposition that responds to the retail real estate challenge. Maryssa Edward's excellent piece reminds us of the boundless potential for technology to be used to show care and compassion for others, particularly our most vulnerable, aging demographic. I certainly learned a lot and enjoyed reading this issue cover to cover! I continue to be in awe of the breadth and depth of our wonderful IMI students.

My gratitude and congratulations to all the amazing IMI writers who have contributed their work to this publication, and to the Editorial and Graphics Teams for putting together such a beautiful, inspiring and inclusive issue.

Yours sincerely,

Soo Min Toh

Director
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INSIDE THIS ISSUE

Navigating Innovation Through Good Design

By Brianna Croft
Edited by Josh Dube

Innovation is a messy, complex and ambiguous undertaking. That said, what business does not want to be more systematic about driving innovation?

While it is now a strategic necessity, regardless of industry, the word "innovation" is interpreted quite differently across and within organizations.[1] Harvard innovation scholar and guru Clayton Christenson defines innovation as a **change in the process by which an organization transforms labor, capital, materials, or information into products & services of greater value**.[2] The Canadian Council of Academies defines it as new or better ways of doing valued things. It is not until an idea or invention has been implemented to a meaningful extent (at scale) that it can be deemed an innovation.[3]

Illustrations: Ru Yap

In the healthcare sector, key focus areas for innovation are around either improving patient outcomes or experiences, significantly reducing the cost of care, or achieving both at the same time. Managing an innovation model or program well in a complex healthcare organization can be a major competitive advantage. But it is fraught with difficulty. Many barriers exist which prevent healthcare organizations from innovating, with some of the main barriers including:

Lack of Needed Mindsets / Culture	**Risk Aversion (or, Some May Say "Intolerance")**
Lack of Resources or Infrastructure	**Misalignment of Incentives**
Entrenched Producer Interests	**Outdated Policies or Regulations**

And the list goes on. In order to overcome these barriers and achieve a desirable, viable, and feasible solution for healthcare, organizations are increasingly turning to methodologies from the field of design.

"Design is the process of going from an existing condition to a preferred one"[4]

Milton Glaser

Design combines creativity with methodology and mindset, and it is **changing the way we understand innovation**. For example, Eve Medical is a company that is using design to solve a problem related to the accessibility of vital cancer screening tests, through developing and scaling an innovative, user-friendly solution.[5] After consulting many women about their cervical cancer screening experiences, they realized that most found it to be a very uncomfortable process. Thus, they often avoid undergoing screening altogether. To solve this problem, the "Eve Kit" was designed as a self-screening device for women to assess their own sexual health. This **product design** innovation completely disrupts the current model of screening that involves making an appointment for a pap test at a cold medical clinic. Their goal is to set new standards of care in sexual health which can measurably improve the delivery of healthcare and the lives of the people who should be screened for cervical cancer. Although this may seem like a straightforward solution in terms of developing the product, integrating their device into the healthcare system is another obstacle the company aims to tackle through **service design.**

It is essential to adopt a design mindset when developing and implementing innovations, however, a tension exists where those previously naive to this mindset are now being required to adopt design thinking in order to produce quality innovations. Fortunately, there are ways to navigate this space without numerous years of experience.

For a person with limited or no design expertise (i.e., a non-designer), tools from the designers toolkit can now be readily used to decode the complexity of innovation and make innovation safe to try through:

- **Being Human Centered**
- **Having a "Learning Approach"**
- **Collaborating**
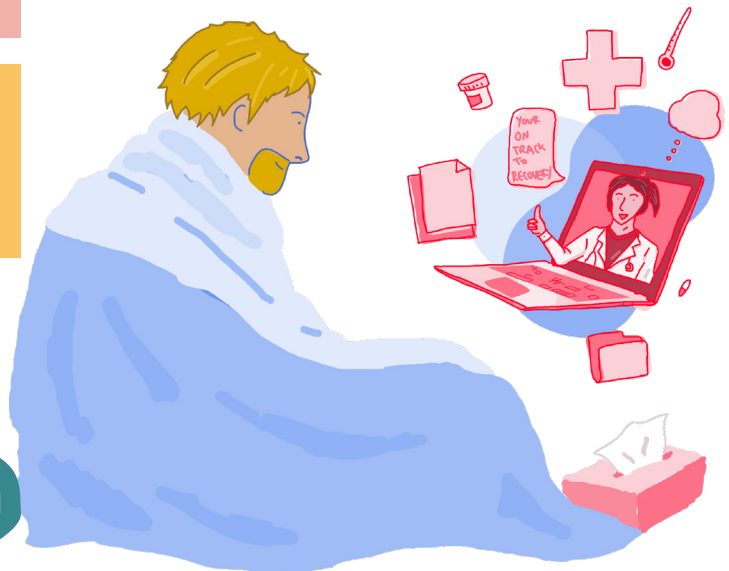
I. Human-Centered Design
It is challenging to come up with ideas if you only have your own experiences to design from. Moreover, it is important to have empathy when creating solutions that will be used by someone other than oneself. Human-centered design is the process of integrating human perspectives in all steps of the problem-solving process. The approach aims to better understand a given issue or opportunity from a human perspective and focuses on what users and stakeholders see, feel, think, do and believe in their environment.[6] Through applying a human-centered design approach, we can begin to find solutions to issues that are embedded in healthcare, such as: navigating our complex health systems; changing individual health behaviours; overcoming barriers to scaling compelling solutions; and challenges associated with measuring health impacts.

The key bemefit of taking a human centered design approach is that taking the perspective of those in close proximity to a given problem, or an opportunity space, enables new value propositions to be created. This is the first building block of creating a new business model: what value will be created?

From there, by looking at all of the pieces that must work in harmony, the designer can successfully create a new **business model = Value proposition [Desirability] + Profit formula [Viability] + Resource model [Feasibility].**[7] The "sweet spot" of health innovation is when these three components of a business model come together and can be tested (Figure 1).
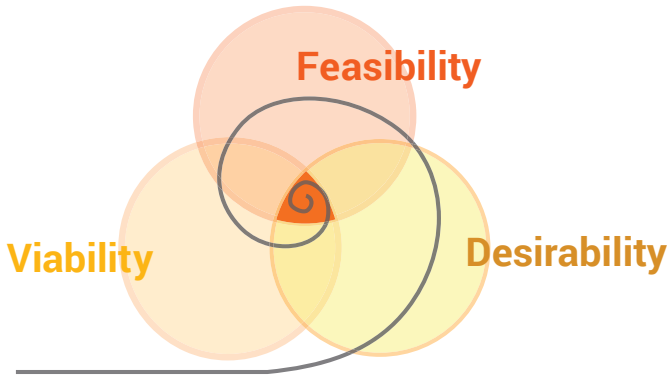

Figure 1. Desirability, Viability, and Feasibility of a Health Innovation

This diagram shows how design thinking brings what is desirable from a human point of view together with what is economically viable and operationally feasible. This design approach is a creative way for individuals who are not trained designers to address an array of challenges.

To find this sweet spot, first, it is important to explore what is **desirable** for the end user. This can be done through asking the following questions: What is the unique value proposition of the innovation? Do people want this new product or service? Does it make sense for them? Next, questions should be answered surrounding the **viability** of a proposed solution: Can we build a sustainable revenue and profit model from this idea? What needs to happen for this business to work? What are the costs and how will they be paid? Lastly, the solution needs to be **feasible.** To do this, the innovation must be possible to implement (operationally) and be functional in the foreseeable future. In order to ensure you work through a meaningful design process, it is essential to ask questions along the way and continually learn.

II. Learning Approach
Asking questions and being iterative when solving problems is key for helping innovators get unstuck. By iterating, refining and improving the way work is done, a project can be positioned in a place where new ideas and approaches can continuously flow and emerge. Iteration is necessary when doing innovation, since impactful solutions are never just right at the first iteration. Rapid cycles of iteration allow a designer to fail and continue refining to bring new ideas forward and arrive at a solution that will ultimately be adopted and embraced.[8] The ability to adopt the right mindset from failure will inevitably allow learning to take place. As an individual with limited design training, there is no shortage of tools in the designer's toolbox that can be easily used. One common tool for getting at the root cause of a behaviour or process is the 5 Whys (Figure 2).
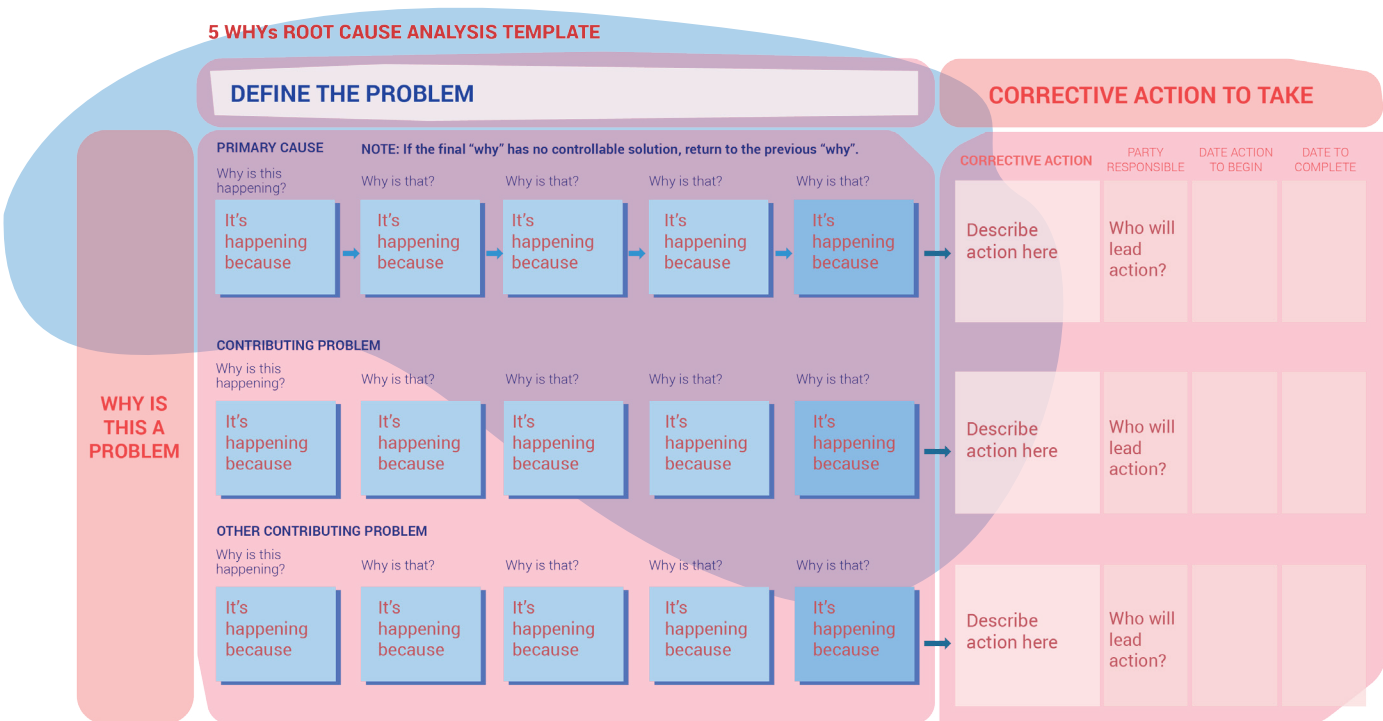
Figure 2. Problem Reframing: Understanding the "5 Whys"

The 5 Whys is an iterative interrogative technique used to explore the cause-and-effect relationship underlying a particular problem. The goal of the technique is to determine the root cause of a defect or problem by repeating the question "why?" Each answer forms the basis of the next question.[9]
Source: https://www.ideou.com/blogs/inspiration/how-to-prototype-a-new-business

In healthcare, for example, the 5 Whys can be used to find the root cause of the following problem: Mrs. Smith has moderate to severe congestive heart failure and has been admitted to the hospital every six weeks; why? Fluid was building up in her lungs and she was having trouble sleeping, why? The sodium content was building up in her body causing fluid retention, why? Mrs. Smith was either ingesting too much sodium, or her diuretic medication was not working well enough, why? Mrs. Smith lacked the knowledge and support to manage her diet and drug regime, why? The patient education process was ineffective and support systems don't exist to help Mrs. Smith manage her condition (root cause).[10]

In order to foster a learning approach, designer's tools like the 5 Why's to help reframe problems and challenge assumptions are invaluable. **When following frameworks for deeper learning, it is effective to work in groups and learn from the perspectives of others.**

III. Collaboration
Working with others when designing solutions is an excellent way to look at problems from a different lens, making innovation less ambiguous, and more efficient. This can be done effectively through adopting the two-pizza rule by Jeff Bezos, CEO of Amazon. The rule states that every team formed should be small enough that it can be fed with two pizzas, to ensure efficiency and scalability when designing.[11] Smaller teams spend less time planning and more time doing the work that needs to be done. Furthermore, it is crucial that these small teams are comprised of interdisciplinary individuals. For example, we could have a group of 4 designers working on creating a new healthcare experience - however, if you add a nurse, a systems thinker and a patient into the mix, the project's results would drastically improve.[12] When a diversified group of individuals visualize ideas and work together, an opportunity for deeper learning emerges. A way to do this is through a process called "Sharing Inspiring Stories". The goal of this activity is to build a repository of stories for a boarder team to draw from, tell and retell. Through this process, a team can collaborate and begin to imagine innovative opportunities and solutions.

Design for Anyone
Although we may not all be trained designers, there are immense opportunities for anyone who can apply design to innovation. Through thinking about users, and continually learning and working with the extended innovation team, design can be used as a way to shift perspectives and look at the world through a different lens. Although innovation can be an overwhelming undertaking for complex health organizations, design can be used as a way to "cut cubes out of fog" and begin to make sense of what is unknown -- to eventually foster a creative solution. Armed with these strategies, it is possible for anyone to innovate and help build a healthcare system that is truly meeting the needs of its users, by design.

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Brianna Croft is a Project Specialist on the Futures team at SE Health (formerly "Saint Elizabeth Healthcare"), a major national seniors aging and home care company. Brianna manages various projects in hopes of creating next practices and business models through innovation. She graduated from Western University with a Bachelor of Health Science in 2016 and recently graduated from the Masters of Management of Innovation (MMI) program at the University of Toronto. Brianna is eager to continue to grow professionally and share information about innovation, health and design.

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THE BURNING RETAIL PLATFORM

BY DAVID FU

EDITED BY BOSCO LI

Illustrations: Caitlin Chang

L ast fall, as a student studying Entrepreneurship at the School of Continuing Studies, I was eager to get started on my AI/smartphone-based inventory management system project for retailers. However, my instructor said, "No, no, you need to get out of the building and talk to the customers." As a result, I went to my target customers, who were used bookstores at that time, to solicit feedback. To my shock, the reception was lukewarm at best. The staff said that the barcode-scanner based system is proven and widely used, so it would be their first choice to consider. Some even suggested the good-ol' pen and paper, and having a great memory as the mantle of a good bookseller. Not seeing enough traction, I needed to pivot. Throughout my conversations with the bookstores, I noticed a common theme that high rents in Toronto was a big factor affecting the sustainability of their businesses. One in particular, Ten Editions[1] had to close at the end of last year, after 35 years in business to make way, ironically, for university residences. This started me down the path of the Retail Real Estate rabbit hole.

The retail real estate industry in Toronto has been trending down for the past few years. In contrast, residential and office space continues to experience high demand (and therefore high prices), whereas industrial buildings are experiencing a resurgence as being converted to fulfillment centers due to strong demand from online-retailers. On the other hand, major brick-and-mortar retailers, like Payless[2] and Sears,[3] are incessantly going out of business in what some have dubbed "The Retail Apocalypse."[4]

THE SILENT SHELL OF TEN EDITIONS STANDS AT SUSSEX AND SPADINA AT UTSG

10

How are retail landlords coping? Many are applying to re-zone their premises to change to mixed-use, so they can convert them to condo buildings or office buildings.[5] Yet, others are not throwing in the towel, and are focusing on creating "experiential spaces" and building the shopping experience around communities.[6] Another emerging trend is pop-up retail.[7] Some malls are exploring the impact on purchasing pattern of placing certain retailers together.[8] Google's Sidewalk Labs Waterfront project promises lower rentals, but that is likely to come at the expense of privacy, where data collected from the inhabitants will be used to make up the price difference.[9]

The recent launch of Hudson Yards in New York City is an interesting retail development. What started out as a bid for the Olympics ended up as the largest private property development in the United States. They chose to use office space as an anchor, while choosing to lease out high-end retail and residential space. Only time will tell if they made the correct bet, but signs are already showing that they just don't "get it." Some say it is a trophy for the rich, not for the rest of us.[10] The Instagram/photo debacle of the "Vessel" certainly starts them off on the wrong foot.[11] What is also interesting is that the Oxford Properties Group, the real estate arm of OMERS (Ontario Municipal Employees Retirement System), is a partner in this project. This begs the question of why the Canadian pension fund is not investing the money instead to make Ontario a better place?

With the availability of cheap money due to quantitative easing, an environment of using leverage to buy up real estate to generate passive income has taken hold. However, the rent-seeking mindset of the investor-landlords will be hard to shake, contributing to their unwillingness to lower retail rental prices. To turn the tide in this struggle, this is the value proposition for Tenatch:

> "Tenatch provides an online marketplace where big retail real-estate owners can bid for a group of stores to relocate to their retail space. Small stores can sign-up and create a profile of their business and where they are willing to relocate.. Tenatch matches complimentary small businesses to create a compelling group of stores, which will be offered up to real-estate owners for bidding."

Tenatch's strategy to solve the problem of high rents for shop tenants is to ask them to provide a reason for the landlords to reduce their rents. A single shop does not provide much value, but a group of complimentary shops, such as one consisting of a bookstore, a cafe and a bakery, will provide a more compelling incentive for the shopping mall landlord to offer rent discounts to attract the group. Such a complimentary group provides the landlord with more sustainable tenants, reducing vacant lots and producing more desirable foot traffic. In effect, the group will become the co-anchors to replace the departing traditional big retail anchor tenants.

The retail real estate business model also looks problematic, with real estate agents putting half-hearted vacancy signs and hoping for the best. Very few real estate agents focus exclusively on retail, but rather, they prefer to spend their time on the more lucrative residential housing sector. Often, outside of the class AAA locations on Yonge Street, shop lots can take anywhere from 3 months to 6 months to fill. Increasingly, even that looks to be a stretch. Like the auto industry, some businesses are simply not coming back.

In a bleak retail environment, a brick-and-mortar retailer will be caught between a rock (high rents) and a hard place (Amazon). By working together with like-minded entrepreneurs to tackle retail challenges, they stand a better chance to survive. While "Making Retail Great Again" will be an uphill battle, the name Tenatch is a tribute to Ten Editions, and the hope that such a retail tragedy will never happen again.[12]

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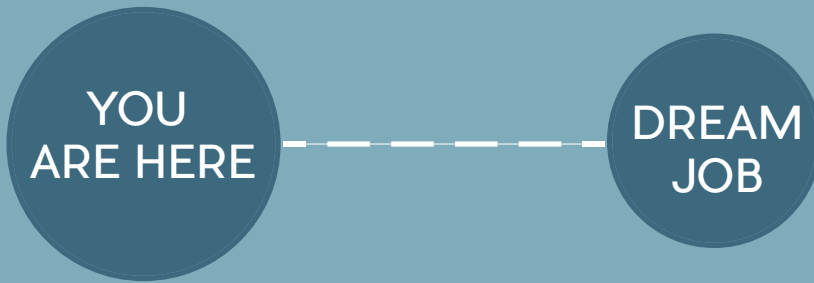
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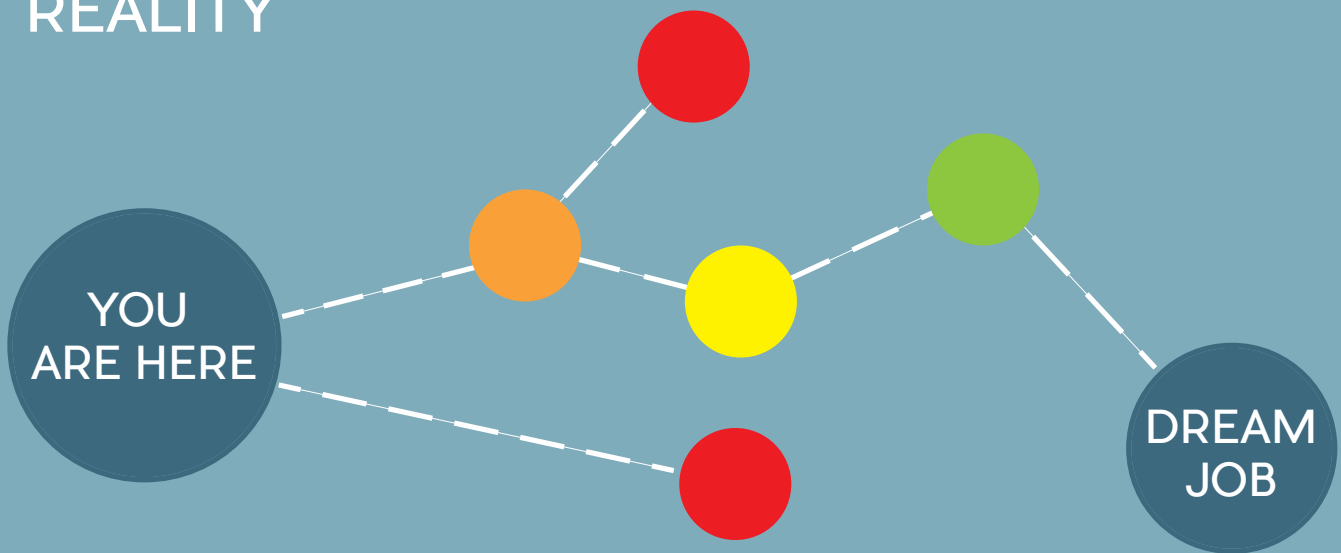
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EXPECTATION

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VALUE OF
PERSONAL PIVOTING:
INTERVIEW WITH GILLIAN LIU

Everyone at IMI comes from different walks of life, in pursuit of different interests and inspirations, and continues onto new and renewed adventures. As many of us have experienced throughout our academic and professional journeys, taking unique paths different from a well-trodden track is often daunting. Gillian Liu, a graduate from the Master of Management of Innovation, shares some of her own pivots and lessons learned along the way.

Illustrations: Amy Haddlesey

Q. What was your journey to IMI?

I graduated from Queens in 2018. I was always fascinated by subjects in science, so was naturally led to major in Biochemistry. From pretty early on, I came to a realization that I wasn't attracted to the professions in medical fields my peers were commonly pursuing. As one of the first steps in career exploration, I worked at a lab during my third summer and connected with a biomedical engineering professor to supervise my undergraduate thesis. Together, we designed a synthetic polymer for wet age-related macular degeneration (AMD) -- in simple words, an artificial material that could treat an eye condition commonly associated with old age. Six months into the project, I was starting to feel a big disconnect between all the hours I was putting in and a tangible impact I was yearning to create. Around this time, my brother and I visited Shanghai where we were struck by the ubiquity of bikesharing offered on university campuses. When we came back to Canada, we built a bike-sharing service for Western University, refurbishing used bikes to differentiate ourselves from existing players. During the process I learned so much about start-ups, like making a pitch deck, finding an advisor and reiterating design, that I was eager to further explore the vigor and creativity of my entrepreneurial side.

Q. Tell us more about the bike-sharing project!

Dropbike and other similar bike-sharing services were already being offered onin university campuses, and in response we leveraged sustainability -- offering cheaper, used and refurbished bikes -- to drive cost reduction. We did extensive research on our target customers, how we planned to enter the market, and other important details we were frequently questioned on during pitch competitions. Within a couple months, we built a rough user interface and launched our pilot program at Western; a few of our friends offered up their bikes to try out the service and give feedback. A key next step identified was improving the user interface, in other words, building the app. Neither my brother nor I had coding experience, and it was challenging to bring a much coveted coder on board. Upon consulting with our advisor, we concluded the project's takeaways have been sufficiently valuable

and ultimately didn't build the app. Having a good idea and executing on the idea are completely different games, and to this day I always plan ahead to make sure I have the tools and resources to support my plans.

Q. So what attracted you to the Master of Management of Innovation (MMI) program?

I have always wanted to work in consulting, which was reinforced by the coffee chats and online networking I committed many hours to before graduating. As expected, biochemistry wasn't a common background for many of those pursuing careers I was drawn to. I had to leverage my unique science background while differentiating myself from the few Biochem grads also pursuing non-traditional opportunities. MMI's one-year curriculum focused on business essentials that could fill the gap between where I was, and where I wanted to be. I also took advantage of the summer months leading up to the program to find a job at a start-up. I think I'd applied to over a hundred jobs in May, unsuccessfully, before landing a role through a connection I'd made through networking. It was an unpaid sales role at a company a 1.5 hour of commute away -- many aspects of which seemed undesirable at first -- that turned out to be one of the most formative experiences in my career. Not only did I learn how to speak to strangers through my sales role, but I also became good at asking the right questions and presenting the most relevant details to the right audience. Going into the job I knew analytical skills were important in consulting, so I sought an opportunity to further hone my skills in this area. I asked the CEO for access to the company's sales data which I realized wasn't being efficiently utilized. I got the free trial for LinkedIn Premium, and taught myself 9 hours of basic Excel analytics. Then I distilled the thousands of entries and data trends into a slide deck that the company ended up using in its future sale pitch to a big client. By the end of summer, I'd gained more skills and experiences than what was listed under the original job description.

Q. Where are you headed after MMI?

I recruited for management consulting and ultimately chose PwC for its culture and the rotational program. For the first two years, I get to work on a huge range of projects. At this point in my career, I'm all about trying as much as I can. Between the end of classes in April and the start of this role in September, I'll be working as a Business Analyst at RBC, through its Amplify internship program. I'll be part of a four-member team designing products and solutions for RBC.

MMI has taught me the importance of teamwork and workplace culture, which I will continue to prioritize when selecting my next steps. I was really happy with the genuineness and energy felt throughout my recruitment at PwC; during my partner interview, we bonded over the Legend of Zelda Breath of the Wild video game. I think I'm going to really love consulting. It's a profession that embraces variety and adaptive thinking,

Q. If you could have any other job, what would it be?

An Innovation Manager sounds cool. I can't name the job but I can describe it: flexible, versatile, and working with technology. I emphasize technology because tech bleeds into every other industry. In the modern world, technology affects almost everything we do, which makes it so exciting. Once you're involved in its core, you can apply it onto any other industry. I want to wake up everyday thinking I'm contributing to something bigger than myself and being able to see the tangible impact.

Q. What is your favourite topic in technology today?

I have this almost-paranoia with security and privacy related to data. How are modern day encryption methods going to respond to the development of quantum computing? How do we create institutions and systems that protect all people's privacy? Quantum computing pushes the limit of what we can do, which means it may be able to render current encryption useless. I'm interested in the role blockchain technology can play, or other emerging technologies like a multifactor verification system using biometrics, especially in today's society where cyber security and privatization are constantly chasing the rapidly improving technology.

Another interesting trend is how technology companies as a growing sector can practice sustainability. When you think of sustainability, there are easy definitions and common examples like renewable energy and recycling, but how do Internet companies practice sustainability? I believe they have a moral responsibility to offset their growing impact globally by playing a bigger role.

Q. Final message?

There is no set path to where you want to go, and the only way to be sure is to try it for yourself. Take calculated risks and pivot when needed to get to your dream job.

Gillian Liu is a MMI graduate with a degree in Biochemistry from Queen's University. She now works as an Associate Management Consultant at PwC in Toronto. She loves working in diverse teams and with innovative technology. In her spare time she's a digital artist and plays too many video games.
Check out her art here: @imaginary.gillian

"There is no set path to where you want to go, and the only way to be sure is to try it for yourself. Take calculated risks and pivot when needed to get to your dream job."

By Linxi Mytkolli
Edited by Laura Väyrynen

"Healthy Innovation"
in Canada's Healthcare System
The View from 2030

Illustrations: Ru Yap

Introduction

The scenario that follows is based upon a future in which major ecological and social (mainly demographic) changes have resulted in major population and economic shifts. This futuristic scenario is one based upon projected impacts of today's present day realities, such as climate change and a rapidly aging global population.

The scenario details how an imaginary agency in Canada, The Healthcare Innovation Agency of Canada (HIAC), has responded successfully to these challenges by adopting and putting into practice the principles that underlie our present-day thinking about innovation, and healthy, sustainable communities. The scenario is presented as a redacted speech from the inaugural leader of HIAC, Florian Metan, in 2030 looking back at the past ten years of change and progress within the agency itself, and how these changes have influenced the broader healthcare system in Canada.

The purpose of this article being presented in such a way is to explore how we currently view innovation in the Canadian healthcare industry, and how we might change our practices to overcome common barriers to not only healthier populations, but also healthier healthcare systems. British futurist James Roberston has said: "Thinking about the future is only useful and interesting if it affects what we do and how we live today." Inspired by this ideology, the goal of this piece is to highlight three key barriers that we face today, and how through collaboration between key actors in the system, we can achieve sustainable change and reframe these barriers as opportunities for future growth.

> "Thinking about the future is only useful and interesting if it affects what we do and how we live today."
> - James Roberston

" The Address

The cultural shift: When the plans for the Healthcare Innovation Agency of Canada were initially being crafted, one thing that was quickly established and agreed upon was that this new federal agency would ultimately serve to support and foster initiatives aimed at breaking down structural barriers to change, and accelerating the scale up of promising innovations.[1] In order to facilitate collaboration among various stakeholders and governments, a paradigm shift in our institutional culture was of utmost importance.

Though it may be hard to believe, ten years ago, (in 2020), our healthcare system in Canada was riddled with almost allergy-like symptoms to systemic innovation. Our crippling intolerance for failure led to a stagnant state of repeating the same tried and true methods of quality improvement, but it limited the adoption of exciting and new ideas. The lack of diversity of opinions fed into the perpetuation of the status quo, and the first task of HIAC was to enable a paradigm shift in our healthcare culture. This was done through partnerships with key organizations within the medical education system.

Collaborators for change: Our most critical ally in this work was the Canadian Federation for Medical Students (CFMS). At the time, they were pushing for what was seen as innovative action – inclusion of climate change in medical curriculums, equal gender representation in mentorship and leadership programs in medicine, and were even offering innovation grants to medical students with ideas that offered potential in changing the status quo of healthcare delivery in Canada.[2] Together with the CMFS, we worked to change the medical school curriculum in Canada to change the mindset of future physicians from a culture of execution to a culture of innovation. Together with the guidance of faculty from Kaiser Permanente Medical School, we instituted technology as a core pillar of medical education in Canada by integrating digital training tools such as virtual reality, augmented reality and more. Additionally, we worked with advisors from Harvard Medical School and MIT to create a mandatory Innovation Bootcamp for all Canadian medical students finishing their first year. The Innovation Bootcamp, where students spend a week in project teams designing a new healthcare venture, is a state of the art accelerated learning program, teaching the principles and toolkits of innovation and entrepreneurship.[3]

Breaking down silos: The cultural change in how we train the physicians of tomorrow was made possible by the systematic destruction of silos within our system. In 2020, the healthcare system was functioning in isolated boxes, where departments such as primary care and complex continuing care were entirely separate from each other, and all other departments of our healthcare system. Historically, the system was designed to be this way because it was easier to harness expertise, build trust within smaller teams, provide focus to these teams, and it was overall easier to manage. At the same time, the silos of our system were contributing to the resistance to change, hoarding talent and resources and perpetuating the culture of interprofessional networking, instead of promoting collaboration of professionals throughout the different teams and departments.

Collaborators for change: The key contributor to our success in breaking down these silos was the "Canadian Connect Health Alliance", a think tank founded in 2020 with the core purpose of facilitating transformation in health and social systems to make them more sustainable by ensuring services are efficient and outcomes improve. We realized that influencing policy change was not sufficient to break down these silos,. Because of this, we sought success through collaborating with a think tank turned "action tank", with previous successful examples in Europe and Asia. The alliance helped us to achieve this change by establishing "Innovation Ecosystems", which are cross-sectoral groups of stakeholders from across Canada (within and outside of healthcare). These groups meet regularly to find new solutions to challenging issues that permeated their sectors both vertically through the supply chain and horizontally throughout different departments. We looked to our colleagues in Europe, specifically in Northern Ireland, who had successfully implemented a similar program in 2015. This program had allowed them to create innovative, cross-sectional solutions to complex problems, such as reducing emergency admittance due to not completing courses of medications, saving their Department of Health the equivalent of 2.5 years in procurement processes.[4]

Updating outdated regulations and policies: In 2020, we were at a crossroads in Canada. For years, the technology had been rapidly evolving and patients' needs along with it. Unfortunately, healthcare delivery lagged far behind, with outdated regulations and policies stifling our ability to move forward. In fact, policies still mandated the use of fax machines – something that you can find in museums today – to communicate data! Here at HIAC we understood the urgent need to update these policies, just as well as we understood that we could not do it alone.

Collaborators for change: The key to our success in the modernization of policies and regulations was the political leadership that came from the Ministry of Health. Our Minister of Health established a clear standard that health was to be used as an economic driver in Canada, and all stakeholders involved in healthcare delivery were to be held accountable to this standard. Similar to what the Obama administration did with the Meaningful Use Law and Regulations to bolster health IT and improve delivery of healthcare in the United States,[5] we rolled out

a phased approach to provide assistance, tools and resources to providers to allow for implementation and utilization of a plethora of digital tools. Key milestones in the modernization of regulations in Canada were the integration of virtual care into bundled payments, and provincial regulatory colleges making it compulsory for every provider to operate with a secure email address and to offer virtual on-call services as part of their practice.[6]

Undoubtedly, I can say that by breaking down silos, updating rules and regulations and shifting the overall culture of the healthcare system here in Canada to embrace innovation, Canada is a more sustainable, viable, equitable and healthy nation than it was ten years ago, when I become the first leader of The Healthcare Innovation Agency of Canada. It took the combined efforts of all sectors, the community around us, our colleagues abroad, and legislative support when necessary for us to get to where we are today!

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Linxi is a recent graduate of MScSM Class of 2019 and she has an Honours Bachelor of Science in Biopharmaceuticals from University of Ottawa. Her passion for health promotion and equality in healthcare drew Linxi to the head leadership position with Actions for Healthcare, a student-run charitable community organization with chapters in several cities across Canada. She believes that sustainability is the capacity to endure over time and healthcare is the field that aims to maintain and improve mankind's health.

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PRO-AGING INNOVATION

BY MARYSSA LYNN EDWARDS

EDITED BY SAMANTHA DIIORIO

Illustrations: Caitlin Chang

Aging is a common journey that connects all human beings regardless of race, religion, colour, orientation, or sex. Early in life, young people enjoy growing independence as they age and look forward to the possibilities that the future may hold. As time goes on, people seek the stability and maturity that comes from the wisdom that can only be imparted by experience throughout the aging process. Amongst all of the hoping, dreaming, and planning for the future there is a poignant sense of dread surrounding the destination of older adulthood.

North American society undoubtedly values youthfulness and these values are reinforced by mass media, pushing all kinds of anti-aging messaging and contributing to societal prejudice against older adults, often referred to as ageism.[1] In addition to the ageism experienced by older adults, there is also an internalized fear of aging found in populations.[1] The distaste observed for the aging population can, at least partially, be associated with terror management theory which states that individuals try to distance themselves from older adults due to their own fear of aging and death.[1] A question then arises: what makes the end of our lives so frightening? Common misconceptions and stereotypes about aging suggest that older adults are unhealthy, unproductive, unwilling to learn or change, and incompetent or dependent.[1] Growing closer to these attributes is, validly, concerning for many individuals. In response, innovative development and implementation of assistive technology and services can help individuals to more fully embrace older adulthood, knowing that they will be able to remain independent and maintain dignity into the end of their lives.

We have entered an era of healthcare consumerism where older adults will actively shop for healthcare, wellness, and lifestyle solutions to meet their needs and satisfy their expectations.[2] For instance, one of the most significant preferences of older adults is to live (and die) at home.[3] Healthcare systems and markets are moving from a hospital model towards the home-spital approach,[4] where people can age healthily with the complement of remote health monitoring systems, voice recognition technology, and a variety of applications and technologies that serve many purposes right in their own homes.

Innovative remote health monitoring systems are already facilitating healthier and a more independent lives for aging people in the Greater Toronto Area. For example, *Health Espresso* is a monitoring system being developed that is inspired by a boutique homecare agency called iCare Home Health, which integrates primary care, e-prescription abilities, up-to-date health data, and artificial intelligence to provide a point-of-care technology.[5,6] Bluetooth compatibility allows Health Espresso to connect with devices like heart rate and blood pressure monitors and communicates the most recent readings available to the individual's primary care physician.[5,6] It is well documented that prolonged hospital visits for older adults result in physical and cognitive decline.[7] With this technology, physicians can virtually monitor their aging patients' vital signs and other bodily readings. This data-driven solution can facilitate the practice of preventive medicine, maintain health, and avoid unnecessary hospital visits for older adults.[5,6] The system even helps with medication adherence, a significant concern in the aging population,[8] by providing audible reminders to take medications and allows physicians to refill prescriptions virtually.[5,6]

Healthcare Consumerism[14,15]

A movement towards individuals proactively seeking out and purchasing trustworthy information and technologies to make informed decisions about their health and health care options in clinical and non-clinical settings.

Healthcare consumerism puts patients in decision-making roles with their care providers as partners in their care as opposed to the more paternalistic model of the past.

With the rising popularity of health monitoring devices like Fitbit and Apple's Health app, there is an opportunity for remote health monitoring systems to capitalize on the self-monitoring trend and facilitate better health outcomes through prevention versus responsive treatments. Health monitoring systems like Health Espresso allow older adults to better manage their own health and wellness by providing one channel for them to access all of their appointments, medications, and data in an otherwise confusing, fragmented healthcare system.[5,6] Therefore, the implementation of innovative remote health monitoring systems can potentially extend the number of healthy years older adults have in their own homes.

Another increasingly popular tech feature which can make independent living safer and less lonely is voice recognition. Three significant concerns for older adults living alone are falls, forgetfulness, and social isolation.[9] Falls occur in 20-30% of the older adult population in Canada each year, causing 85% of all injuries in this age group and costing the healthcare system $2 billion.[10] Falls, unfortunately, can also lead to deaths when individuals who have fallen are immobilized and unable to contact emergency services.[9,10] However, with the integration of voice recognition technology into homes, older adults are enabled to call out for help from a distance. Thanks to artificial intelligence, voice recognition devices can understand the request and make the call for help to the older adult's network.[9] In addition to the safety features, voice recognition technology can support aging people in other tasks by managing heating and cooling systems, lighting, and recalling information that may be difficult to remember like phone numbers or important dates for older adults with any physical or cognitive limitations.[9,11] Lastly, social isolation is a significant concern in populations of older adults who live alone.[9] Having a device like Amazon's Alexa or Google Home to chat with may not be an exact substitute for human interaction, however, as voice recognition technology and human-like chat bots continue to develop they could increasingly be expected to become helpful companions. Evidence has found that even now, using Alexa can help older adults feel more connected in their communities.[11]

Three significant concerns for older adults living alone are falls, forgetfulness, and social isolation.[9]

While much of the aforementioned technology deals with meeting the physical needs of older adults, it is important to explore innovative ways to meet their socio-emotional needs and to promote comprehensive wellness in aging populations. Applications are being developed to serve innumerable purposes, many of which can meet the needs of the aging population.12 One notable application, Cake, prompts a conversation about end of life planning by asking the users thoughtful questions, having them upload or create relevant documents, and plan their legacy using Cake.[12,13]

Hello, how are you doing today?

Remember to take your medication at noon.
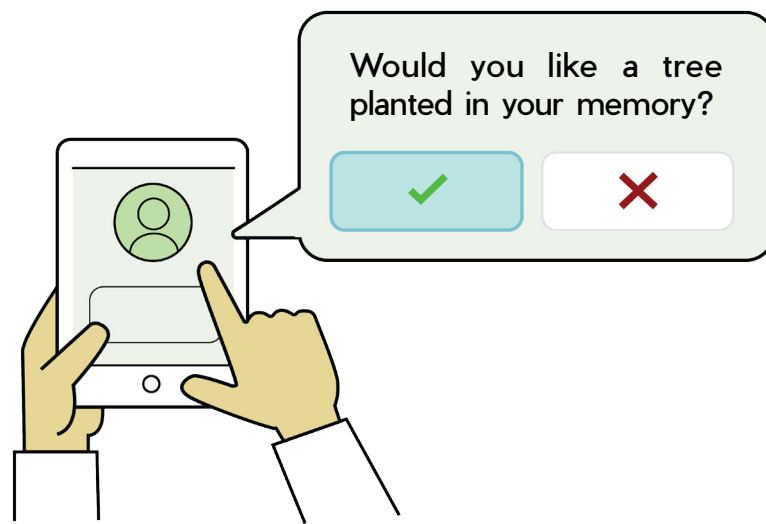
Maintaining dignity in death is important to many aging people and innovative applications like this create non-threatening spaces for people to reflect and make forward decisions about their care and legacy at the end of their lives.[12,13] Older adults may feel a great sense of relief in knowing that they will have a say in the activities surrounding their death.

Oftentimes, older adults are perceived as unable to learn or use new technologies. However, with the development of technologies that are intuitive and more easily navigable, their integration into the lives of the aging population has boundless potential. Purposeful, pro-aging innovation can give people more independent years and dignified lives in the environment of their choice; whether it be at home, in aging communities, or in more formal institutions like retirement living complexes. Technology designed with older adults in mind can help lift the burden of natural physical and cognitive changes so that older adulthood is a destination we can all look forward to. Aging is inevitable, however, the integration of well-designed technologies into the everyday lives of aging people will have a significant impact on their ability to manage their own health, safety, and comfort - alleviating common fears and allowing older adults to truly enjoy their golden years.

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Maryssa is a recent graduate of the Master of Management of Innovation program at the University of Toronto. Through the MMI program she was able to develop a strong business acumen to complement her experience in the health sciences. Her graduate education, paired with an honours Bachelor of Health Sciences degree and work in the Caregiving Research laboratory at Western University has allowed her to apply critical, innovative thinking to projects in the health and aging space. She completed an internship at SE Health working as a special projects consultant on their private care business team where she was able to work on critical initiatives for the organization during turbulent times in the healthcare industry. Maryssa is excited to begin a career that enables her to continue working with creative minds and impactful projects in the health and aging space.

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Fuels like gas
Burns without emissions
Fueling the Canadian Economy with H$_2$

By Samantha Dilorio
Edited by Laura Väyrynen

Illustrations: Ru Yap

With today's changing climate and the world population soaring, the demand for energy is increasing considerably. Meanwhile, forward-thinking countries are making efforts to divest from fossil fuels and use alternative energy systems such as wind and solar power. For example, in 2017 Norway committed to divest from oil and gas, showing their commitment to renewables and climate action. A renewable energy source that has not been discussed as widely in today's public discourse are hydrogen fuel cells, which will be the focus of this article.

Why Hydrogen?

Many may not be familiar with the benefits of using hydrogen as an alternative fuel source to fossil fuels. Hydrogen can be extracted through renewable energy or captured from industrial waste streams, and the main benefits using hydrogen as a fuel is improved air quality and reduced greenhouse gas (GHG) emissions as the only by-products of burning it are heat and water.Additionally, using hydrogen presents an economic opportunity for countries to produce their own clean electricity and helps them develop reliable energy systems.

Unlike traditional batteries, hydrogen fuel cells produce electricity without internal combustion engines and do not require recharge contingent on a constant source of fuel and oxygen. Fueling a hydrogen car is very similar to gasoline refueling stations, except fueling only takes a few minutes. Additionally, the main difference between traditional batteries and hydrogen cell batteries is that in a traditional battery the electricity producing reactants are regenerated in the re-charging process, whereas in a hydrogen fuel cell, the electricity producing reactants are constantly being supplied from the storage fuel tank (hydrogen) and air. Thus, hydrogen cell batteries truly capture a closed-loop system energy system, optimizing efficiency and energy.

**What is hydrogen and how is it used?**

Hydrogen is scientifically the most abundant element on Earth. However, solar, wind and hydro power differ from hydrogen in the sense that they directly power electrical grids. Hydrogen, in turn, must be generated through electrolysis or captured as a by-product from other processes. Currently, hydrogen is mostly captured as steam from the process of reforming methane gas, which is used in the petroleum industry. It should be noted that this process produces greenhouse gases). Hydrogen can also be produced through electrolysis where water is split into its chemical components. This process does not produce any greenhouse gas emissions contingent on using renewable energy sources to split the water molecules). Hydrogen can be transported as a compressed gas or liquid via pipelines, or by road in cylinders, tube trailers or cryogenic tankers.[1]

Advantages of Hydrogen Fuel Cells

1. Produces electricity without the use of internal combustion engines, generating no noise, vibration, air pollution or greenhouse gases
2. Fuel cells do not need to be recharged because fuel is stored in external tanks (similar to gasoline), and refueling is quick, although it can be limited due to lack of infrastructure.
3. Fuel cells can be installed on-site scaling energy storage from watts to megawatts, reducing the need for large power generation plants with extensive power lines. Stationary on-site fuel cells are highly efficient, often being used as primary or back-up power for large infrastructure sites (e.g. hospitals, data centers, telecommunication towers, emergency response systems and military applications).[1]

Revenue, R&D and Demonstration Expenditure, and Employment Since 2001
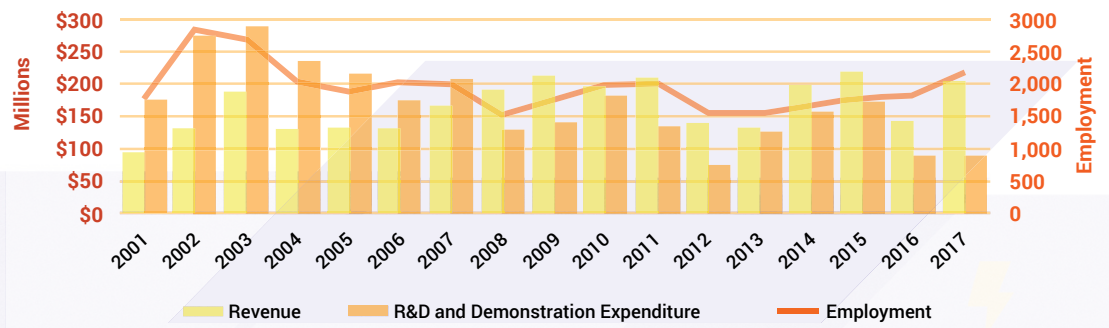
Source: Canadian Hydrogen and Fuel Cell Sector Profile (2018)

Canada as a Pioneer

Canada is considered a global leader in hydrogen and fuel cell technology and is known for its expertise in a broad range of applications including passenger vehicles, buses, trucks, ships, planes and back-up power generation. Over a half of Canada's hydrogen and fuel cell activities took place in British Columbia, followed by Ontario (18%), Quebec (9%) and Alberta (2%). Outside of Canada, activities in Germany (4%), the United States (3%) and China (3%) are as low, demonstrating that Canada is truly a leader in this space.[2] To date, Canada's focus has been primarily on research and fuel cell development manufacturing. Canada exports a staggering 90% of the technology that has been developed in the country.

Challenges

Although the future of hydrogen sounds promising, growing this field does not come without its challenges. Kumar & Sehgal (2018) have identified four main challenges: 1) fuel cell durability, 2) fuel cell efficiency, 3) fuel cell cost and performance, and 4) hydrogen storage.

Fuel Cell Durability: Recently, on road data has shown that the maximum durability of fuel cells is near 3,900 hours, with laboratory tests reaching 4,000 hours. However, to compete with gasoline ICEVs, over 5,000 hours is necessary.

Fuel Cell Efficiency: To date, fuel cell systems are at approximately 60% efficiency. However, increasing this efficiency would be beneficial to expand distance range with less fuel. The goal is to reach efficiency levels of 65%, nearing 70% long term.

Fuel Cell Cost and Performance: Hydrogen fuel cells are not yet economically competitive. With today's technology, hydrogen fuel cells are projected to cost $55 per kW with high volume production (500,000 per year). To compete with ICEVs, the cost will need to be $30 per kW or less.

Hydrogen Storage : To provide a driving range over 300 miles (483 km) with a full tank at $8 per kWh or less, on-board storage must not compromise performance, safety or interior space. Thus low cost, high performance composites, alternative, high strength materials, and systems that are capable of having non-cylindrical shapes are needed in order to maximize storage capacity.

Lastly, fuel cells for vehicles produces less than 1.16 volts of electricity, which is far from the amount of electricity needed to power a vehicle. To achieve sufficient voltage, multiple cells must be assembled into a stack. The power generation capacity will depend on the number and size of cells in addition to the surface area of the proton exchange membrane (PEM).

The Future of Hydrogen

Hydrogen fuel cells are certainly an up-and-coming alternative, clean energy technology. They can help countries meet their emission reduction goals (based on the 2015 Paris Accord) and become less dependent on fossil fuels, while being cost-competitive with internal combustion engine vehicles (ICEVs). By harnessing highly efficient mechanisms with renewable, low carbon hydrogen, fuel cell electric vehicles (FCEV) have the potential to lower greenhouse gas emissions per mile compared to ICEVs. Moreover, with millions of cars on the road every day, emission reductions in the transportation sector are crucial. Beyond passenger vehicles, FCEVs can also enter the medium to heavy-duty vehicle market. Many of these vehicles currently operate on fossil fuels, and switching to hydrogen fuel would be hugely beneficial (switching to pure battery electric or plug-in electric is not suitable for these vehicles due to size and distance). In addition to transportation, fuel cells can be used for energy storage and transmission, helping store energy at times when electricity production is greater than demand. Stationary fuel cells can provide clean, efficient and reliable off-grid power to homes, businesses, telecommunication networks and utilities to name a few. Companies such as Apple, AT&T, CBS, Coca-Cola, Google and Walmart have invested in fuel cells for primary or back-up power generation.[4]

Governments also play a role in providing support to further develop hydrogen fuel technology from research and development to deployment of fuel cell systems. Thus far, billions of dollars have been invested by various levels of government around the world over several decades. In Canada, revenues reached $207 million in 2017 and the industry employed more than 2,000 people.[3]

In conclusion, growing the market through increased manufacturing will help reduce costs across the industry help develop infrastructure, increase consumer acceptance, and address other challenges. Hydrogen fuel, while still emerging in Canada's market, has a hopeful future and has the potential to take over for gasoline and diesel as vehicle fuel sources. Canada is certainly a primary contributor to the hydrogen technology field and hopefully will be able to continue building on its momentum and become a global leader in the field.

About the Author

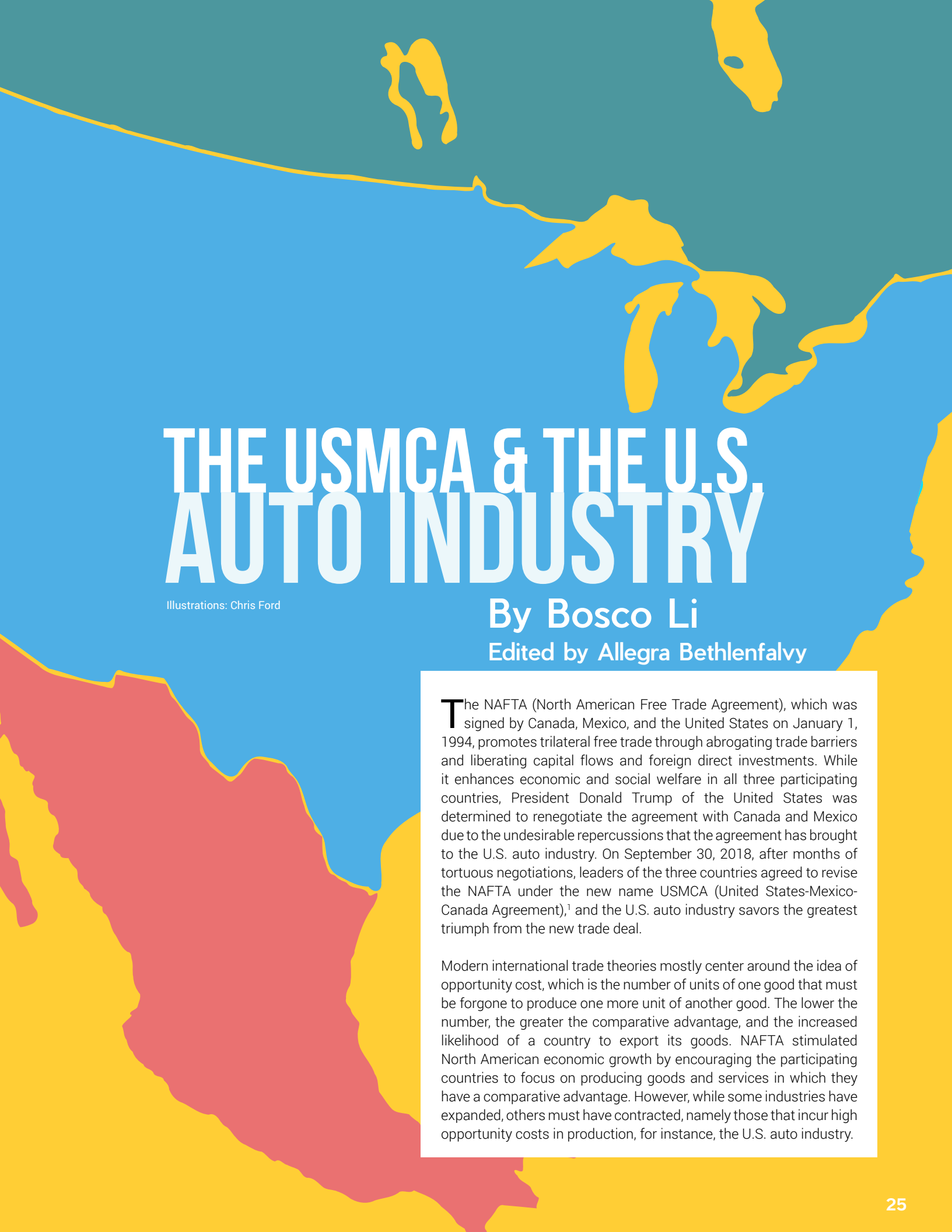**Contact:** samantha.diiorio@mail.utoronto.ca

Samantha is a recent graduate of the Master of Science in Sustainability Management (MScSM) program at the University of Toronto in Mississauga. She has a strong interest in building strong, resilient cities that foster innovation and technology. Currently, she is working for the City of Mississauga, educating the public about climate change and mobilizing the community to take action.

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THE USMCA & THE U.S. AUTO INDUSTRY

Illustrations: Chris Ford

By Bosco Li

Edited by Allegra Bethlenfalvy

The NAFTA (North American Free Trade Agreement), which was signed by Canada, Mexico, and the United States on January 1, 1994, promotes trilateral free trade through abrogating trade barriers and liberating capital flows and foreign direct investments. While it enhances economic and social welfare in all three participating countries, President Donald Trump of the United States was determined to renegotiate the agreement with Canada and Mexico due to the undesirable repercussions that the agreement has brought to the U.S. auto industry. On September 30, 2018, after months of tortuous negotiations, leaders of the three countries agreed to revise the NAFTA under the new name USMCA (United States-Mexico-Canada Agreement),[1] and the U.S. auto industry savors the greatest triumph from the new trade deal.

Modern international trade theories mostly center around the idea of opportunity cost, which is the number of units of one good that must be forgone to produce one more unit of another good. The lower the number, the greater the comparative advantage, and the increased likelihood of a country to export its goods. NAFTA stimulated North American economic growth by encouraging the participating countries to focus on producing goods and services in which they have a comparative advantage. However, while some industries have expanded, others must have contracted, namely those that incur high opportunity costs in production, for instance, the U.S. auto industry.

The Economics of International Trade

There are predominantly two theories of international trade economics that address the stagnation of the U.S. auto industry as a result of free trade. Primarily, the Heckscher-Ohlin Theory builds upon the idea of factor abundance as a source of comparative advantage for a country in those goods that utilize the abundant factor intensively in their production processes. As low-skilled labor is relatively abundant in Mexico compared to in the U.S., Mexico has a comparative advantage in producing goods that require low-skilled labour relatively more than other factors of production. Hence, Mexico has a comparative advantage in the car manufacturing industry. As factor abundance transformed to lower factor prices, U.S. automakers started to optimize their production by shifting their assembly operations to Mexico, giving rise to the Mexican Maquiladora sectors where new jobs were created. This practice is known as offshoring, which improves the competitiveness of U.S. automakers at the expense of U.S. autoworkers whose jobs are lost to their Mexican counterparts. According to the Stopler-Samuelson Theory, free trade raises the real return to the factor of production used intensively in the after-trade growing industry but lowers the real return to the factor used intensively in the after-trade declining industry. As the U.S. auto manufacturing industry declines under free trade, labour wages will be negatively impacted, exacerbating income disparity in the U.S. Overall, consistent with the prediction of economic theories, NAFTA has created prolonged problems in the U.S. auto industry.

US-Mexico-Canada Agreement

In contrast with NAFTA, the new USMCA is purposely drafted to tackle these problems by imposing restrictions on trade, essentially making the free trade of cars 'less free'. Effective on January 1, 2020, an automobile must have at least 75% of its components manufactured in Canada, Mexico or the United States to qualify for zero tariffs, representing a substantial increase from the current 62.5% requirement.[1] This more stringent requirement is detrimental to the U.S.'s suppliers of auto parts in developing countries, factitiously raising the comparative advantage of U.S. automakers by decreasing the comparative advantage of those in other countries. A second new restriction intentionally targeting Mexico (who is theoretically immune from the first restriction due to its 'ally' status) is that a significant portion of the manufacturing work required to produce an automobile must be performed by workers earning at least $16 an hour.[3]

This is about three times of what a typical Mexican autoworker makes.[3] This restriction reinforces the artificial strengthening of the U.S.'s comparative advantage in automobile manufacturing by raising the opportunity cost of offshoring in-house auto

Prime Minister Trudeau, alongiside US President Trump and Mexican President Enrique Peña Nieto signs the U.S.-Mexico-Canada (USMCA) trade agreement during a ceremony in Buenos Aires on November 30, 2018.
Source: U.S. State Department Flickr, photo by Ron Przysucha https://www.flickr.com/photos/statephotos/32244728588

production to Mexico. As a result, offshore assembly operations will repatriate back to the home country, creating employment opportunities for citizens in America. Additionally, this new trade agreement stipulates that Mexico must make it easier for workers to form labour unions.[2] Equipped with the power of collective bargaining, an autoworker union can, on top of the $16 hourly wage requirement, demand higher wages from automakers in Mexico, which will face significant challenges in cost controls to survive. In short, although the new USMCA represents a victory for the U.S. auto industry, it introduces strict requirements that potentially violate the Heckscher-Ohlin Theory of international trade, allowing the U.S. to direct its economic resources to produce goods in which it does not have a natural comparative advantage.

Essentially, from the perspective of the U.S. economy, the revision of the NAFTA epitomizes a classic story of trade barriers giving rise to economic inefficiencies. As one person's earning must be another's expenditure, the higher income for the U.S. auto labour force will eventually pave the way for higher production costs and consequently higher automobile prices. If this is the case, the ultimate effect of the NAFTA revision on the U.S. economy will be ambiguous. As the new trade agreement is stipulated to be reviewed after six years, given all the above considerations, it will be unwise to conclude too early that the successful renegotiation of NAFTA represents triumph for the U.S. auto industry.

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THE STREAMING SERVICES ERA, OR JUST ANOTHER CABLE?

BY HOWARD HSU
EDITED BY MAY LIM

"Cord cutting" is becoming the trend as audiences are fed up with cable televisions and turn to alternative service providers like Netflix, Amazon and Hulu.[1] These companies seek to stand out from the packed market by promoting their original content, but the strategy ends up making consumers buy a bundle of streaming providers for the few shows they really need. It is likely that streaming televisions are bringing us back to cable.

Illustrations: Amy Haddlesey

▶ The Streaming War Begins

According to the survey from CNBC, fifty-seven percent of Americans are streaming, and the number is still rising, because more audience is moving away from the lackluster content offered by cable televisions; plus, Generation Z, people who were born past mid-1990s, prefer to watch everything through the Internet.[2] Today, Netflix, who is spearheading the delivery or creation of streaming content, remains in first place in the market, reaching more than 56 million subscribers in the U.S., followed by Amazon, who has around 26 million. The third place is Hulu, having 17 million subscribers.[3]

It is hard to tell how long will Netflix dominate the market. In 2019, Disney and WarnerMedia are launching their own streaming services, Disney+ and WarnerMedia, which will bring new challenges to the old giant. According to news reports, Disney+ plans to not only feature its own content, including Marvel, Pixar, National Geographic and Star Wars, but also launch ESPN+ to extend its coverage to sports. As for WarnerMedia, the company could get a boost from its blockbuster movies, from Harry Potter to Lord of The Rings, and other popular content like the HBO series and the Cartoon Network.[4,5]

In addition to Disney and WarnerMedia, there are also YouTube premium, CBS All Access, Facebook Watch, Apple, and dozens of providers which focus on different fields such as animations, sports, or foreign language films. The streaming market will only get more saturated.

🔊 Original Matters

For all the streaming providers who offer similar content, lowering the subscription price is most likely the fastest way to expand market share. However, in the long run, price cut will damage providers' revenue, and even trigger a price war in the industry. Hence, they have to stand out in other aspects of their service.

Eight years ago, Netflix began its "Original missions", utilizing big data to predict audience's interest and preference. Then in 2013, "House of Cards" came out, making a record in the television series history. Following the success, Netflix put more money on its Originals. According to *Business Insider*, the streaming giant has spent eight million dollars on its own content in 2018, and the budget only goes higher in 2019.[6]

Developing its Originals could be Netflix's best strategy to stay competitive in the streaming market, because once other providers establish their own service platform, they may stop licensing their content to Netflix that it now relies on. Meanwhile, Netflix could lower the expenses from buying the licenses of shows that are available in other providers.

Exstreaming, the media focusing on streaming industry, revealed that Netflix's number of films and TV shows has been cut in half since 2012 — going from about 11,000 series to 5,302.[7] It shows that Netflix intends to spend more of its budget on its exquisite Originals instead of buying as much content as it can.[8]

Like Netflix's Originals, Amazon set up "Amazon Studio" to produce its own content in 2010. Its perseverance paid off in 2017 when its movies won three Oscars. "Manchester by the Sea" won best actor as well as best original screenplay, and "The Salesman" won best foreign language film. The host of ceremony Jimmy Kimmel joked, "You can expect your Oscar to arrive in two to five business days, possibly stolen by a GrubHub delivery man."[9]

◀◀ Back to Cable Days

Self-produced content looks like a promising trend. For providers, they are finally not hurting each other by slashing their own prices, but establishing a strong audience base who is faithful

to their content. For consumers, they can enjoy more outstanding shows and choose to subscribe to their preferred providers. However, there has been growing criticism that streaming is kind of like cable because the whole market today is too segmented.

Today, increasingly more users express frustration that they have to pay a full monthly fee for only two to three shows or originals what they really want to watch, and in order to get different shows and movies, they have to subscribe to multiple providers, because much content is monopolized by specific providers. In short, they feel that streaming is taking the audience back to cables, reminiscent of how consumers paid a lot of money every month for a bundle of redundant channels.[10]

Not surprisingly, as a response, streaming bundles have emerged: for example, Sling TV, the first U.S. based streaming TV service delivering a package of live streaming channels including CNN, ESPN and TNT. "Great re-bundling," says Will Kreth, the executive director of the Entertainment Identifier Registry, "The temptation to bundle is just too great." [11,12]

A streaming bundle may not be as cheap as many think. According to NBC's research, costs of the Internet and a bundle, which now includes Netflix, Amazon, Hulu and HBO, is just about ten dollars less than costs of average Internet service and cable. Meanwhile, it is highly possible that streaming services could raise their monthly price in order to invest in their original content. Some say the streaming costs make them switch back to cable, because at least they don't need to switch among five apps.[13]

Streaming is still a volatile and fastly changing market. Just years ago, audiences cheered for streaming, which crippled the empire cable services had built. But with more providers wanting to control content, the industry's landscape is changing yet again. Could streaming just be becoming "cable on the Internet?"

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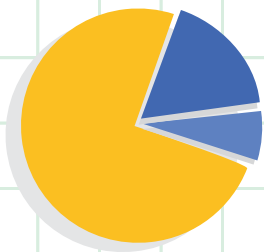
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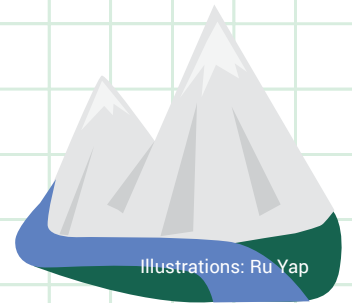
RISHABH NANDA
EDITED BY AMANDA VRBENSKY

Illustrations: Ru Yap

In the late 1990s, as soaring Internet stocks pulled Nasdaq to new heights, people asked if the economy had fundamentally changed. Maybe old principles of stock valuation no longer apply. "The New Economy is a banner under which we recognize certain new kinds of asset classes," argued John Kao, a Harvard Business School professor, in 1996.[1] "We recognize the value of ideas; we recognize the value of transforming those ideas in value. We recognize the value of agility." A 2009 *Wall Street Journal* article even suggested that investors should rethink the "quaint idea" of profits when valuing a company[2]. If financial markets value different things at different times, is sustainability valued appropriately today? Some believe that sustainable companies are undervalued. In this article, we look at data analytic approaches that seeks to correct such market inefficiencies and direct capital to sustainable companies.

A *PARADIGM SHIFT* IN VALUING SUSTAINABILITY

How financial markets assess sustainability has shifted quite a bit over time. Ioannis Ioannou (London Business School) and George Serafeim (Harvard Business School) studied how financial analysts' views of Corporate Social Responsibility (CSR) initiatives evolved between 1993 and 2007. In the early 1990s, analysts viewed CSR initiatives by companies as a distraction from the focus on profit and therefore, lowered the companies' valuations.[3] Analysts' interpretation of CSR reflected the dominant view of the firm as a set of contracts between different parties: shareholders, employees, suppliers and customers. The managers' role, from this perspective, was to maximize monetary return on investment for shareholders. In only 15 years, analysts began to see firms as interdependent with a broad range of stakeholders.[4] Such stakeholders are those with whom firms have contracts, but also local communities, government and the environment. In this view, the quality of stakeholder relationships creates financial risks and opportunities, as well as social and environmental value. Ioannou and Serafeim found that, over time, analysts came to interpret CSR efforts as a way of managing stakeholder relationships, and increased their valuation to reflect this new perspective.

ANALYTICS CAN UNCOVER ADDITIONAL MARKET INEFFICIENCIES

If market valuation of sustainability has come this far, it can change even more. This is, at least, the assumption behind some innovative data analytic solutions that seek to identify sustainable companies that are still undervalued today. Commonly, institutional investors integrate Environmental, Social and Governance (ESG) considerations into their strategies by eliminating from portfolios companies involved in questionable ESG practices.[5] Investors see this as a way to reduce financial risk. However, as asset managers increasingly recognize ESG's role in financial success, they seek ways to automate the integration of ESG data into their decision-making processes and make it more sophisticated.

But making sense of ESG information is still a bit challenging. Such information is abundant, it comes in many formats, and it presents metrics that are produced following different conventions. Three case studies show innovative approaches to analyzing ESG data and informing financial decisions. Such new solutions go beyond negative screening of risky firms, and direct investment to companies that stand out as sustainability leaders.
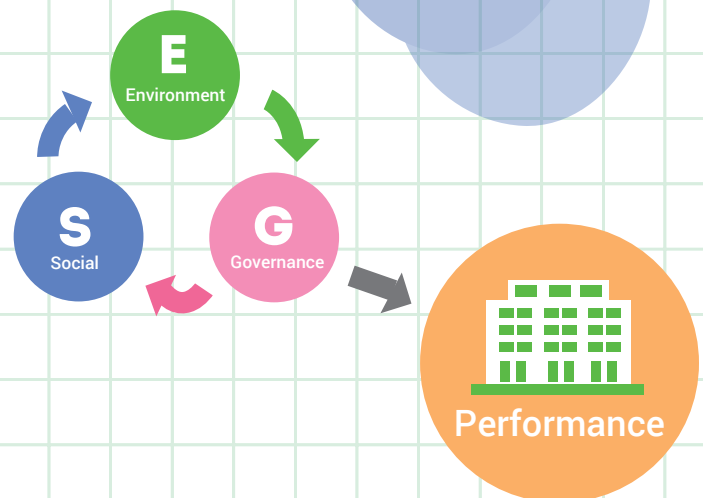
CASE 1: EXTRACTING INVESTMENT TIPS FROM TRADITIONAL ESG DATA

Sustainalytics has been rating ESG corporate performance for over 27 years. In 2016, the company launched ESG Signals, a tool that derives investment advice by linking ESG ratings and firm financial information.[6] To build its ESG ratings, Sustainalytics takes an "old school" approach, using extensive research by a team of analysts and engagement with the rated companies. But to translate these ratings into predictions of financial performance, Sustainalytics turned to machine learning and teamed up with Advestis, a company that specializes in this field. Machine learning is an approach that lets computers improve the way they perform tasks based on experience. This approach excels in many data analytic tasks that are too big for human analysts, or too complex for computer programs that use fixed rules. ESG Signals employs machine learning to identify which ESG variables are correlated with positive or negative returns, and uses these correlations to direct investment decisions.[6]

ESG Signals complements Sustainalytics' ESG indicators with financial data on 1,600 companies, totalling over 500 variables for each company.[6] ESG indicators can relate, for example, to animal testing policy, environmental supply chain incidents and the independence of the board of directors. The system identifies the most important indicators, monitors them, and produces risk and opportunity signals for investors.

THREE CASE STUDIES

CASE 2: AUTOMATING ESG RATING BY MEASURING SENTIMENTS

Like Sustainalytics, TruValue Labs develops corporate ESG ratings and links them with financial performance.[7] But where Sustainalytics uses human analysts to develop ratings, TruValue draws on big data analytics. The company's Insight360 platform rates companies' ESG performance by analyzing text about the company from multiple Internet sources, such as news and social media. This automated approach allows ratings to be updated daily instead of annually. Insight360's automated approach uses sentiment analysis, a technology that identifies an author's attitude to the topic he or she is writing about. When the system flags a reference to an ESG issue in relation to a company, it also assesses how positive or negative the discussion is.

Ratings reflect the overall attitude toward the company across a wide range of analyzed sources. The resulting score can be called "an objective sentiment," suggests Jim Hawley, TruValue's Head of Applied Research and professor emeritus at Saint Mary's College of California.[7] TruValue Labs claims that the ESG intelligence uncovered by its platform can yield substantial financial gains.[7] In a back-test on historical data from 2013-2017, TruValue found that a portfolio guided by Insight360 beat a benchmark of S&P 500 stocks by 5% per year.[8] A measure of how much ESG performance trended up or down over the last 12 months was especially predictive of future financial performance. Hawley says that these insights fit with academic findings. "Momentum has been found in the ESG literature to actually be a very good indicator for increasing long-term value. But the data that has been used to track momentum has been typically annual data, so what you get is momentum in the rear-view mirror." By scanning tens of thousands of data sources daily, TruValue Labs "can track that much closer to real time, in a much more granular way, because we have much more data."

CASE 3: CRUNCHING ORGANIZATIONAL CULTURE

Company culture has traditionally has been hard for investors to systematically assess. Culture Capital takes a data-driven approach to identifying and investing in companies with strong culture and investing in them The company uses ESG data to assess culture. It relies on Datamaran, a platform that analyzes ESG sources such as corporate reports and online news.[9] Datamaran screens these sources for references to relevant cultural elements such as transparency, employee retention, and community engagement. "Those things that sustainable investors care about," says Geoffrey Burger, Culture Capital's CEO, "are very closely related to the culture of an organization."[10] Such characteristics mean financial success. "If a company has a very diverse set of opinions and diverse workforce, and it's engaging its customers in real open dialogue, then the types of products they manage, the types of solutions that they're coming up with, will be more creative and embracing more of the sustainable trends that we see in the marketplace."[10]

Burger believes that Culture Capital's investment approach takes advantage of Wall Street's blind spot, "with investors that focus so much on the short term, and all these quarterly statements, that they lose track of the long term." Instead, Culture Capital tries to capture companies' investment in a culture that can help them thrive over the long term. Sources may be unreliable, especially when companies self-report. Burger says greenwashing and false reporting were common practices only a few years ago. However, he believes sustainability's increased spotlight and the new automatic monitoring capabilities have made such tactics much riskier. "You can say that you're doing all these things, but there are a lot of external organizations that track them. And the reputational risk is very high."[9]
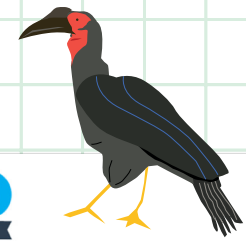
DOES IMPROVED VALUATION ADVANCE SUSTAINABILITY?

ESG Signals, Insight360, and Culture Capital are designed to help investors profit from untapped insights from ESG data. But do they also support sustainability? Sustainability benefits may develop if such solutions channel capital to sustainable companies and increase their access to financial resources. By establishing sustainability as a source of competitive advantage, these solutions create market incentives for it, and further integrate ESG into investment strategies. On the other hand, these solutions do not value sustainability for its own sake, but for the financial gains it produces. Therefore, the incentives these solutions create would hold only as long as sustainability and profit are aligned. The evolution in financial markets' assessment of sustainability, it seems, is far from over.

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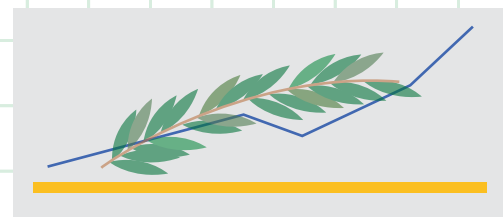
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LOW-WASTE GROCERY SHOPPING IN ONTARIO: CHALLENGES AND OPPORTUNITIES FOR RETAILERS

EDITED BY LAURA VÄYRYNEN

WRITTEN BY DANIELLE REID

Illustrations: Su Min Suh

The Low-Waste Shopping Trend:

Recycling has long been thought of as a feel good activity. Dropping a bottle into the blue bin gave you sense that you were doing something good for the planet. However, the satisfaction that many get from recycling has been deteriorating as consumers are becoming increasingly aware of the impacts of plastic pollution, and the fact that many items that we drop into the blue bin don't end up being recycled. This has resulted in a willingness amongst consumers to reduce the environmental footprint associated with their food consumption. 61% of Canadians say that the packaging of a food or beverage product (i.e. whether it is compostable, recyclable, etc.) has influence on their decision to consume it.[1] Information about the environmental impacts of plastic pollution has become more accessible as a result on pressure from non-governmental organizations (NGOs), and social media campaigns. Greenpeace's "A Million Acts of Blue" campaign, which advocates for plastic-free supermarkets as one of its main objectives is an example of this.[2] This article will examine how retailers are responding to consumer demand for package-free shopping, challenges they face in implementing it, and how sustainable packaging is being sought as an alternative.

Response from the Market:

The new demand for waste-free shopping presents grocery retailers with an opportunity to increase market share, develop a reputation as an environmentally responsible and conscious business, and reduce risks related to waste management. However, this is only possible if companies are willing to innovate their processes, supply chains, and retail spaces. At the moment, Bulk Barn has the largest consumer-oriented reusable container program in Ontario, with its 82 stores across the province. The program was implemented in February 2017 after significant consumer demand. There has also been an increase in smaller zero and low-waste grocery stores across the province, such as Organic Garage (GTA), Nu Grocery (Ottawa), and Bare Market (Toronto). Additionally, the growth of farmers markets across the province has also facilitated growth of package-free shopping.[3] These types of retail experiences can induce more resource-efficient behaviour amongst suppliers and behaviours, improving the social and environmental impacts of food supply chains. However, for the most part grocery retailers in Ontario have not showed much willingness to embrace zero-waste, as evidenced by the absence of these programs amongst top retailers such as Loblaws and Sobeys.
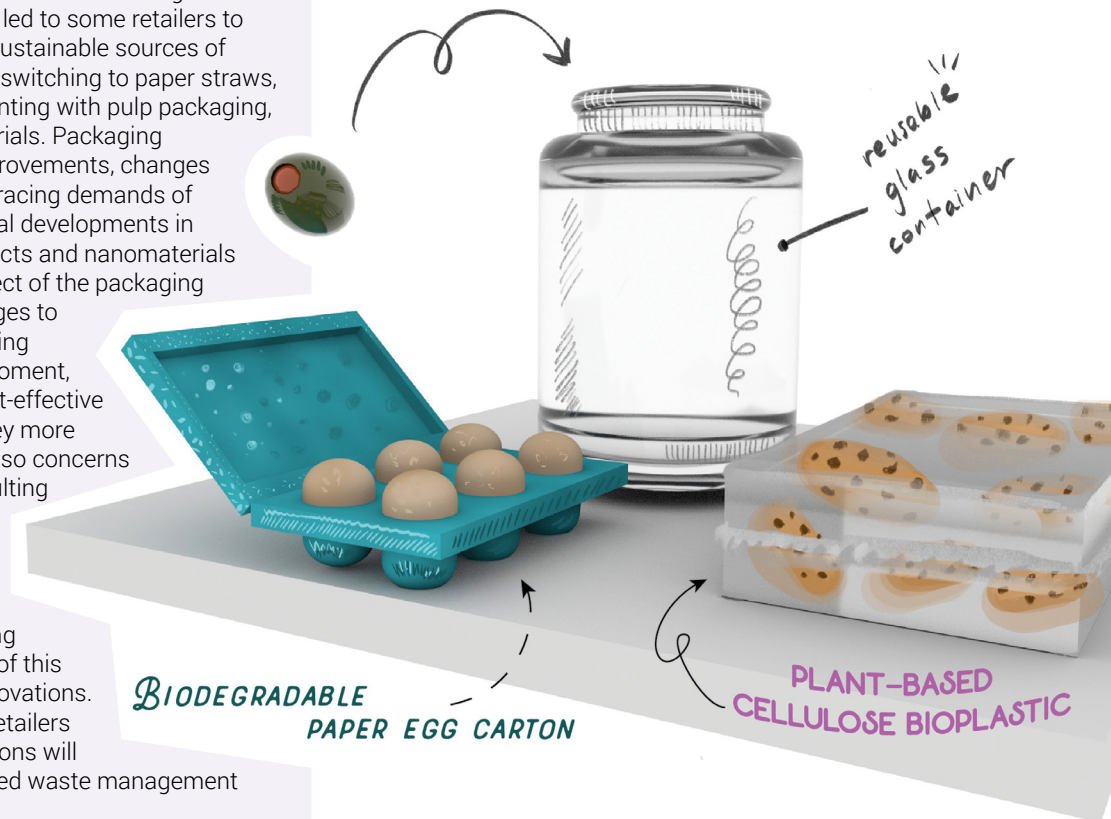
Challenges for Retailers:

One of the biggest challenges related to more sustainable packaging options is related to food safety. A 2014 study from the University of Guelph found that visible organic residue, bacteria, mould and yeast was found in reusable plastic containers which are used to package fruits and vegetable for shipping to retailers.[5,6] These concerns are equally relevant to reusable packaging consumers bring. Containers which are not properly sanitized present a risk, particularly if customers are putting food items into their containers and then returning them to store containers if they change their minds. Additionally, lack of food packaging in supply chains also creates issues of traceability, which poses safety risks if a food recall were to take place.[4]

An additional challenge that some retailers face in implementing reusable container programs is figuring out how to ensure customers aren't being overcharged for products. Many produce, meat and seafood products are sold in stores by weight. This means that if you were to try to buy tomatoes being sold by weight, you would be charged a higher price when the cashier cashes you out due to the weight of your container. Retailers with reusable container programs have mitigated these issues by having customers bring their containers to cashiers to be weighed before shopping and have minimum standards containers must abide by in order to be used (i.e. cleanliness, type of container, etc.).[7]

The issue of food safety, as well as the other challenges of implementing these programs have led to some retailers to instead look at ways to have more sustainable sources of packaging. Some examples include switching to paper straws, eliminating black plastics, experimenting with pulp packaging, and increased use of recycled materials. Packaging redesign requires technological improvements, changes in management practices, and embracing demands of external stakeholders.[8] Technological developments in biodegradable materials, plant extracts and nanomaterials have facilitated growth in this subsect of the packaging market.[9] However, there are challenges to fully integrating sustainable packaging into the whole value chain. At the moment, sustainable packaging is not as cost-effective as its alternatives.[10] Not only are they more expensive to source, but there are also concerns over reduced shelf life, possibly resulting in a tradeoff between plastic waste and food waste. Many of the reputational benefits associated with sustainable packaging are only experienced by consumer-facing industries, making vendors outside of this less willing to pursue packaging innovations. Finally, a persistent challenge that retailers face when making packaging decisions will be navigating Ontario's uncoordinated waste management landscape.

Final Thoughts:

The issue of plastic pollution, particularly in oceans, is representative of a classic economic conflict, the tragedy of the commons: it is a shared resource that whose health we depend on but abuse with pollution. A waste audit from the global plastics movement "Break Free From Plastic" found that food companies representing restaurants, consumer goods, and retailers were amongst the most significant plastic polluters.[11] Given the significant negative impacts that North American food systems have on oceans related to packaging, serious changes need to be made to how the industry manages its waste. These issues are systemic and will require changes be made by stakeholders throughout the value chain if there is to be any real success in managing the plastics problem. Through their operations, grocery retailers serve as a key point of connection between stakeholders on both ends of food supply chains, putting them in a unique position to drive sustainability in the system. From a packaging standpoint, this can be done by creating spaces that accommodate consumer demand for low-waste shopping and working with vendors to find innovative solutions.

reusable glass container

BIODEGRADABLE PAPER EGG CARTON

PLANT-BASED CELLULOSE BIOPLASTIC

While the challenges retailers face in implementing reusable container programs and other low-waste initiatives are persistent, the fact that more retailers are developing these programs tells us that there is a willingness to surmount these barriers. How retailers respond to this trend over the next few years will be interesting to observe, since developments in public policy, consumer demands, and public discourse all indicate that packaging will only increase in importance in the coming years.

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Danielle is a MScSM graduate whose love of food and hate of waste have led her to a career devoted to tackling the sustainability challenges in the food industry, particularly on the retail side. In her spare time, Danielle enjoys grilling, writing, and keeping up with her favourite housewives.

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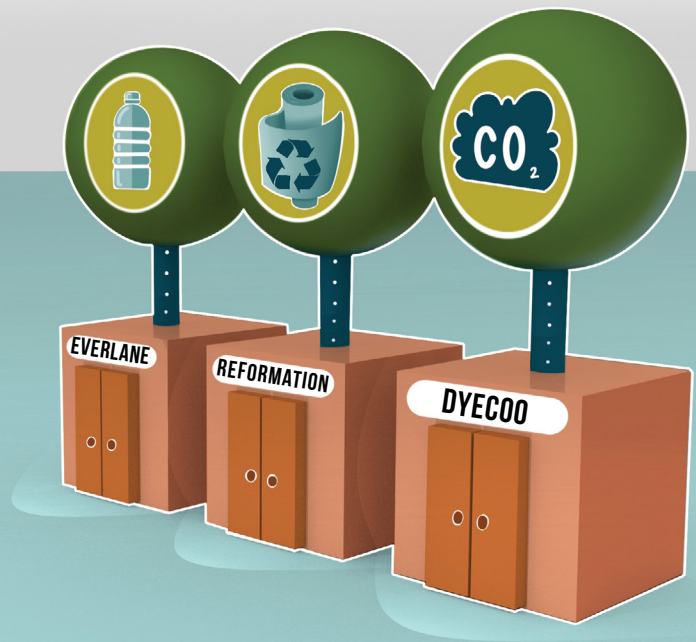
SUSTAINABLE FASHION: A NEW OUTLOOK FOR THE INDUSTRY

BY ALLEGRA BETHLENFALVY AND HOLLY NEVISON

EDITED BY AMANDA VRBENSKY

Illustrations: Su Min Suh

Introduction

The fashion industry is a constantly growing business worldwide. Consumers purchase clothes to follow current trends and to buy an essential product that they need. People value clothes that follow their style and are affordable for their price range. What most consumers do not consider is what the clothes are made out of. The textile industry focuses mainly on the design, production, and distribution of clothing. It uses various threads, including natural and synthetic fibers, to manufacture and design products for consumers. Naturally occurring fibres are gathered from animals and plants including cotton, wool, and silk. These materials biodegrade easily. With the growing demand for clothing products, manufacturers are opt for synthetic fibers for their designs. Synthetic fibers are human-made fabrics that are developed using chemicals to create durable and long-lasting products. The common synthetic fibers that are alternative to natural fibers and are present in many clothing products include polyester, rayon, and nylon. While they are less expensive and easy to maintain, there are significant environmental costs associated with these products.

WHY IS THIS A PROBLEM?

The environmental costs associated with synthetic fibers occur during their production and use. Producing synthetic fibers requires significant fossil fuel and water extraction as these fibers are manufactured directly from polymers derived from oil. Textile production releases approximately 1.2 billion tons of CO_2 and uses approximately 93 billion cubic meters of water annually.[1] Following their production, fibers are dyed. This again requires extensive water use, and chemicals used for dyeing are often discharged from the production facility into surrounding environments.[1] Discharged water from synthetic fiber production often contains sulfur, acetic acid, and heavy metals such as arsenic, lead and mercury which can reduce soil productivity and effect water quality.[2] When clothes are being used and washed, they release microfibers into the water. This contributes to microplastics entering the ocean, as two-thirds of microfibers in the oceans are from erosion of textiles in water and during washes.[3] It is estimated that approximately half a million tons of plastic microfibers end up in the ocean annually from washing clothes made from polyester, nylon, or acrylic.[1,2] Clothes are also not being worn for as long as they used to, which results in approximately 73% of clothing ending up in landfills.[1] If current trends of over-consumption and fast fashion continue, the environmental impacts could be devastating.

WHAT ARE COMPANIES DOING ABOUT IT?

Everlane

While many well-known clothing brands lack initiatives for sustainable fashion, there are new companies that are starting the trend for the industry. One small company that has been flourishing is **Everlane**. It is a clothing retailer that is headquartered in San Francisco. Their products are manufactured in ethical factories across the globe, and they have collections that aim to reduce their environmental footprint. For example, Everlane created a new label called *ReNew*, which produces outerwear that is made out of discarded plastic bottles.[4] They have been able to make something useful out of the bottles that would have otherwise ended up in oceans and impacted the marine species that consume the microplastics from the decomposed bottles. Additionally, the company has committed to have no new plastic enter their supply chain by 2021. With regards to their textile use, they are working to replace all synthetic fabrics with repurposed materials. Some of their products do contain synthetic fibers, but they are working to avoid them and have already achieved considerable results so far. Their efforts have helped reduce the need for natural and synthetic fibers while also reducing their own environmental impact within the business. While the company can still work towards becoming more sustainable, they have shown people that wearing clothes made from recycled materials can still be trendy and affordable.

Reformation

Reformation is another upcoming fashion company based in San Francisco dedicated to making the industry more sustainable. Reformation uses renewable or recycled fibers and will never use synthetic fibers such as acrylic, nylon, polyester or spandex. Reformation internally rates environmental impacts of fibers and has a goal for 75% of all products be made from fibers with an A or B rating by the end of 2019.[5] These fibers include recycled cotton or Tencel Lyocell.[6] They also publish the amount of carbon, water and waste savings associated with each product.

To manage harmful chemicals from dyeing, they have set an internal goal that 75% of all fabric will have clean chemical certifications such as Bluesign, which ensures safe use of chemical and require monitoring of water emissions.[7] In 2018 they only reached 26% fabric with clean certifications, however they are working with suppliers to build their capacity to document all chemicals used, and test all clothing against a Restricted Substances List.[7]

Reformation is also tackling the amount of clothing ending up in landfills by launching RefRecycling. This program allows customers to ship clothes they are no longer using and ensures they are reused and recycled.[8] If clothing is of high enough quality, customers will receive in-store credit for future purchases.[9] In 2018 Reformation recycled 92,852 garments, which is a good start to improving the circularity of the textile industry.[10]

While Reformation still has many ways to become sustainable, like Everlane, it shows it is possible to have fashionable clothes that do not have a negative impact on the environment, and to educate the consumer about the impacts of their clothing.

DyeCoo

On the manufacturing side, **DyeCoo** is a company that has developed a dyeing machine that eliminates the need for water and processing chemicals for the dyeing process.[11]

Instead of water, recaptured CO_2 is used as the dyeing medium. In the machine CO_2 becomes pressurized and has a high solvent power, meaning the dye can easily dissolve onto the garment. No additional process chemicals are needed, and because no water is used, there is no waste water produced. The CO_2 is then re-used for the next dyeing process. DyeCoo works with Nike, Ikea and Adidas.[11] DyeCoo has the capacity for this technology to be used at an industrial scale, and therefore if it is widely adopted it could have a huge impact by eliminating both water use and pollution for dyeing.

Conclusion

There are many opportunities for companies to start the trend and use more sustainable textiles. While some companies have already started to make some improvements, action is still required from large clothing companies to reduce their environmental impact. It is equally important for consumers to be aware of the materials in their clothing products in order to make more sustainable decisions in the future.

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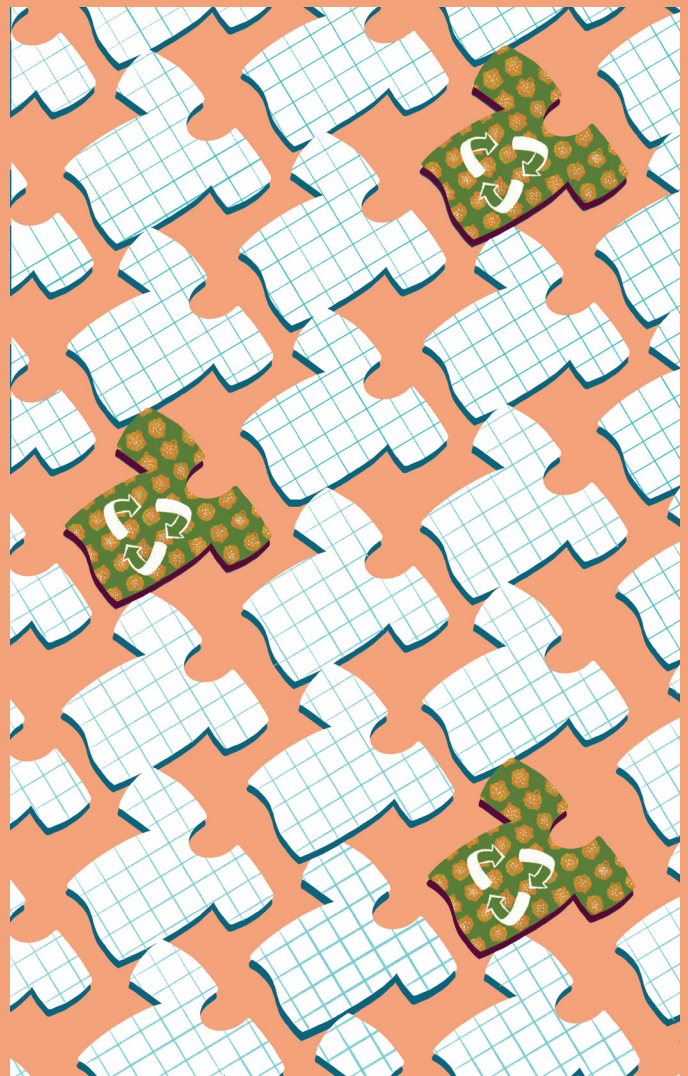
The Oceans are Drowning – in Plastic
by Paulina Szlachta

Edited by Samantha Dilorio
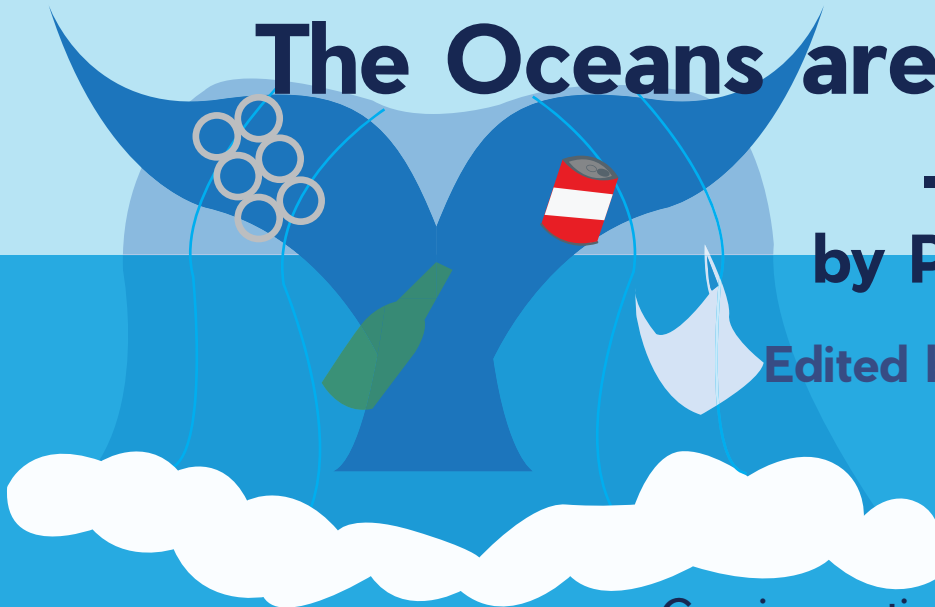
Illustrations: Amy Haddlesey

Can innovation save our oceans?

Introduction

Plastic is everywhere. We use plastic every single day and our dependence on it is rapidly increasing. From food, to healthcare, transportation to entertainment, plastic is a material deeply embedded into everything we do. As our lives become busier and faster-paced, so is the rise of plastic use. But what happens to those bags when we unload our groceries, or to those single use containers when we throw out the remainder of that fast food? Many plastics are either not recyclable, or recycled if they can be. Many plastic products are not properly diverted and end up in landfills or in vulnerable ecosystems. Ecosystems critical to our planet's well being (and therefore our own well being) are overwhelmed by a constant influx of plastic waste every day. Our global waterways, specifically our oceans, lakes, and rivers are being irreversibly damaged by plastic waste - and the amount of plastic found in these ecosystems is growing at an alarming rate. It is estimated every minute a garbage truck's worth of plastic is dumped in the ocean. Varied in size and composition, this waste can range from large obstructing pieces down to microplastics, which are easily ingested by marine life -- inevitably entering our food chain. Further, as plastic waste is made up of various synthetic materials, many remain intact for years or decades and their gradual decomposition leeches toxic chemicals into our waterways further endangering the quality of ocean life.

Changing Global Approach to Plastic

In early 2018, China (the world's largest importer of plastic waste) stopped accepting plastic waste, throwing a wrench into global waste management processes. In January of this year, Malaysia also announced plans to stop imports of waste. While this has lead to recycling facilities being overwhelmed with materials, it could also spur innovative policies. For example, San Francisco became the first city to ban the sale of plastic water bottles in March of this year.[1] These shifts signify a changing global attitude towards plastic waste and emphasize the need for new practices in the industry. However this could also increases the threat to our oceans. With high plastic use and a now limited ability to export plastic waste, the likelihood of increased ocean contamination through poor waste management processes grows -- as does the threat to our oceans' ecological health.

Mitigation and Innovative Solutions

Some of the most visually disturbing damage caused by plastic waste can be seen in vast groupings in our ecosystems. Once pristine beaches now covered in waste, clogged river mouths teeming with waste, or marine life ingesting and dying from plastic waste are proof that global consumption of plastic is out of control. One such example is the Great Pacific Garbage Patch (one of at least five such collections of ocean waste in the world). This patch is a gyre (a circulating ocean current) which is the world's largest grouping of floating trash.[2] The circulation in garbage gyres (such as in the Great Pacific Garbage Patch) means that waste is trapped in a circulating current which prevents it from dispersing.[3] Discovered in 1997, today the Patch is a collection of plastics, fishing gear, and garbage -- and has grown to more than 600,000 square miles.[4]

However, the global response to ocean plastic waste is growing, and with it new technologies and methods for reducing and removing the flow of plastic in the oceans. This mass of plastic waste represents our devastating addiction to plastic and the enormous effect it can have on our natural ecosystems. However it also represents an opportunity for mitigation and recovery. Several non-governmental organizations (NGOs) have emerged in response to the plastic crisis and the global response has been significant. The Ocean Cleanup Project initiative began in 2013 and through crowdfunding and scale model testing

methods for clean up has developed technologies to remove plastic from 'the Patch'.[5] The organization intends to achieve a plastic free ocean by 2050 through a combination of its garbage removal technology. This technology includes a floating barrier system, which creates a synthetic 'coastline' to trap and gather waste by using the natural ocean current and efforts thoroughly focus on point source reduction of plastic waste. This reduction is critical to reducing the amount of plastic in the ocean, and many critical initiatives such as Ocean Cleanup say that without drastic change in our consumption, we will not improve the state of our oceans and waterways.

SOURCE theoceancleanup.com
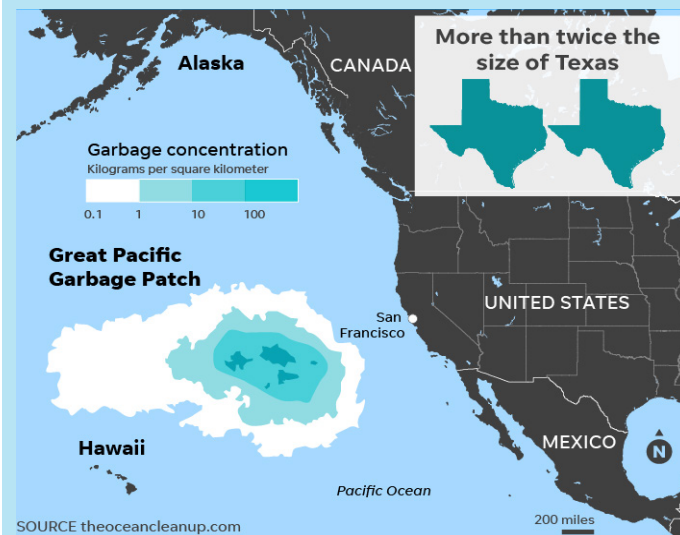
Future of Plastic

Despite clean up initiatives, we must tackle the root problem of plastic. We simply produce too much plastic for the world to handle, and initiatives that tackle the production of plastic itself (or find solutions for replacement materials) are considered by some to be the future of plastic. Critics of clean up programs argue that removing waste is futile -- when your kitchen sink is overflowing you don't start with mopping up water, you first turn off the tap. Plastic Bank founder Dan Katz argues that the solution lies in changing the value of plastic in order to stop plastic flow into our waterways. The Plastic Bank has created a system for impoverished countries (where approximately 80% of ocean plastic is estimated to originate from)[6] to participate in plastic clean up, and also creates an opportunity for individuals to support themselves. Plastic waste is brought into plastic banks where the collector of the waste is paid electronically for their deposit (in a similar fashion to bottle return depots). In this way, participants are able to maintain an income and the opportunity to start savings that they can borrow against. At the same time, plastic is being removed which would have ended up in waterways -- and plastic itself is given a new value. Post collection, this plastic is being purchased by major manufacturers. By making plastic valuable the Plastic Bank is shaping the future of plastic and allowing for social impact -- a sustainable approach to the issue.

Katz argues that the 8 trillion kg of plastic we have produced to date has so far been considered waste. However, initiatives such as this one place a value on the recycled materials, and at approximately 50 cents per kilogram, a potentially new closed-loop industry is being created -- unleashing a potential $4 trillion value. According to Katz "social plastic can become the bitcoin for the earth and is available for everyone."[7]

Conclusion

Perhaps one of the most powerful initiatives is also the simplest. Grass roots movements to clean up our shorelines are emerging in our communities. People are paying attention to the power of collective action in environmental rehabilitation and movements such as The Great Canadian Shoreline Cleanup are growing. This cleanup began in 2002 and is now the largest direct action conservation program in Canada with 800,000 volunteers. The future of our oceans and our planet's health lies in these movements coupled with innovative use and reuse of the plastic we have already created. Reducing the amount of plastic that is manufactured will be a critical achievement in reaching plastic neutrality and safeguarding our ecosystems. By educating consumers on the dangers of plastics (to ourselves, our ecosystems, and others around the world) producers must begin to follow demand and offer alternatives to plastic packaging, and cut out single use plastic. Together we can hope for a powerful shift in both our use and disposal of plastic, as well as our relationship and regard for the natural world.

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Paulina is a recent graduate of the Master of Science in Sustainability (MScSM) program at the University of Toronto. Through the MScSM program Paulina developed her strong background in sustainability and a deep understanding of how issues facing the planet can be tackled with business driven solutions. Her interests include the promotion of innovative solutions to tackling climate change and getting the plastic out of our oceans and ecosystems for good.
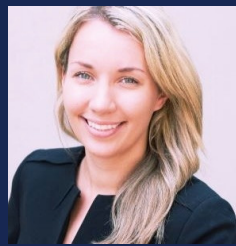
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INDIVIDUAL CLIMATE ACTION

WHAT IS HOLDING US BACK?
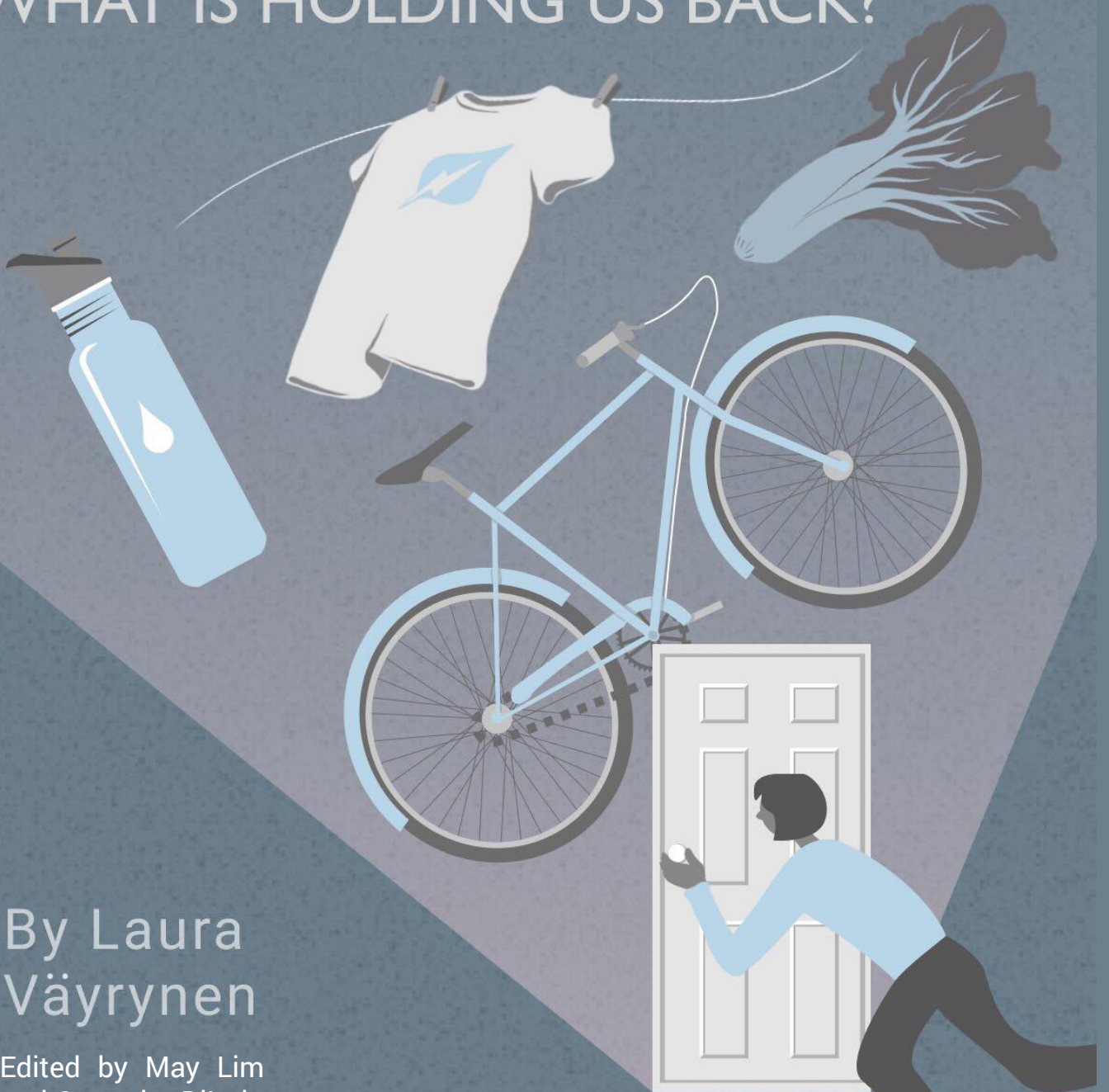
By Laura
Väyrynen

Edited by May Lim
and Samatha DiIorio

Illustrations: Farah Hamade

Today, climate change is an increasingly significant part of public conversation. Investors, corporate executives and governmental decision-makers are facing ever-growing calls for accountability. According to the recent IPCC report, greenhouse gas emissions must be reduced by 49% by 2030 and the world must become carbon neutral by 2050 to avert a 1.5°C warming. The current trend is not promising; in 2018, global carbon emissions increased by 2.7% compared to the previous year after three years of nearly flat emissions. Sufficient action is not being taken to properly address the climate crisis considering the fact that with the current trend, the world will warm by 3-5°C by 2100 -- an increase with catastrophic consequences.

Is individual action irrelevant?

Climate denialists aside, few people would argue that individual action is completely futile in the fight against climate change. Many say that the problem is already beyond individual action, and now the onus is on policymakers and corporations to fulfill their moral obligation. Another popular argument is that individual action must be collective at a mass scale to have a significant impact on our changing climate, and to mobilize the masses in a sufficient time frame is unlikely. Richard Heede, the co-founder of the Climate Accountability Institute, argues that individual actions aren't meaningless. In 2017, the institute produced a report called Carbon Majors, which found that 70% of the world's emissions can be traced back to 100 companies. "They're producing the fossil fuels we all use. [...] What the companies do is produce the fuels, extract and market these fuels, so that we can use them." He continues that this does not take away the responsibility from the oil & gas companies but shifts some of it to consumers. In his opinion, consumer demand for "green products" influences business decisions of companies, inspires our peers, and normalizes these actions.

Why is individual action difficult?

There is no one answer as to why individuals hesitate to take immediate and personal action on climate change (namely lifestyle changes). Some find reasons in inherent human nature, while others focus on specific issues of today's society such as consumerism and so-called late capitalism.

Art Markman of the *Harvard Business Review* presents two reasons: first, climate change action represents a trade-off between short-term and long-term benefits. Individuals often prefer to maintain their lifestyle that they have deemed comfortable instead of making the effort to change their lifestyle for long-term benefits. Second, the nonlinear nature of climate change makes it hard for humans to make decisions concerning it. As an example of a linear problem where cause and effect are clear, when spending a few dollars on a coffee, it is easy to understand its impact on one's weekly budget. Climate change on the other hand is a global problem that has crept up gradually, and has begun escalating more quickly in recent years. No one action is the single cause as no one outcome is the only effect. In addition to this, psychological distance to climate change and its impacts is also a great driver of inattention; it's not going to happen in my time, or where I live, so why should I care?

A few interesting insights emerged from this roundtable.

SITRA, a government-funded Finnish innovation fund, recently organised a national event to encourage conversation among people from all over the country to talk about climate change.

The key factors that came up in the conversations that were stopping these individuals from making climate friendly decisions were:

- Fear and unwillingness to deal with the issue
- The lack of consistent information and its fragmented nature
- Personal Comfort
- Societal Pressure
- Finances
- Time

Older participants thought that the lifestyle they had worked hard to accumulate over the years was hard to give up, while younger participants said that they had been brought up in a consumerist society, and the "nice but polluting things" were something they didn't want to give up. A majority (54%) of the respondents replied that many of the activities that they enjoy were carbon-intensive and that they were not ready to give them up. Financial and temporal issues were identified as impediments. Both the idea of climate-friendly technologies - such as electric cars - being more expensive and the fact that some participants felt that worrying about their financial situation and having only a limited amount of free time acted as a constraint to considering their environmental impact. Nearly 40% of the survey participants said that they do not have time or energy to think about their environmental impacts, and half of the participants said that they prioritized taking care of their physical and mental health instead. A related factor is the lack of infrastructure enabling individuals to make changes. If there are, for example, tax incentives in place to encourage installing solar panels, an individual on the fence will be more likely to do it.

How do we change?

As with most complex issues, there is no clear, one-size-fits-all solution to encourage individual change. Solutions that were identified in the SITRA conversations discussed above included easily accessible and trustworthy information to facilitate meaningful change. This could include

lessons, fact sheets, or even letters sent to homes. The participants identified governments, schools, and media responsible for disseminating this information. In addition, many said that they would implement lifestyle changes faster if the climate-friendly options were easy and comfortable, which in turn puts the responsibility on governments and corporations to incentivize environmentally friendly choices as the default option, and to facilitate systemic change.

Researchers are also exploring ways to reduce the aforementioned issue of psychological distance. This involves replacing distant, abstract ideas of impacts of climate change such as droughts with tangible, "here-and-now" vocabulary and imagery. An example of this would be instead of talking about sea level rise in general, it could be attributed to impacts close to the local environment. Additionally, giving the abstract "future generations" a name and character, such as one's own grandchildren, uses the same technique.

In conclusion, climate change requires an unprecedented effort on the individual, communal, organizational, corporate, and governmental level. However, even if some believe that individual action is futile and cannot make a dent in the global greenhouse gas emissions, it is undeniable that individual action can encourage a change in the community and act as a symbol of hope to many. Changing social norms against our current obsession with consumption, indulgence and resource exploitation is critical to the development of a low carbon society.

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THE IMPACTS OF EXPONENTIAL TECHNOLOGIES IN SOCIETY AND SUSTAINABILITY

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Technology today is both appearing and improving at an exponential rate, creating profound changes in society.[1] This megatrend has the potential to add great value to our lives, or even destroy it, depending on how technology is used. This article highlights several such examples of exponentially growing and improving technologies that can have both positive and negative impacts, and then finishes with a discussion on the integral role that technology plays for a sustainable future.

Exponentially Improving Technologies

There are several enabling technologies are currently improving and growing at exponential rates - these include computer processing speeds, the scale and performance of the internet, and the number of wirelessly interconnected devices. There are also many technologies that are appearing at exponential rates, having only recently reached commercial viability. These include examples such as artificial intelligence, autonomous vehicles, blockchain technology, and various biotechnologies. We will now explore the impacts that some of these examples are currently having on society.

Computer processing speeds have been improving at an exponential rate since 1965.[2] This is an important observation because computer processing underpins every digital system on the planet and the faster and more complex the computing gets - the more we can innovate. A classic example of this is

spaceflight. The Apollo Guidance Computer was several thousand times less powerful than a modern iPhone[3] -- astronauts literally had to do the math on their way to the moon! This is a sharp contrast to today's rocket boosters which count-down themselves and companies like SpaceX can successfully launch and land three rockets simultaneously.[4] But computer advanced computer processing can also be abused. Keeping with the topic of spaceflight, one may want to consider the potential for rockets to be weaponized — if we can land rockets with extreme precision, surely we can also hit targets with extreme precision.

However, it doesn't stop here. New methods of processing is also accelerating that rate at which computer learn -- giving way to Artificial Intelligence (AI) which is predicted to disrupt every single industry by optimizing efficiencies and bringing new value to users.

A pizza company's business model is entirely transformed when it uses self-driving vehicles and AI to deliver pizza. By reheating pizzas on the vehicle for just in time delivery, providing cost savings for the business and exceptional customer experience, AI is able to optimize efficiencies on all ends to allow both businesses and consumers to win.[5]

AI is also transforming the work landscape and automating jobs. In restaurants and grocery store check-outs, this trend will continue, replacing repetitive and tedious jobs but also create about 58 million jobs by 2022.[6] This means employees and companies must be prepared to retrain employees and build new skills.

As international governance bodies awake to the unknowns that AI will create, the World Economic Forum begins to form a global AI Council to determine a standard for regulating AI and controlling it globally.[7] By developing policies and finding common ground amongst nations, it hopes to look beyond AI having strategic advantages to determine a consensus for AI governance. This task is ideal but will be challenging since AI encodes cultural values and agreeing on one set of values with such global diversity will be one of many obstacles.

As the scale and speed of wireless communication grows rapidly, so does the number of interconnected devices. According to the World Bank, there is a world average of 105 mobile phone subscriptions per 100 people.[8] In the very near future, the 5G network will deliver data at a speed of 1 gigabyte per second with a latency (delay) of just 1ms.[9] This will pave the way for an interconnected world of digitally connected products and services.

This rapid network of interconnectedness has allowed us to transcend physical geographies and redefine the meaning of borders. Through globalization, distance becomes a negligible factor in many decisions. E-commerce is one of the numerous aspects that have disrupted the way we do business. With companies like Amazon, you can order anything from a bag of chips to a vacuum to be shipped from China to your home in under a day. This would not have been possible without advancements in technology.

Impacting millions of individuals daily, connected devices and inter-operable platforms allow the app WeChat to bring new meaning to the word 'convenience'. Chinese Citizens can easily spend hours each day on a single app accomplishing a wide range of tasks. From talking to friends, to paying bills, to ordering a dog walker -- WeChat does it all.

However, this interconnectedness is not always a good thing. As the world becomes more dependent on social media, new problems such as long-term health implications and social media addictions arise. The Netflix documentary American Meme depicts the extreme influence this digital world has on our behaviour and culture. It describes a world where people are beginning to think only in terms of their next snap, tweet, or post. As we become more connected to our peers and technology continues to expand, self-awareness and critical thinking will be evermore important in the era of information abundance and fake news.

Technology can also be manipulated on a larger scale. The Chinese government has created something called the Social Credit System. This system allows the government to track and score their citizen's actions, limiting the access of low scoring citizens to services like trains, hotels, flights, and loans.[10] The system will even automatically withdraw money from your WeChat account if a public camera catches you jaywalking.

This system is made possible through advances in facial recognition technology.

With technology enabling surveillance, the long-term outcomes remain uncertain. The regulatory frameworks established now will determine whether this face recognition technology is used to enhance national security and help with information collection -- or is used to violate human rights and privacy concerns to manipulate citizens. San Francisco recently banned face recognition technology for use by the government.[11] Surveillance is just one of the many areas which have the opportunity to head in either good or bad directions.

Technology also solves social issues by making solutions more affordable and accessible. For example, drones are being used for blood transfusions in Rwanda to deliver supplies to doctors in remote communities. This is all made possible through an app. Those who once died because resources could not be accessed in a timely manner now have a chance of surviving. The use of drones with this app also contributes to increased social and economic prosperity within the countries as there are more able bodies to work, contribute and add value to society. But even drones can be abused. There are countless examples till today where international airports like London Heathrow have closed due to drones flying in their air space, and in Canada drones have been used to deliver weapons, drugs, and other contraband to inmates.

Decentralization of traditionally centralized industries, such as energy and banking, are being disrupted in hopes of making processes more transparent and secure for users. This technology redistributes the power of governance for resources and societal systems away from large companies and governments. In the energy sector, decentralization allows for increased surplus renewable energy distribution and resilience in the grid. Decentralization contributes to more transparency and distributed governance. It also has co-benefits for sustainability and builds citizen trust in established yet fractured systems. In the banking sector, blockchain allows transactions to be more transparent and efficient through the distributed ledgers. This system reduces the ability for hacking into other accounts and illegal activity which ultimately contributes to economic efficiencies and sustainable economies.

But still, blockchain may not always been a good thing. The dramatic crash in the value of cryptocurrencies in early 2018 wiped out billions in economic value from the system, much of which belonged to retail investors. Such a system of fluctuating value has little chance at becoming to the sustainable economic

The Predictions of the Futurists

The examples highlighted in the previous section give but a small taste of the ways that technology can both positively and negatively impact society. But if we look forward a few decades, the potential impacts become evermore dramatic.

The megatrends of exponentially appearing and improving technologies has led to several high-profile predictions about what is to come of our future. One popular prediction is the idea of a technological singularity, made popular by Kurzweil in 200.[9] The singularity roughly describes an inevitable point in time (predicted to be 2045) where there is an explosion of intelligence, either artificial or biological.[12] The singularity has since been explored by academics and Hollywood writers alike.

The explosion of AI is likely the most popular version, where AI enters a runaway reaction of self-improvement cycles with each new smarter version of itself appearing faster than the previous version.[13] The second version of the singularity plays a little differently, focusing on the rapid evolution of human intelligence by advancements in biotechnology. This can be supported by the exponential cost decline of genome sequencing and synthetic DNA synthesis.[14] The scenario is often extrapolated to the emergence of an entirely new human species - one that has overcome ageing, disease, and death. In other instances the scenario ends with the physical merging of man and machine, as alluded to in Dan Brown's most recent best seller, *Origin.*

Other theories of the singularity also exist around specific technologies. But whether one accepts an 'inevitable explosion' of intelligence or not, one thing is for certain: technology is appearing and improving faster than ever and this is bound to have extraordinary implications on society. In 2018, the six largest public companies in the world were all technology companies, with a combined market cap exceeding $4.25 trillion.[15] Their platforms allow us to communicate long distances, access the world's information, and order just about any product or service from the palm of our hand. But in these companies we also put tremendous trust – with our data, our money, and even our lives.

What does this mean for us today?

As technology continues to expand exponentially, this poses new opportunities and threats to society as we know it. How we choose to accept this fact will determine if we dictate technology or let it dictate us. Technology is already ingrained into our everyday lives. This is seen through watches that monitor our heart rate and health to the smart phone being the most frequent item we interact with. Computer processing speeds, network connectivities, AI, and apps are just some of the innovations that are rapidly changing our world today. Technology has the potential to enhance our experiences, services and solve global problems contributing to a sustainable future. By anticipating the changes technology will bring and investing in human capital, society will be equipped to make the transition for a sustainable future.

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