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Introduction

The drivers behind this paper.

Innovation has always been at the core of business success, and yet suddenly it’s the hottest of corporate buzzwords as we enter 2019. The expensive management consulting firms are all preaching innovation today as if it's a new religion.

To understand what this is all about, and get a sense of current innovation trends, we interviewed 100 corporate innovation executives at some of the largest and most influential companies in the world. The companies included in our study represent $4.8 trillion in revenue, employing over 3.7 million people.

We talked with innovation executives at large global brands such as PepsiCo, Anheuser-Busch, the NBA, Volkswagen, Santander, Barclays, Deutsche Bank, Starbucks as well as a number of smaller companies representing a diverse set of business vertical sectors – Financial Services, Consumer Packaged Goods, Oil and Gas, and Automotive – operating in 54 different countries around the world.

Our interviews revealed that organizations around the world increasingly regard innovation as key to their future success. In the course of the discussions with these leading executives we uncovered some patterns as to how companies today are creating sustainable innovation within their organizations.
The Innovation Imperative

Why it matters.

In 1997, Harvard Business School Professor Clayton Christensen published *The Innovator’s Dilemma*. This seminal work describes how well-managed incumbent companies can lose their market leadership status to new innovations (and end up completely disrupted and bankrupt). The book has become required reading in business school programs around the world and is considered a cautionary tale for business executives everywhere.

And yet in the years since the book’s publication we’ve seen hundreds more incumbent companies laid to waste by entrants ranging from Amazon to Uber (and a thousand other innovative companies).

Just this past year we saw the once-mighty Sears file for bankruptcy. At one time the undisputed king of retail, Sears ended up on the scrap pile of history in 2018 despite the valiant efforts of “innovative” private equity firms to pump billions of dollars into its lifeless body the past few years. In the end, the iconic Sears (once considered a disruptive innovator itself) became the most recent example of a market leader unable to innovate successfully enough to maintain its once-dominant incumbent position.

In the preface to *The Innovator’s Dilemma*, Christensen notes that two questions shaped his research: 1) *Why is success so difficult to sustain?* and 2) *Is successful innovation really as unpredictable as the data suggest?*
In the time since the book’s publication, the increasing velocity of change has made success even more difficult to sustain. And the second question still lingers: Is successful innovation random and unpredictable, or is there a methodology that can be applied to producing it in some reliable way?

For the most part, the executives we interviewed for this paper believe that it is possible to put methodology around creating innovation. One of them, an exec at a Berkshire-Hathaway company, told us “Warren Buffett doesn’t make ‘lucky’ investments and neither does our innovation group. When we produce an innovative product that wins, it’s because of the careful methodology we use”.

And yet the real-world results from corporate innovation are mixed. The fact remains that most disruptive innovation has come from startup entrants, not incumbent companies. Uber disrupted the taxi cartels. Amazon disrupted Sears. Every digital camera company disrupted Kodak. Airbnb is disrupting large hotel chains.

There are several reasons why it’s difficult for incumbent companies to create disruptive innovation, of course. Most companies reward managers who invest in improving existing products for existing customers, whereas innovation often comes from investing in new products that may use unknown business models for unknown customers, creating future waves of opportunity for the company.

There is an organizational DNA aspect to this as well. Incumbent organizations are built to execute plans, look for efficiencies, and build market share. P&L managers typically have incentive compensation plans that are focused on profits, so their incentive to innovate is weaker than their interest in finding incremental improvements in margins in existing product lines.
Most companies today have successful processes in place for incremental innovation. It's the disruptive innovation that is harder to create from within. It requires seeing patterns that others miss, and it sometimes means creating something that will kill a company's existing lines of business. As a result, organizational DNA sometimes treats disruptive innovation as a threat and works to expunge it.

So, is it even possible to reliably create genuine innovation within large organizations? Or have we simply entered a new normal where companies turn over every generation? Will Uber eventually be Ubered, itself?

Our research tells us that organizations must be willing to adapt their culture and organizational structures if they hope to generate the innovation required to sustain relevance in today's marketplace.

Failure to adapt has predictable results in an otherwise unpredictable world.
Macro Trends 2019

What marketplace trends are driving innovation today?

Early in the research process for this paper, we interviewed Hitendra Patel, CEO of the Center for Innovation, Excellence and Leadership in Toronto, and he told us “Trends are the starting point for successful innovation.” We’ll take his advice and start this paper with a rundown of the big trends in the global marketplace today.

The innovation executives we interviewed are operating in many different sectors and geographies, but they all discussed being subject to the larger global macro trends that surround us.

### Innovation Survey Responses

Which of these macro trends are you following as you develop innovative products and services?

<table>
<thead>
<tr>
<th>Choices</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Consumers’ expectations of NOW!</td>
<td>58.62%</td>
</tr>
<tr>
<td>Products becoming services.</td>
<td>50.00%</td>
</tr>
<tr>
<td>Consumer trend toward Health/Wellbeing.</td>
<td>46.55%</td>
</tr>
<tr>
<td>Consumer Data Privacy Concerns (GDPR, etc.)</td>
<td>44.83%</td>
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<tr>
<td>Rise of the Millennials.</td>
<td>43.10%</td>
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<tr>
<td>Globalization.</td>
<td>39.66%</td>
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<tr>
<td>Trend toward sustainable products.</td>
<td>34.48%</td>
</tr>
<tr>
<td>Generation Z on the horizon.</td>
<td>32.76%</td>
</tr>
<tr>
<td>Economic uncertainty ahead?</td>
<td>22.41%</td>
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Rise of the Millennials

The US will see a significant demographic crossover this year, as 2019 is the year that Millennials will outnumber Baby Boomers for the first time.¹ The same general demographic vector exists in other countries around the world, representing a significant generational transition.

Generation Z on the horizon

The next generation in the pipeline, Generation Z (usually defined as having been born between 1997-2015²) is the 25% of the population now entering their twenties. They are the most ethnically-diverse cohort and will reach peak income (and purchasing power) roughly 10-15 years from now.

Consumer Data Privacy Concerns (GDPR, etc.)

In 2018, consumer data privacy was in the headlines and on the minds of consumers everywhere. Data breaches at T-Mobile, Orbitz, Marriott, Target, and many more, have brought security to the forefront in the minds of many consumers. The Facebook and Cambridge Analytica scandal, plus many other security breaches in the private and public sectors has eroded consumer confidence.

In response, the European Union implemented the comprehensive General Data Protection Regulation (GDPR), a sweeping set of regulations that apply to any company doing business in Europe. Shortly afterward, California, the largest state in the US, passed its own version of the GDPR, which goes into effect at the end of 2019⁷. For businesses this will present regulatory compliance burdens, but the upside is there is now one set of regulations to comply with across Europe (and perhaps eventually the US).

¹http://www.pewresearch.org/fact-tank/2018/03/01/millennials-overtake-baby-boomers/
²http://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/
⁴https://www.bbc.co.uk/bbcthree/article/253d8b3e-1891-43ab-8848-4a5110bda171
⁶The World is Flat, Thomas Friedman, April 2005.
It’s also worth noting that this trend may cause some Internet companies to begin to re-think their business models. Seven of the world’s ten most valuable companies by market capitalization are technology companies. Five of those companies are built on a foundation of collecting and monetizing personal information from consumers. Facial recognition has the potential to supplement data tracking and collection, causing a new set of ethical concerns and potential consumer backlash.

**Products becoming services**

As Benjamin Gamboa, Innovation manager at HP put it to us, we’ve entered the era of “Everything as a service”. Organizations no longer buy servers, because infrastructure-as-a-service from AWS or Azure makes more economic sense. Jet engine companies now do contracts with airlines based on paying per hour of use of an engine instead of buying it – instead of buying engines, the airlines buy “thrust as a service”. Turning CapEx into OpEx is a trend across many sectors.

**Globalization**

Newsflash: it’s a global world today. We are all working in a commercial trade environment that is more global than ever before in history. Consumers today can buy products from an Etsy merchant in Estonia as easily as one from Chicago. Trends in LA can drive purchases in Beijing. As Thomas Friedman wrote almost 20 years ago, “countries, companies, and individuals will need to remain competitive in a global market in which historical and geographic divisions are becoming increasingly irrelevant.”

**Consumer expectations of NOW!**

If there is one defining characteristic of the current world of consumer expectations it’s that we have come to expect instant gratification. We click a button and receive Amazon boxes the next day. We push another button and receive groceries delivered the same day. Mobile apps bring on-demand cars and cannabis. This expectation places pressure on anyone selling consumer products today (and these expectations are increasingly being felt in the enterprise as well).
Consumer expectations of “Meet me where I am”
Technology has been an enabler for companies getting closer to their customers, and the corollary, customers increasingly expect that companies will meet them wherever they are - whether that's their sofa at home or a beach in Mexico.

Consumer trend toward health/wellbeing
25 years ago, consumers made choices around their diet typically in response to a chronic health issue (diabetes, cholesterol, weight). Today consumers are far likely to be forward-looking in their eating choices. Health and lifestyle choices have become part of social status. Products labeled as fresh, organic, low fat, or high fiber are commanding premium prices. This trend is seen not only in food and beverage sectors, but in seemingly unconnected sectors such as fashion, where “active lifestyle” brands sell briskly today.

Personal mobility
We’re seeing the most profound disruption ever in personal mobility - as much or more than the inventions of railroads and automobiles in previous centuries. Uber and Lyft (and Didi Chuxing in China) have completely changed the way that urban populations get around. In addition, with autonomous cars on the horizon, urban areas are investing heavily in modernizing public transportation, which itself is becoming increasingly automated. Getting from here to there will never be the same. Tesla, which once had the lead in electric vehicles, will become just one of many EV brands in 2019, as Audi, Volvo, BMW, and many others roll out their own new EV lines. Meanwhile, micro-mobility (scooters and bikes) are suddenly hot: Two scooter-share companies, Lime and Bird, raised nearly $1 billion in venture capital funding in 2018.

These trends in personal mobility will drive a sea-change in the way that people get around. The impacts of this will be far-reaching, from finance and insurance, to service and repair, to the way people’s time is occupied while riding in autonomous vehicles. As car ownership falls, traditional car companies will be under increasing pressure.

8https://www.crunchbase.com/organization/bird
Cash was once king. Now it’s a fading stepchild

In many parts of the world, cash is going away. Sweden is nearly cashless – last year cash represented just 1% of Sweden’s GDP\(^9\). The European marketplace is seeing tremendous disruption from FinTech (financial technology) startups handling payments and other cashless transactions from mobile devices. Regulations have slowed the spread of FinTech in the US, but one of the most successful digital banks, N26, is expected to get US operating approval in 2019\(^{10}\).

Meanwhile, two Chinese systems are expanding abroad. One is Alipay, a smartphone-based system devised for Taobao, an online platform run by Alibaba. With over one billion product listings, sales on the Taobao Marketplace (and its sister organization, Tmall.com) exceed $400 billion US (3 trillion yuan) an amount greater than all US retailers and e-commerce sites combined. Its rival, WeChat Pay, a product of Tencent, the social-media giant, is also moving westward. Closer to home, Venmo, the mobile payments firm now owned by PayPal, is approaching $10 billion/quarter in payments processed\(^{11}\). Any way you slice it, consumers are increasingly adopting mobile payments and financial services technology in general.

Trend toward sustainable products

Many recent studies have shown that consumers are increasingly making purchase decisions influenced by their perception of the sustainability of the products, ranging from food to fashion. “The circular economy” is the current buzzword, referring to companies and consumers who participate in creating sustainable products and services\(^{12}\).

Democratization of knowledge

Anyone with a smartphone has access to all the knowledge in the world. The internet brings access to markets and the means of production, unprecedented in human history. Business models that rely on information arbitrage are less likely to be successful today, as access to knowledge has leveled many playing fields.

\(^{11}\)https://www.recode.net/2017/7/26/16044528/venmo-8-billion-transaction-volume-growth-rate-chart
\(^{12}\)https://www.ellenmacarthurfoundation.org/circular-economy/concept
Customers are buying experiences

A clear trend across consumer sectors is the emphasis on the consumer buying experiences instead of just products. From the new “Experiences” section on Airbnb, to retail store designs created as branded experiences, consumer preferences extend beyond products themselves. “Retail stores are going from a place where inventory is stored to place of experience,” was how Danny Ryback, Director of Emerging Tech and Innovation at Leo Burnett put it to us during our interviews.

Social consciousness and women’s rights

2018 brought the #MeToo movement, and in the US an election in which over 100 women won congressional seats. 2018 also brought a new California law that requires public companies to have women on their boards of directors. These examples reflect a general public trend toward women’s rights and other social equity issues and a heightened awareness of social equity as a business issue. In many parts of the world, issues of social equity have become mainstream business issues. For example, Iceland in 2018 became the first country to oblige large companies to demonstrate they were providing equal pay for equal work. Another example: the UK became the first country in the world to require employers to publish their pay gap data.

Personalization gets personal

In 1909, Henry Ford famously announced that his Model T was available in any color customers wanted so long as it was black. Today consumers expect to have everything their way, personalized just for them. In the last 20 years we have seen a dramatic trend toward personalization in consumer goods and services. As others have observed, the 20th century was about mass production, while the 21st century is about mass personalization.

Economic uncertainty ahead?

Now the downer news. The political winds are shifty, with the Trump administration in the US, and a divided Congress for the next two years. In Europe, concerns about Brexit, and leadership in the UK and Germany persist, where both Theresa May and Angela Merkel have lost favor with voters. The “yellow vest” marches in France are spreading in Europe. Meanwhile, across the Pacific, China faces a slowdown in growth and uncertainty over trade policies. The US economy has been on its longest bull run in history, a fact that is beginning to make investors nervous that it may soften soon.
Key Insights
What we learned from interviewing 100 leading global executives.

For this research project, we had the opportunity to talk with innovation executives at some of the largest brands in the world (PepsiCo, Anheuser-Busch, the NBA, Volkswagen, Santander, Barclays, Starbucks, Intel, Intuit, and many more). Despite the variance in sectors and geographies, certain patterns emerged from the conversations.

Creating disruptive innovation within incumbent organizations is notoriously difficult. There is a natural tension between what incumbent organizations are built to do – efficient execution and taking care of customers in existing lines of business – and what the innovation process often requires, which is inefficient, unpredictable, and rule-breaking. And, of course, the incentive compensation of managers is typically based on the former, not the latter.

Given this dilemma, is it possible for incumbent organizations to take care of current business while also creating genuine innovation for the future? We put this question to our interviewees.

Organizational structure matters
Among the executives we spoke with for our research, there was broad consensus that the placement of the innovation function within an organization is a big factor in the success or failure of the function.

The best success stories we learned about in our interviews related to innovation groups that were able to work autonomously and with high-level sponsorship. One exec went so far as to say “The innovation director has to be hired by the CEO. Without that, she’ll never get the organizational support she needs to do her job.” Others spoke of the need to be cross-functional in one’s approach because creating innovative new products and processes requires crossing silos. “My innovation team’s super-power is facilitation,” said Meredith Regan, Director of Innovation of ALSAC/St. Jude Children’s Research Hospital. Some execs we talked with mentioned that a corporate innovation group needs a different set of personalities than other groups within an incumbent company. “There are operators and there are explorers. They are different kinds of people, and a sustainably successful organization needs both” was how one top executive described it to us.
“Idea Hubs” work. Sometimes. Maybe?
In many organizations, there is pressure to create inclusiveness. As a result, many corporate innovation groups have created some sort of “Idea Hub” where anyone in the company can submit innovation ideas. The results around these are mixed, according to the execs we spoke with. “The problem with internal calls for ideas” said Scott Sheaf, Director of Innovation at Greif, “is that for ideas to be actionable they have to have a business case wrapped around them” and torrent of ideas without business cases doesn’t necessarily help the cause. The consensus view from our discussions is that while internally-sourced ideas do have merit, product innovation is more likely to come from customer insights than from employee opinions.

Innovation needs to fit the overall strategic framework
In a corporate setting, innovation needs to be done within the context of a larger strategic framework. Creating something innovative that is completely outside the bounds of the company’s direction may be really innovative but it’s unlikely to get much backing. “First look at the strategic framework, then look for innovation opportunity,” was how it was put to us by Jane Lee, Director of Innovation for the global nutrition group at Pepsico.

Build your funnel big
The mythical notion of sitting around in a comfy chair thinking big thoughts until you suddenly have that big breakthrough idea is seductive (sounds fun!) but our interviewees believed unanimously that successful corporate innovation requires having a big pipeline of ideas, knowing that only a few will ever see the light of day. “You need to have a big frothy pot of ideas” said Jeff Bradley, Group Customer Experience Director chairing Aviva’s global propositions practice, “so that if one year there is suddenly a strategic need you have an existing pot of developed ideas already waiting”. Of course a pot full of random untested ideas isn't likely to be helpful, Bradley continued, so “to me the key is that the pot of ideas needs to be measured, so that it is pre-qualified and a company can know (and agree) which ideas are in the top 5% for consumers.” Other execs talked about portfolio-building as the key to risk-mitigation in innovation (as in any other aspect of a business). “Success is dependent upon having a portfolio of ideas in development,” said Benjamin Gamboa, Innovation Manager at HP, “since the odds of any one idea being transformative are pretty low.”
Innovation Survey Results

What does your CEO think you do?

During the course of our interviews with each innovation executive, we casually asked each one “So your title is Director of Innovation - what does your CEO think you do?”. Their answers illustrate how each organization views the function slightly differently.

“He thinks I build enablers to support his long-term strategy”.
“Create a solid pipeline of innovation opportunities”.
“Develop new platforms for future global products”
“Helping to change the understanding of the entire organization with regard to how successful new products are developed”.
“He thinks of our group as being the one group in the company that can step away from the operational thinking of a business unit, giving us the luxury of looking forward without constraints”.
“My CEO thinks I’m the guy who pops in with cool ideas once in awhile”.
“My CEO thinks I’m the guy who always has expensive ideas”.
“He thinks I’m a little weird”.
“Honestly, he didn’t know anything about innovation until he interviewed me”.
“My CEO has no idea what I do, but he likes the outcomes”.
“Hunting for insights and building business cases around them”.
“Identify gaps where opportunity might be, and hand off to execution team”.
“She thinks we’re optimists”.
“Pulling the organization into a more forward-thinking state”.
“We ask too many questions and don’t provide enough answers”.
“Envision a future and get us there”.
“Accelerate the transformation of our organization”.
“Figure out how to build better solutions for customers”.
“Make senior leaders more innovative”.
“Keep up with whatever the newest things are”.
Tell the story

“Storytelling” isn’t typically part of an MBA curriculum, yet a surprising number of our interviewees talked about how storytelling skills are an important corporate skill for innovation. An example of this might be the “working backwards” approach used at Amazon, where a group working on a new product starts by writing an internal press release announcing the finished product. The press releases are “centered around the customer problem, how current solutions (internal or external) fail, and how the new product will blow away existing solutions.”

One could think of this as prototyping with words. The Design Thinking framework for innovation includes starting with developing deep empathy for customer needs and then doing rapid prototyping of a product until you have developed something that meets those needs. The Amazon approach in writing a forward-looking press release is essentially an exercise in customer-centric storytelling.

One innovation exec told us “My job is to teach people in the organization to be more innovative,” he said, “and part of the way I do that is by helping them to be better at telling a story – a story about the problem we need to solve, and how it affects the lives of our customers.”

Another one exec from a very large financial services firm told us: “A successful corporate innovation group needs to be a story-telling machine.” Creating stories around the day in the life of a customer is often how great innovation opportunities are uncovered.

Jeff Bradley, Chair of Aviva’s Global Propositions Practice provided us another example of prototyping with words: “I’m a big advocate of testing even before the traditional MVP in the form of a short written phrase. This approach allows us to scale up the number of ideas tested and to drastically simplify the testing so we can do it quickly and affordably, at scale.”

Prototype, Prototype, Prototype

One thing that all innovation frameworks have in common is that rapid prototyping is at the core. A great example from history might be NASA’s Apollo space program – arguably the most difficult engineering innovation project ever. When the moon landing program was initially announced, NASA had no way to actually fulfill the mission. The vision could be seen (literally, every night!) but the thousands of innovations that would be required to make it happen were unknown, and unknowable. Prototypes provide the

learnings required to make it happen. “Becoming skilled at developing Proofs of Concept (POC) and well-conceived business models and prototypes, before initial Minimum Viable Products (MVP), is key to innovation,” said Giovanni Monti, Vice President and Director of Healthcare Innovation at Walgreens Boots Alliance, the world's largest pharmacy.

Mix some startup elixir into your corporation
An interesting pattern in our discussions indicates how often startup principles came up in conversation despite the fact that these execs work in the antithesis of a startup – some of the largest companies in the world. It's clear that the writings of Eric Reis (The Lean Startup) and Steve Blank (The Startup Owner’s Manual) have permeated the halls of large incumbent organizations. “Creating a successful innovation group within a company is largely about mixing some startup world into your corporate world,” said Cristina Gonçalves, Innovation and Partnership Director at BraziLAB.

Get good at killing your cute fluffy favorites
The innovation execs we interviewed broadly felt that coming up with ideas is the easy part – the hard part is deciding which to kill and which to feed. Many corporate innovation groups have a stage gate process by which ideas have to prove their worth at each stage before receiving funding to advance to the next stage. Many of the execs we talked with said that it’s best to start with a problem and then have several possible solutions incubating in competition with one another. “The goal is to find the best solution, not just a solution,” said Ejnar Schultz, CEO of SEGES.

Develop comfort with ambiguity
Our interviewees reflected on the fact that disruptive innovation usually means going down unknown paths (which runs counter to conventional corporate operating expectations). Operators use existing knowledge and known execution models to get where they need to go, whereas innovators need to explore unknown paths using unfamiliar methods. “Be comfortable with not knowing.” advises Scott Peppel, Director of Food Innovation at Starbucks. “Develop ways of working that feel uncomfortable and foreign,” says Daniil Vinokur, Director of Strategic Innovation & Incubation at Salesforce.
Diversity matters

“For true innovation, rule number one is diversity,” said David Milestone, Acting Director of the Center for Innovation and Impact at USAID. This was a theme that many of our interviewees discussed. Diversity came up across several different (diverse?) dimensions. One dimension is ethnic diversity – the demographic for most products is increasingly more diverse, and so it’s important that product innovation groups bring diverse backgrounds and viewpoints to the process. Another dimension is functional – successful innovation comes from bringing a cross-functional mindset to the process (if you place your innovation group in the IT department you’ll get a very narrow solution set to every problem).

Hackathons are so 2016

A few short years ago “hackathons” were frequently promoted as a tactic for innovation. The notion was that if you put a big bunch of smart techies in a room and give them 24 hours to hack together some digital prototypes, the result would be great innovation. From our conversations, we found that there seems to be less enthusiasm for this today. “Hackathons don’t really work for finding the next Uber,” said Brian Ardinger of the podcast Inside Outside Innovation. “Uber came from a customer insight – two guys stuck in the rain trying to find a taxi.” Disruptive innovation usually starts with insight into a customer problem and then proceeds without a preconceived notion of what the solution might be. Hackathons are sort of the opposite – techies using the tools they know (writing code) to create something they think might be cool. “Hackathons are helpful is you already know the answer,” said Federico Puebla, Director of Innovation of Desjardines.
Partner with your customers
That successful innovation begins with understanding your customers is self-evident, and innovation methodology frameworks from Design Thinking to Human Centered Design all start there. But several of the innovation execs we spoke with took it a step further by treating customers as partners in the innovation process, bringing them into the process. “You’re not smarter than your user base,” said Adi Pavlovic, Director of Innovation Labs at Keller Williams Realty International.

Start with problems, not solutions
A theme we heard from nearly all the execs we interviewed is that transformative innovation starts with problems worth solving. “Fall in love with a problem, and then find a solution,” suggests Philippe Gosselin, Director of Innovation at Desjardins General Insurance Group. “Curiosity matters,” said Jessi Moffitt, Director of Innovation at Canteen. Curious people are good at finding problems and brainstorming about all the ways that a problem might be solved whereas incurious people are more inclined to find one solution and run with it. “The best innovations are born out of frustrations,” was how one executive described it. Karen Iveson, Director of Innovation at Duracell put it to us this way: “Most great innovation is Customer-driven, not technology-driven.”

Back into the revenue
Ultimately, corporate innovation is obviously about driving long-term revenue. As Scott Sheaf, Director of Innovation at Greif, put it, an innovation group’s ultimate responsibility is to “marry light bulbs with dollar signs”. But it starts with solving customer problems. “Solve the customer problem first and then let revenue be a byproduct, rather than starting with the revenue”, was how Kevin Robinson, Director of Innovation at Kellogg School of Management put it to us.

Look outside your sector
Another way in which the innovation function is different from the operating function at a company is that operational execs need to have a deep understanding of the sector they operate in. However, the same thing that has made them successful operators can sometimes inhibit innovation (if you know how to use a hammer than everything around you looks like a nail). Looking outside your sector is often where ideas for innovation within your sector can be found. “I always say to my team ‘what would we do differently if Google was competing head-to-head with us?’” said Ken Zakalik, Director of Innovation at ALSAC, the fundraising and awareness organization for St. Jude Children’s Research Hospital.
Innovation Survey Results

We asked our interviewees what one word they would use to describe their biggest challenge today, and what one word they would use to describe their biggest opportunity ahead.

Challenge
- Time
- Scale
- Funding
- Competition
- Extensiveness
- Consistency
- Execution
- Prioritization
- Rapid-iteration
- Capacity
- Sustainability
- Speed
- Integration
- Disruption
- Conservative
- Talent
- Status-quo
- Buy-in
- Relevance
- Adoption
- Ambiguity
- Exponential
- Regulation
- Leadership Alignment
- Culture
- Influence
- Restrictions
- Differentiation
- Recourses
- Budget
- Stasis
- Empathy
- Legacy
- TunnelVision

Opportunity
- Data
- Technology
- Stabilization
- Self-Care
- Robotics
- Rapid iteration
- Telehealth
- IoT
- Crypo
- APIs & Integration
- Leadership
- Use of AI/ML
- Resilience
- Platform
- Experience
- GovTech
- Sustainability
- Co-creation
- Value-based healthcare
- Automation
- Culture
- Globalisation
- Social Purpose
- Speed
- Delight
- Human-centered
- Personalization
- Culture
- PSD2
- Design
- Disruption
- Obsolescence
- Engagement
- Creativity

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Mindset matters
It’s easy for a corporate innovation group to get in the mindset of exploring cool new technologies and building sexy technology demos. But that’s a backwards mindset. “Solutions looking for problems are a trap for innovation,” said Federico Puebla, Director of Innovation at Desjardins.

Execution matters
As in everything else in business (and life) actually executing on innovation efforts is key to success. “You can’t just create an innovation group and then expect things to start popping out,” said Eric Paquin, a former Microsoft manager who now runs an innovation lab in Ireland. You need a formalized way to prototype, test, ideate, test some more, and prototype again in iterative cycles. Not everyone is naturally creative in ideation and also disciplined in execution, but our interviewees across the board believe this is crucial to successful corporate innovation. “Dream in technicolor and execute in black and white,” is how Jane La Rocque, described it to us. She is Director of Innovation at Clearwater Seafoods, leading global provider of Marine Stewardship Council (MSC) certified wild shellfish.

Concluding Thoughts
A century ago, the great economist Joseph Schumpeter said the “gale of creative destruction” was the heart of capitalism, “a process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one”.

If that’s true, then it’s the role of corporate leaders to avoid having their organization erased by the “industrial mutation” of Schumpeter’s “gales of creative disruption”.

We’ll give the last word on this to Scott Sheaf, Director of Innovation at Greif, who told us: “Innovation is the best insurance against disruption.”

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1 He also said his life goals were to become the greatest economist in the world, the greatest horseman in Austria, and the greatest lover in Vienna. He claimed to have succeeded at two of the three, but he never revealed which two.
Methodology Madness

From Design Thinking to Double Diamond, what frameworks are being used?

A variety of academic frameworks for innovation have emerged to facilitate and put structure around the process of innovation. Many of these frameworks have gained widespread adoption and our interviewees discussed which ones they use in their organization. While there is variance between the frameworks, they all put the user in the center. “Human-centered approaches are no longer a curiosity or a ‘nice to have’ — they are the future of business.”, said Teaque Lenahan, National Director of Design + Innovation at Fjord (Accenture).

Cristina Gonçalves, Innovation and Partnership Director at BraziLAB, added “Believe in all the frameworks, but don’t take them too seriously. Hack your own.”

Innovation Survey Responses

Which innovation frameworks do you believe in and preach within your organization?

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<thead>
<tr>
<th>Framework</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Design Thinking</td>
<td>46%</td>
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<tr>
<td>Agile</td>
<td>33%</td>
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<tr>
<td>Human Centered Design</td>
<td>30%</td>
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<tr>
<td>Open Innovation</td>
<td>28%</td>
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<tr>
<td>Lean/MVP/Steve Blank</td>
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<td>Business Model Canvas</td>
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<td>Design Sprints</td>
<td>24%</td>
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<tr>
<td>Stage Gate</td>
<td>12%</td>
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<tr>
<td>Double Diamond</td>
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<tr>
<td>Doblin Ten Types</td>
<td>2%</td>
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Design thinking

The design thinking methodology elevates the importance of user experience in the development of products and services. It has application across all markets – non-profit fundraising, healthcare delivery, or consumer product interfaces. Design thinking ordinarily starts with a consideration of how a user interacts with a product or service and works back to the technical requirements for delivering that experience. As much a perspective as a methodology, design thinking is intended to expand the discovery of innovative solutions with new angles of approach to a problem driven by customers. In fundraising, for example, design thinking can be applied to the process of testing approaches with actual donors to see what works. As with any methodology, especially those intended to produce innovation, design thinking presents a set of phases in an iterative process. Empathy for end users drives the whole approach. Design thinking borrows from other methodologies to shorten cycles through iteration and reduce the obstacles to creative problem solving, ensuring that a solution aligns with end users.

Business model canvas

A business model canvas is a way of depicting on one sheet a complete summary of an entire business, business model, or business plan. Brief summaries for each key segment of a business are written into block sections of the canvas. Segments include

- Key Partners
- Key Activities
- Value Propositions
- Customer Relationships
- Channels
- Customer Segments
- Key Resources
- Cost Structure
- Revenue Streams
things like customer relationships, channels, or cost structure. More than a convention for depicting the facts of a business, the business model canvas is also a method for developing or modifying a business plan through collaboration.

The intent of the business model canvas is to concentrate the facts of a business onto a single page – an exercise that can help identify gaps in a business model, or help to tune and refine some aspect of a business that may be unstable or changing. An aid to identifying areas of strength and weakness, it’s an effective tool for communicating with potential partners, customers, or employees.

**Human centered design**

The broad application of human centered design across disciplines and industries attests to the relevance that this perspective brings to the development of products and services. Human centered design is design for people. In contrast to design thinking, human centered design is closer to an ethic. While it may seem a given, innovation and problem solving based on human requirements is a relatively recent trend compared to problem solving that narrowly focuses on a business goal, technical application, policy, or feature.

Borrowing from a range of other disciplines, human centered design leverages diversity, active ideation, game theory, and other influences to challenge conventional thinking and assumptions to produce innovation. Adopting human centered design can help develop clarity around the actual character of communities that a solution is intended to serve.

**Double diamond**

Double diamond is a design process created by the independent firm Design Council. It is represented by a graphic of two diamonds touching at the points. Each diamond
represents a portion of a design-oriented problem solving process consisting of four phases. The first segment, or diamond, represents the discovery and definition phases. The second segment, or diamond, represents the development and delivery phases.

The point of double diamond is to identify in a problem solving or innovation scenario, where divergent or unconventional ideation should occur, and where it should transition to convergent thinking in order to deliver a plan or end result. The widest parts of the two diamonds represent the divergent thinking part. Where the diamonds narrow represents the convergent thinking that is necessarily a part of producing a plan and developing a solution based on the plan. The discovery and definition phases result in a plan. The development and delivery phases result in the solution or product.

**Design sprints**
Design sprints are an application of a concept borrowed from the Agile development methodology. In Agile, a sprint is a relatively short period of development and testing that results in ‘runnable code’ – effectively, a workable result, whatever the medium. The concept of the sprint emphasizes short, focused development that results in something real that can be validated with an intended customer or stakeholder. Because sprints are short in duration, adjustments in priority, execution, and features can be made quickly. In contrast to conventional long-form planning and development, such as ‘waterfall,’ sprints help reduce the impact of significant changes in requirements or even a failed design sprint.

A design sprint focuses on the rapid development and testing of design elements that are part of a user interface, for example. A design sprint might result in a user interface element or experience that is validated by a customer or stakeholder. Output can include wireframes, paper or other prototypes, graphic elements or user experiences. Design sprints enable the generation and testing of many more possible solutions in less time than a conventional long-form process that yields a finished design that may not meet customer requirements.
Agile

Agile began as term used in software development, emphasizing a process that is iterative and involves rapid efforts (sprints) to produce tested and validated software components. It is typically described as the successor to the long-form software development practice known as “waterfall” in which an extensive planning and design effort happens in the beginning and is followed by development and testing phases in linear fashion. Agile evolved out of the need to improve the “agility” of organizations in responding to changing customer requirements. However, it also results in higher quality code. Because development and testing phases are part of each sprint, bugs and errors are easier to identify and fix resulting in less disruption during final product integration. Sprints help teams narrow their focus to whatever is required to complete the sprint. As a widely practiced methodology, Agile is integrated into modern development tools and platforms and has become the de facto standard for software engineers and teams.

Stage gate

Phase- or stage-gate based project management is a technique that divides a project into sections separated by “gates” or decision points that determine how or if the project should continue based on a set of criteria. This technique is meant to reduce the risk of project failure by reviewing progress along the way and formalizing decisions.
on whether to proceed. This approach has been in use for decades, particularly by organizations like NASA that undertake complex large-scale engineering projects. Stage-gate is a variation of phase-gate project management.

Stage-gate planning and design happens up front, at the beginning of the project. In software development, the classic waterfall approach is a version of this technique – each phase in the project depends on the success of the previous phase – there is no going back. In contrast to Agile, a technique used in software development that uses short iterative and typically non-linear cycles, phase- or stage-gate projects are linear and one-way. This technique of front-end loading in project management works best on large complex projects in which requirements and design are stable and can be well defined in advance of development.

Doblin Ten Types

Doblin Ten Types is an approach to innovation intended to expand the target of innovative thinking beyond traditional limits. Rather than focus on one area of innovation, Doblin Ten Types models a process in which multiple areas of a business are also considered. This approach can be helpful in expanding the impact of any innovation, particularly when multiple innovations are coordinated into a group that amplifies the impact well beyond the effect of any individual innovation or set of uncoordinated innovations.

The technique targets 10 areas of any business for innovation including partnerships, product delivery, customer engagement, profit model and others. As with many defined techniques for innovation and creative problem solving, Doblin ten types helps to expand the field of possible solutions beyond the limitations of more traditional innovation practice. For some businesses, this model introduces new areas of opportunity they may not have considered.
Digital Dances

What are the technology trends that will impact innovation in 2019?

William Gibson famously remarked, “The future is here, it’s just not evenly distributed.” From our conversations with innovation executives, most believe the technologies that will shape 2019 are already here and available, awaiting wide adoption in innovative products and services.

Innovation is not always about technology, of course. As Jeff Bradley from Aviva put to it us: “Tech is just one way to act on the human imperative.” But we certainly live in an era in which technology is driving much of the innovation happening around us. We asked our interviewees which of the current technologies (buzzwords?) are driving their thinking today. Their responses are represented in the chart below:

### Innovation Survey Responses

Which current technologies do you think will be relevant to your work developing innovative products and services?

- **AI/Machine Learning**: 80%
- **Big Data**: 69%
- **Predictive Analytics**: 68%
- **Blockchain**: 53%
- **IoT**: 51%
- **Chatbots**: 46%
- **AR/VR**: 36%
- **Voice (Alexa, etc)**: 34%
- **Telehealth**: 23%
- **Edge Computing**: 16%
- **5G**: 16%
- **None of these matter to me**: 5%
5G
In the past ten years, mobile devices have revolutionized the way in which consumers interact with the internet and digital services. Now a new revolution in connection speeds is about to happen in 2019. The fifth generation of mobile broadband network technology, known as 5G, will have its first phase (release 15) complete in April and will have a significant impact on all applications using mobile data.

As the successor to LTE or 4G, 5G addresses the shrinking capacity of current broadband spectrum by operating on multiple spectrum bands. It will first appear as Enhanced Mobile Broadband (eMBB) making consumer mobile phone data much faster, then as Ultra-reliable low Latency Communication (URLCC) with major implications for embedded device applications such as factory automation, autonomous driving, and remote surgery. Later, 5G will impact Massive Machine Type Communication (mMTC) by providing narrowband Internet access for sensing, metering, and monitoring devices (see “narrowband IoT” below). Taken as a whole, the new 5G standard will have a significant impact across many sectors.

Blockchain
Blockchain continues to be a leading buzzword, and although use cases outside cryptocurrency have been slimmer than the hype would suggest, in 2019 we expect to see use cases blossom. The essential benefit of Blockchain – a distributed ledger with a secure audit trail – is that it can be applied to everything from consumer payments to the provenance of seafood.

Big data
Big data, another leading buzzword the past few years, was mentioned by many of the interviewees we talked with, but execs are less interested in collecting more data today (we’re all drowning in data) and more interested in getting better at finding insights in data that can help inform their innovation efforts.

Voice
30 years ago, computers were machines that humans interacted with via keyboard and command line. Then came the mouse and the “point-and-click” revolution, followed by touch screens. Today, voice has become a legitimate software interface, and consumer
products such as Google Home and Amazon Alexa provide the ability to control a wide range of home control and entertainment devices through open API's. Additional contexts for using Voice User Interfaces (VUIs) include TV remotes, computers, cars, wristwatches, and other wearables.

Voice-enabled applications are common and growing in number. APIs that support VUIs are expanding and gaining in sophistication to enhance personalization, ubiquity, and sensitivity. At the big Consumer Electronics Show (CES) in Las Vegas in January of 2019, voice assistants (Amazon Alexa and Google Home) occupied huge show real estate, and the fact that both companies have opened-up their voice engines to developers will likely mean a proliferation of additional use cases for voice as a software interface in 2019 and beyond.

**AR/VR**

AR or Augmented Reality, refers to the digital augmentation or enhancement of real-time human experience in a specific context. AR can also help deliver high resolution modeling capabilities in a variety of design applications, from architecture to consumer products.

VR or Virtual Reality refers to an immersive and completely digital experience. It can be delivered through a specialized headset or other display technology for full sensory effect, or, for example, experienced as a virtual walk-through of modeled architectural or retail space.

**IoT**

The Internet of Things, or IoT, refers to the networking of autonomous devices and the communication of data among these devices. In the consumer products market, this includes appliances, sensors, home control gear, wearables, and other devices networked through wifi, bluetooth, IR, GSM, 5G, and other data protocols. In commercial applications, IoT devices include everything from field sensors for gathering data to manufacturing equipment, medical devices, cameras, large system components, and so on. Common applications include environmental monitoring, error reporting, maintenance, and robotics.
AI/Machine Learning

Artificial Intelligence is a discipline that has been around since the earliest days of computer science (not to mention the earliest days of science fiction) but in the past two years we have seen practical applications of AI flourish. Partly this is because of the newer field of Machine Learning, which recognizes that computers are better at being “intelligent” if we can teach them to learn.

One way to understand this distinction is with the classic software engineering problem of teaching a computer how to recognize a cat – a very time-consuming process requiring teams of software engineers to write lots of code about what a whisker looks like, what cat ears look like, or how a cat is different from a racoon, and so on. The machine learning paradigm is to give the computer 100,000 pictures of cats and say “you figure it out.”

Across a range of industries, machine learning is being used to identify fraud in financial applications, improve transportation efficiency through traffic pattern analysis, gather and analyze environmental sensor data, and produce insights into human behavior and health.

Predictive analytics

Predictive analytics is the application of data, AI, and machine learning to help predict events or trends in the future. While not new, it has been amplified by the development of AI, Big Data, and IoT and other recent trends in business competition, software development, and computing hardware.

Common applications of predictive analytics include marketing, risk mitigation, complex system modeling, and financial analysis and fraud prevention.
Telehealth

The increasing reach and capacity of the networked world has expanded access to healthcare services beyond the limits of physical proximity. Telehealth encompasses the range of interactions possible between provider and patient using mobile devices and apps, web portals, video, and data. It includes the integration of smartphone apps and wearable technology in monitoring health data or guiding individuals in their exercise, dieting, and treatment regimens.

Chatbots

Combining AI and the human love of chatting, chatbots provide human-like text- or voice-based interactions in toys, human resources and customer service applications, and social apps to help users communicate, solve problems, answer questions, or find information. Leveraging gains in machine learning and AI, chatbots can enhance a user’s experience and improve the quality of engagement by learning from their interactions over time with human users.

Edge computing

Edge computing is the distribution of application components or services to separate nodes in a cloud environment so that these services are closer to sources of data or other elements of a distributed system. For example, edge computing helps reduce latency for end users by distributing key components of an application to regional centers that serve a specific geographic locus.

Factory 4.0

Factory 4.0 is a term used to encapsulate the fourth generation transformation of manufacturing process and technology to incorporate AI, machine learning, IoT, and autonomous systems. The “smart factory” incorporates these technologies to improve efficiency, quality, and lower costs.
Low earth orbit satellites

There’s a revolution happening in space. Once the exclusive province of NASA, space is now served by private companies ranging from SpaceX to Planet. Associated with this new space gold rush, Low Earth Orbit (LEO) satellites will become far more numerous in coming years. Low earth orbits have an altitude of 2000 km or less. Most satellites, including the ISS, orbit in the LEO space. LEO satellites are cheaper to deploy, service, and to decommission. They also require less power to communicate and deliver less latency in their transmissions. Large numbers of LEO satellites are expected to be deployed in coming years chiefly to provide Internet services to remote regions of the planet.

Because LEO satellites see less of the planet due to their low orbit, a distributed swarm of such LEO satellites is required to provide total coverage of the Earth's surface. In addition to satellites, thousands of pieces of space debris are also orbiting in LEO space, which is cause for some concern. Collisions could add to the debris field and compound the risk of disabling or destroying satellites orbiting in the same plane.

NarrowBand-IoT

NarrowBand-IoT (NB-IoT) is a technology that provides lower power consumption, more capacity, and higher efficiency for IoT devices. This technology allows IoT devices to be deployed to remote areas and inside buildings. Use cases for NB-IoT include agricultural, manufacturing, utilities, and other applications.

Security

While not a technology, per se, security concerns are driving many initiatives in tech today. The publicity surrounding data breaches at T-Mobile, Orbitz, Marriott, Target, and many more, have brought security to the forefront for many consumers. This was compounded by the Facebook and Cambridge Analytica scandal, as well as other security breaches in the private and public sectors. This is largely a best-practices issue (both both consumers and companies) but it's also an issue with regard to the way digital products and platforms are architected and the way in which companies communicate policies internally and externally. There are significant waves of innovation happening in the areas of automated threat detection, encryption, and much more.
Automated Driver Assistance Systems (ADAS)
Self-driving cars have received most of the publicity, but Level 5 (complete automation) is still on the distant horizon. Meanwhile, some form of ADAS is now being installed on most new cars and aircraft. The technologies that drive ADAS systems (LiDAR, radar, image processing, computer vision, and in-car networking) have seen tremendous innovation and advancement, and we expect this entire field will continue to grow and expand in coming years.

Quantum computing
Quantum computing is in the early stages but has the potential to allow scientists to simulate incredibly complex scenarios and solve problems that would otherwise take decades of compute time. Computers as we know them today are binary digital electronic devices based on transistors and capacitors. Quantum computers use quantum bits or qubits, which can be in superpositions of states (instead of only two definite states, 0 or 1) and will represent a step change in computing power for many kinds of applications.

Stack Stitching¹
Building software applications has always required teams of coders – software engineers. But we’re entering a new era now where creating new software applications (or just creating quick prototypes) is less about writing new code and more about stitching together the incredibly powerful code libraries and services that already exist.

A gifted stack stitcher can create powerful applications that involve deep technology such as AI, machine learning, voice, and image recognition by stitching together powerful services from AWS, Google Cloud, Azure, and others. This dramatically improves time-to-market and reduces the coding time required to build and launch a new comprehensive product. This also represents a step-change in the development of innovative new products that have a software component. The entire software development paradigm will change. The conventional paradigm of one domain expert and a team of coders will evolve to become a team of domain experts and a few brilliant stack stitchers.

¹https://link.medium.com/DwTghWyVyT
Social Sector Innovation

As long as we’re innovating, let’s save the world.

In looking at all the ways that innovation is being applied around the world today, some of the most inspiring examples are ones in which innovation is being used to solve social problems ranging from poverty alleviation and economic development to environmental sustainability and climate resilience.

In fact, the entire model of how social impact is delivered has seen innovation in recent years, as the charity model has increasingly given way to the social enterprise model, a sort of hybrid organization.

Some quick background: In the 50 years from 1962 to 2013 the world’s population more than doubled, from 3.2 billion to 7.1 billion. During that time, the world’s for-profit corporations grew and flourished while focusing on delivering products and services to the top 30% of the globe’s population, largely ignoring the bottom two-thirds.

In 2004 a business school professor named CK Prahalad wrote a book named *The Fortune at the Bottom of the Pyramid*, suggesting that there were new entrepreneurial opportunities to be found in viewing the 3 billion poorest people as a ready market rather than a burden.

The most famous example of putting this concept in action is Nobel prize-winner Mohammed Yunas, the Bangladeshi banker who developed the microfinance model, giving loans to poor communities that traditional banks had historically ignored. In so doing he not only created a profitable operation – Grameen Bank – he also lifted millions of people out of abject poverty by giving them access to credit, allowing them to build livelihoods for themselves.
Today, there are social enterprises thriving all over the world, creating innovation around the notion of harnessing the power of markets to create sustainable social, environmental, and economic change.

Can innovation frameworks such as Design Thinking be used for nonprofits and social enterprises, as they are for commercial organizations? We put this question to Bill Scull, a consultant who uses Design Thinking with commercial clients as well as with social sector clients, and his answer was an unequivocal yes. “The human centered part of talking iteratively with your customers still holds”, he said, “although sometimes there are multiple ‘customers’ - the beneficiaries, the funders, etc, but the same Design Thinking principles apply”. Along these same lines, Steve Blank has created the Mission Model Canvas¹ as an alternative to the well-known Business Model Canvas.

While a full examination of this is outside the scope of this paper, it’s worth taking a quick look at five organizations, as a way of including an overview of innovation trends in the social sector.

**USAID**

USAID leads international development and humanitarian efforts to save lives, reduce poverty, strengthen democratic governance and help people progress beyond assistance. As part of this project we interviewed Dave Milestone, Acting Director of the Center for Innovation and Impact. He discussed how USAID is using grand challenges to create innovation, and they have funded a total of 150 innovators through four grand challenges they have run¹. They have also developed an “Innovator’s Toolkit” which they distribute to organizations developing an innovative product, technology, service, or application of a creative business and delivery model that can better deliver impact at a lower cost per beneficiary².

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**US State Department**

While many people would think of US government bureaucracy as being the antithesis of innovation, as part of this paper we had a chance to interview Jim Thompson, Director of Innovation for the United States Department of State. He gave us several examples that can perhaps serve as examples of how innovation is being applied in this sector including Boldline\(^3\), startup incubator aimed at creating innovation in public-private partnerships, Diplomacy Lab\(^4\), a consortium of 37 universities to “course-source” research and innovation related to foreign policy challenges, and Fishackathon\(^5\), an innovation initiative described more fully in the “Food” section of this paper.

**Leaf**

Leaf could be described as “Venmo for refugees”. There are an estimated 68 million people who have been forced to flee persecution around the world. Carrying cash puts families at risk with thieves, corrupt border guards, and other dangers. Leaf uses Blockchain technology to provide affordable financial services to refugees crossing through multiple countries via any mobile device (no smartphone required). Friends and family abroad can also contribute into a refugee’s account, whenever the refugee reaches a point of safety, they can withdraw into the new local currency or use their balance as collateral on a microloan.

**Five One Labs**

Around the world, there are more than 25 million people living in refugee populations, most of them having been displaced by war and other conflict. While NGO’s and host governments tend to focus on delivering relief in the form of food and other aid, Five One Labs believes the power of entrepreneurship can create more sustainable economic development in these communities. Borrowing a page from Silicon Valley’s playbook, Five One Labs is creating startup incubators to help refugees become entrepreneurs, form businesses and create jobs. They launched their first operation in the Kurdistan Region of Iraq (KRI), partly because many of those refugees are Syrians who were well-educated professionals at home, and have the right to work in the KRI, making them high-opportunity candidates for a startup incubator. One can think of Five One Labs as being an “innovation on creating innovation” to benefit people in displaced communities around the world.
Rethink VC

A significant driver in social sector innovation has been as a result of re-thinking the venture capital model. Traditional venture capital is ill-suited for social enterprises, because the venture capital model is based on taking equity in startups that are being run toward for a high-return liquidity event (IPO or M&A) within a fixed time horizon (typically 5-8 years). Social Enterprises, even if profitable, don't fit this mold. And so Rethink VC and others have established the notion of a new asset class called **Impact Capital** - funds that can be raised and invested for the purpose of achieving both a financial return and social impact. Other examples include New Schools Venture Fund, and Arborview Capital. A thought leader in this space is John Kohler, who has developed innovative investment instruments for funds to use for investment in social enterprises. In a sign that impact capital is becoming a legitimate asset class, financial giants such as BlackRock, Goldman Sachs and Bain Capital have recently added impact investing units, so we may see new fund growth over the next five to 10 years as this new capital is aggregated and deployed.

Thought for Food

Covered in more depth in the “Food” section of this paper, Thought for Food is an organization working to empower the next generation everywhere in the world with the skills, connections and mindsets they need to transform our food system.

The problems the world is facing are huge. But all over the globe social entrepreneurs are using innovation to create sustainable solutions that have the promise of finally solving issues of hunger, poverty, health, and individual rights.
Food Sector Innovation

Humans gotta eat.

There are those who say that innovation can solve any problem. If that’s true, then a big win would be applying it to one of the biggest problems in human history: feeding the world’s hungry.

Food security is a big problem worldwide. Most people associate hunger with poor countries in the developing world, but in the United States, the USDA estimates that 12% of the American population doesn’t have enough to eat¹ – worldwide the number is close to one billion².

So we thought we would take a deeper look at this particular sector as part as part of our exploration of the broader topic of innovation today, to understand how modern innovation methodology is being applied to solving a big global problem.

We began by talking with Christine Gould, an expert on food and agriculture innovation. In the course of our conversation she quoted Steve Jobs, who, just a few weeks before he died, predicted that the next big wave of innovation would be at the intersection of technology and biology³. Indeed there is tremendous activity at that intersection today, much of it with the potential of solving food security as a global issue.

All over the world today, startups and other innovators are working on improving food production. Agricultural technology startups are using Internet of Things (IoT) and predictive analytics to help farmers increase their yields. Others are working on hydroponic advances to make urban farming in dense areas not just possible but profitable. Several startups are working on being able to grow meat in a laboratory. The European Union has allocated millions of euros in grants to universities working on developing new approaches to high-yield, high-quality food production⁴. In the US, the

¹https://www.ers.usda.gov/publications/pub-details/?pubid=90022
²https://www.un.org/sustainabledevelopment/hunger/
³Steve Jobs, by Walter Isaacson, page 539
⁴http://www.fp7-prohealth.eu/
Farmers Business Network (FBN) utilizes data science and machine learning to provide farmers with insights about their field crops, powered by billions of data points from the network.

In fact, food production is a sector that’s likely to see continued transformation and innovation for the coming decade and beyond, fueled by the sheer size of the problem and the opportunity.

**The problem**

Famine, of course, is as old as the human race. War, weather, crop failure, population imbalance, government policies, and economic collapse are some of the many reasons that populations are exposed to deadly famines. Five thousand years ago, the invention of agriculture made civilization possible, but at the same time it also made civilization critically dependent upon that earliest of innovations. When agriculture began, the global population was less than 10 million people. Today it’s 7.6 billion, and well on its way to 10 billion by the end of the century. The size of the planet hasn't changed any, but the number of humans to be supported by it has grown exponentially.

Food security is a key factor in our collective quest for global peace and economic stability. Countries who have underfed populations are unlikely to achieve political and economic stability. Historically, hunger and economic unrest have led to many wars.

Even in urban areas there are people who go hungry, and some underserved neighborhoods in the US are referred to as “food deserts” where low income populations are faced with neighborhood conditions affect physical access to food. High quality food products aren’t available resulting in diets that rely on convenience foods. Negative health outcomes such as obesity tend to be associated with these low income urban populations, and may even have a negative effect on the mental health of children, thus continuing the cycle of poverty.

According to the UN’s Food and Agriculture Organization (FAO) in the years 2010-2012, nearly 870 million people suffered from chronic undernourishment, representing 12.5% of the population (1 in 8 people). The same report cites several stages of food insecurity, ranging from food secure situations at one end, and full-scale famine at the other.

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5Demographic Problems, Ralph Thomlinson, page 121.  
The United Nations has established 17 Sustainable Development Goals (SDGs) as part of its goals for 2030. Goal number two is Zero Hunger. Number 6 is clean drinking water. Most of the other 14 goals (such as education, decent work, and economic development) have obvious dependencies on the availability of adequate and clean food and water.

Here is a look at the different ways that the problems of food security are being addressed by entrepreneurs and innovators around the world:

**Those genes look beautiful on you**

Genetically modified (GMO) crops can deliver a huge advantage to agricultural yields. They can be modified to be more pest-resistant, require fewer chemical fertilizers and pesticides, and grow in a wider range of climates. However, the topic has become a politically sensitive one. The body of scientific evidence appears to indicate that GMO foods are safe, but there are ongoing concerns. Monsanto, historically the leader in developing GMOs was acquired by Bayer this past year after suffering some bruising PR over their products and tactics. Meanwhile, there is tremendous excitement in the area of crop genetics around the new CRISPR and related technologies which allow very precise gene editing, a potentially a less concerning way of making genetic changes to crops.\(^8\) Recently CRISPR technology was used to block a gene expression in potatoes that induced browning, giving them longer shelf life. Other examples include apples, mushrooms and many more.

How these will be regulated is still being determined, but such innovations are not facing the same timelines as transgenic crops. A single innovation – extending the post-harvest life of certain crops – could make a huge difference around the world. The Food and Agriculture Organization (FAO) of the United Nations estimates that one-third of food produced for human consumption worldwide is annually lost or wasted along the chain that stretches from farms to processing plants, marketplaces, retailers, food-service operations, and our kitchens\(^9\).

\(^8\)https://www.acsh.org/news/2018/04/03/crispr-created-foods-are-different-gmos-its-wrong-anti-gmo-activists-pretend-theyre-not-12790
Inspiring the next generation of food innovators

If you believe in the power of entrepreneurship to change the world (as I do), then you'll love the approach that Thought for Food is taking to bring innovation to the global food production sector.

Founded by Christine Gould, Thought for Food inspires young people to develop the very food-related solutions that their own futures depend on.10 With a mission to “empower the next generation everywhere in the world with the skills, connections and mindsets they need to transform our food system,” they offer an interdisciplinary educational program, entrepreneurial support, and access to opportunities throughout the industry to solve the world’s food problems.

In their 2018 report, impacts reported to date included more than 12,000 participants, 2,000 teams in 160+ countries, 40 startups launched, 15 sponsors, 30 innovation and pipeline partners, 250 ambassadors all over the world, 25 members of the Next Gen Council, and more than 24,000 followers on social media. They are driven to create “a sustainable and inclusive food system by bringing forward the new ideas, methods, values and voices of the next generation.”

Bold future leaders will use modern innovation methodologies to transform the global food system in areas like biotechnology, vertical farming, new foods and nutrition, logistics, precision agriculture, and appropriate tech for smallholders. As Christine says “if you want to have a next generation solution, start by meeting next generation people.”

Putting the hackers to work

An innovative collaboration was organized by the US Department of State’s Office of Global Partnerships in 201411 with a mission to protect life in the ocean, make fisheries more sustainable, and preserve our planet’s future. Regular hackathons are held, inviting young technologists to create digital solutions that address the challenge of sustainable fisheries.

10https://thoughtforfood.org/
11https://fishackaton.co/
Thousands of concerned subject matter experts, developers, and designers gather for a weekend Fishhackathon. They work on the endemic problems that are defined by experts who specialize in fisheries management. The problems of overfishing and related problems that harm marine environments can be devastating. Many of these problems occur in developing countries where small-scale fishing marketplaces and communities are already struggling. Enforcement of actual protections that do exist is challenging. Fishackathon attempts to build practical solutions that solve all of these problems. This past year, 2018, Fishackathon involved more than 3,500 participants in 30+ countries and 40+ cities. Partners in the same year included the NRDC, WWF, the Stockholm Resilience Center of Stockholm University, and the Forum for the Future.

Hydroponics goes vertical
Hydroponics has tremendous potential to be part of the solution to food security, as it uses space very efficiently, allowing agriculture to develop even in densely-populated urban areas. Unlike traditional agricultural fields, hydroponic farms can be built vertically, making it well-suited to urban environments. This approach also reduces crop losses from pests, reduces the water required for agriculture, and can potentially offer significant increases in community self-sufficiency in both food supply and production.

In Europe, Holland is the largest grower of hydroponics, however, successful hydroponic start-ups are also right here in the US. In Detroit, Michigan, a woman-led hydroponic farm called Planted is providing jobs and establishing a local food source on the East Side of Detroit. “We no longer ship in lettuce from California's Central Valley,” says the founder. “That’s a big deal, and reduces the carbon footprint associated with fresh greens.”

On the consumer side, Harvest20, a startup based in Chicago is, developing hydroponic systems to help ordinary consumers grow healthy food indoors at home. Founded by an entrepreneur best-known as the CEO of Sportvision (the company that brought the yellow first down line to NFL broadcasts) Hank Adams is an avid gardener with a passion for healthy food. The stated goal of Harvest20 is to “integrate professional grade hydroponic technologies with human centered design to create garden yields comparable to a commercial vertical farm that is easy to use and does not disrupt your daily home life.”

Digital defenses

13https://planteddetroit.com/
Quite a bit of innovation activity is happening around the use of nano-sensors to detect pathogens such as salmonella in the food supply chain. The concept of a “lab on a chip” that can rapidly detect mycotoxins and pathogens holds promise with its high sensitivity. DNA barcoding and blockchain can be used, for instance, to track and classify seafood, for example, which is reportedly often mislabeled.

Nanotechnology can assist in the combining of plant sources of protein in the proper proportions. Multicomponent solutions, such as nourishing soups that combine three food groups in one serving, can offer stable food in instances of disaster relief. Alternative protein sources such as insects can be studied using sensory analysis of consumers’ taste preferences. Nutrigenomics, which explores how genes and food preferences interact, can be a major factor contributing to one’s diet. For those suffering from dysphagia, molding pureed food into its original food shape may hold promise, and may be more palatable than current alternatives.

**Educating foodservice channels and consumers**

The Culinary Institute of America and the Harvard University School of Public Health have partnered to create Menus of Change, an organization committed to the business of healthy, sustainable, and delicious food choices.

Their goals include showing restaurants that changing menus can be a powerful way to drive improvements to public health and the planet by bringing attention to the impact of macronutrients (meat) on the environment or making plant-forward dining a mainstream concept in the culinary profession and foodservice industry. Education throughout the foodservice supply chain – even in the developed world – will be a big part of solving a global problem.

**Using IoT to create an Internet of food**

By some estimates, the planet will have to increase calorie production by 60-70 percent just to keep up with population growth between now and 2050. Some of the most promising innovations in agriculture today include using the Internet of Things (IoT) in agriculture to collect and use data to optimize crop yields. Here are just a few examples from around the world:

• In India, Stellapps uses 26 different sensors to collect cloud-based information throughout the cow supply chain, collecting health data and analyzing milk’s fat content.

• Weather affects crop production, so in 2013, New Jersey’s Arable was able to raise nearly $10M for an IoT solution. This multifaceted crop and weather sensor, collects rain, hail, irrigation needs, air pollution, and other data.

• AI platform GrainSafe helps with decision-making in the grain supply chain. Founded in 2014, Telesense in Silicon Valley raised $6.5 million for its sensor ball for grain, collecting temperature, humidity, and other data.

• Managing specialty farms like orchards and vineyards, FieldIn is an Israeli start-up that provides IoT in pest management applications. AI algorithms pull and analyze sensor and weather data to fine-tune the application of insecticides in order to limit their use. A related startup, Blue River Technology, controls weeds by better utilizing computer vision.

• Wexus Technology, a San Francisco-based startup, raised $4.8M to keep track of solar arrays, processing equipment, buildings, and irrigation pumps. This cloud-based technology can monitor dropping well levels or pumps and risk of failure.

• Boston-based startup American Robotics uses drone deployment for IoT in agriculture. They’ve raised $3.1M for a system providing real-time insights on the health of crops.

By 2050, the planet will have to increase calorie production by 60% - 70%
Grow me some meat
At the giant Consumer Electronics Show in Las Vegas in January of 2019, the award for Best New Product Launch was not a new TV, a new mobile phone, or even a new voice assistant – it was a new plant-based hamburger from Impossible Foods. In fact, there are many companies today working on innovations to improve (or replace) the very inefficient way that meat is produced. In the US alone, 26 billion (that's billion) pounds of beef are eaten each year. Since one cow can drink 11,000 gallons of water each year and occupy lots of acreage, the incentive for reducing the impact of the cattle industry on the environment is significant. Some estimates are that 15 percent of greenhouse gas emissions worldwide may be due to livestock.

In addition to plant-based burgers, lab-grown meat is taking off as well, using cultured tissue as a method of growing many meat proteins using only a few cells. Using progenitor cells, researchers trick the cells into “thinking they’re still in their owner.” By using nutrients like sugars and salts, the cells turn into connective tissue, fat, or muscles. Meanwhile a startup named Just grows and harvests lab-grown foie gras.

Innovation is evolving to find a means for replacing meat and/or producing it using more sustainable methods. In the meantime, McDonald’s continues to sell 75 hamburgers every second.

Can it be done?
The holy grail of innovation is turning intractable problems into a big opportunities. The innovation activity going on today in the food sector suggests that we may be seeing just that. Around the globe, innovators are leveraging technologies, expertise, and intense dedication to eliminating food insecurity.

Steve Jobs may have been right (again): a next big wave of innovation opportunity is indeed at the intersection of technology and biology.

16https://www.wired.com/story/lab-grown-meat
17https://justforall.com/
Summary

So what did we learn? What does the future hold?

Innovation has always been at the heart of business success. What makes today different is the velocity of marketplace change and the scale and structure of many organizations.

In Christensen’s Innovator’s Dilemma, he makes a distinction between “plans to execute and plans to learn”. Established companies tend to have strong muscles around building plans to execute, while our interviewees for this project emphasized that a successful innovation group needs to focus on plans to learn.

Most of the highly-visible disruption of the past 30 years has happened from new startups. Startups have inherent agility, but Christensen posited that the biggest advantage they have is that they “can do things that it doesn’t make sense for incumbent companies to do”.

Our interviewees, almost without exception, told us that that’s the job of a corporate innovation group - to try things that don’t make sense for the rest of the organization today.

Schumpeter’s disruption is relentless. One-tenth of the economy today is in sectors where four firms or fewer control two-thirds of the market¹. Those are ripe opportunities for disruption.

The opportunity ahead is huge. At the Davos meeting of the World Economic Forum this month, it was predicted that The Fourth Industrial Revolution – which we are now entering – will unlock $3.7 trillion in economic value by 2025².

That’s what’s at stake. The great innovators will win.

¹ The Economist, November 15, 2018
² https://www.weforum.org/events/world-economic-forum-annual-meeting/sessions/shaping-the-future-of-finance
About the Author

Bret Waters has been immersed in the innovation culture of Silicon Valley for his entire career as an entrepreneur, an executive, and an academic. Today he’s a lecturer at Stanford University, teaching entrepreneurship and innovation, and consulting with select organizations. Previously, he founded and ran three successful Silicon Valley software companies and has run two non-profit organizations.

For the past ten years his volunteer work has been at the Miller Center for Social Entrepreneurship, helping social entrepreneurs to develop, refine, and scale innovative new ventures that can have a positive impact on the world, with a particular focus on women’s economic development and global climate resilience. He spent six years on the board of the Stanford University Graduate School of Education, working to bring innovation to K-12 education. Bret has served as Chief Mentor with the European Innovation Academy, teaching Silicon Valley innovation methodology to engineering students from around the world. He received his MBA from the Kellogg School of Management at Northwestern University.

You’ll find him on all the socials as “bretwaters”, or you can contact him directly via bretwaters@gmail.com
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