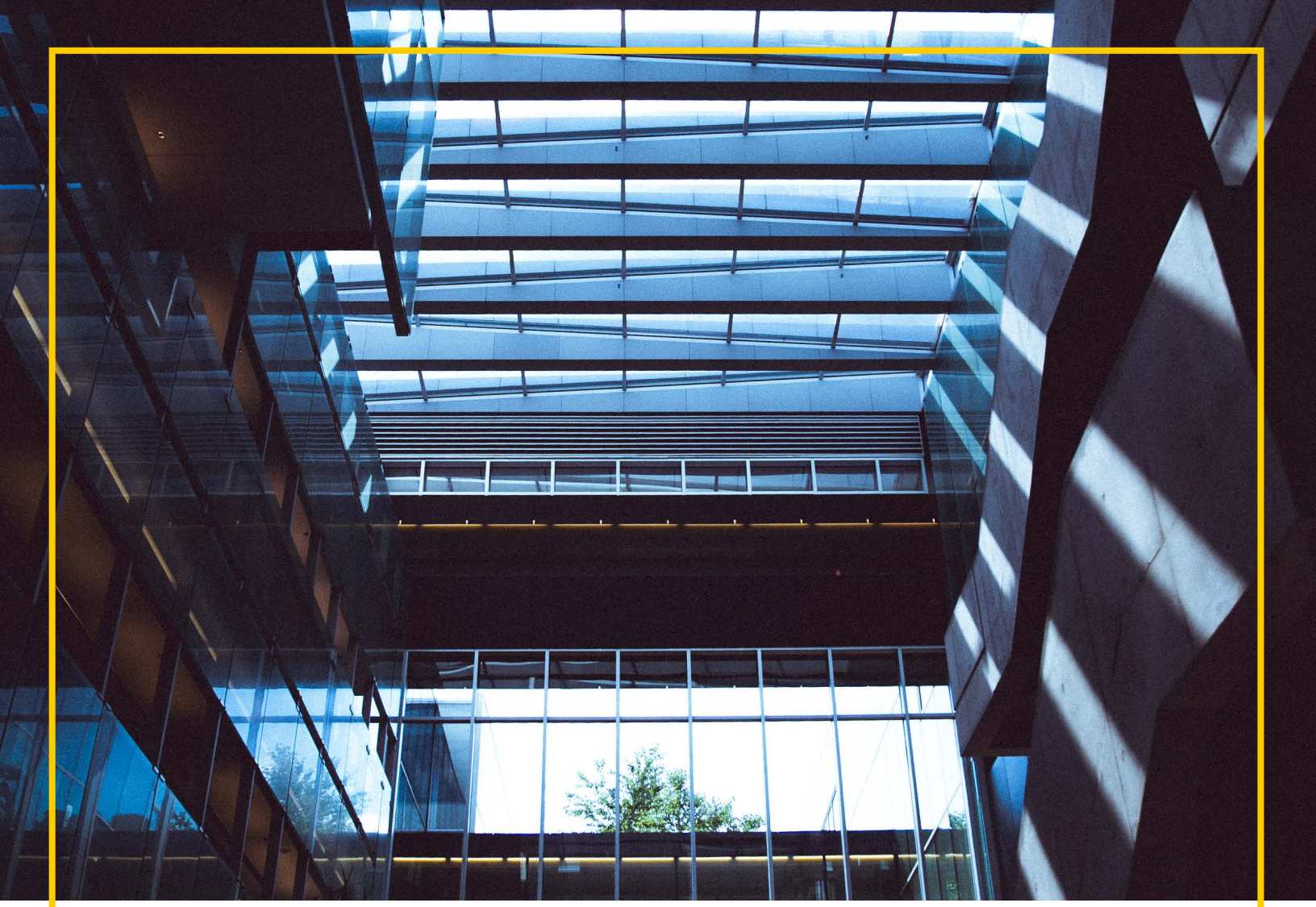

COMMUNITECH®

Towards a new understanding of intellectual property: IP 2.0

White paper by Charles Plant | November 2020

Summary

Technology, government and university leaders need to expand their concept of intellectual property. It's no longer enough to think of Technical IP in isolation. To succeed today, we need to take a broader view in which Marketing IP and Process IP are recognized as intellectual property and, along with Technical IP, are equally valued and integrated within a new IP framework—IP 2.0.

An intellectual property development journey

Let's set the stage for our discussion with a case study. Vive Crop Protection was founded in 2006 from original work done at the University of Toronto in Dr. Cynthia Goh's chemistry lab. The company is a good example of how a Canadian enterprise was able to scale, through the development of intellectual property, to become a worldwide success. Vive is now 14 years old, has multinational sales, close to 50 employees and has acquired over $28 million in capital.

Dr. Goh and five of her students, including Dr. Darren Anderson who later became CEO of the company, originally developed a way of creating nanoparticles very inexpensively and efficiently. In a departure from previously existing methods of creation, these particles were water-based, using no solvents in their production. This process formed the basis of their first patent.

Having developed Technical IP, their next challenge was to figure out who cared. To better understand the market for their IP, they searched patents for other applications for nanoparticles and began approaching companies to do joint development work in order to configure their particles to meet company needs. In this way they sought to turn their platform technology into a series of products with greater value than would be obtained by selling a commodity. They developed a small base of revenue doing this work.

It was while they were exploring product potential that they attempted to find an application that could be funded by Sustainable Development Technology Canada (SDTC). To create a project, they began to work with a multinational pesticide company. Through this relationship they began to identify agriculture as a potentially large market and, specifically, that their particles formed a good delivery system for pesticides to protect crops. Progressing from the identification of the market, research partnerships enabled them to test their application live in fields against the competition, giving them a better understanding of the competition.

This process was one of developing Market IP, the knowledge of the market's needs, competitive differentiation and market size, which they could marry with Technical IP to form the basis of a company. Without Market IP the Technical IP was essentially worth little, since a platform does not have tremendous value without an application to take to the market. Furthermore, each time they discovered a new market and a different competitive comparison, they had to go back and tweak their formulas to optimize the product for these markets. Thus, the understanding of market needs and the development of the technology went hand in hand to form the backbone of Technical and Market IP.

The next challenge was how to take this application to the market. For this they needed to either develop or acquire an understanding of the commercialization process, or Process IP. Instead of trying to get a professor and a team of students to figure out how to take their application to market, the team brought in Keith Thomas as the first CEO of Vive. He had technology commercialization experience and, by hiring him, they acquired the capability to get financing and take their new range of solutions to customers. The final piece to the puzzle was the ability to scale the technology. Grants from SDTC enabled them to scale up manufacturing and deliver to customers. With this in hand, they had all of the IP elements required to go to market.

- Technical IP (more than 30 patents)
- Identification of a large market
- Understanding of the market's needs
- Competitive differentiation
- The knowledge of how to scale the technology
- Experience in taking a product to market
- The ability to obtain capital

This example has referred to Technical, Market, and Process IP. Why is this all intellectual property? Well, in the industrial economy it was okay to think of intellectual property as the technical details of a product or a manufacturing process. Back then, markets were smaller and slower moving, competition was less intense, and market participants didn't have much choice — they bought what was available. Since the dawn of the innovation economy, however, we have moved into a new realm for intellectual property, one where technical capabilities are not enough. In the innovation economy, understanding of the market is an essential intellectual property, as is the process to get a new technology to market. Firms that focus on the development of these different forms of IP are the ones that succeed in the innovation economy. Technical IP is now table stakes; it is necessary but not sufficient for success. To succeed today, companies in the innovation economy must marry Technical IP to Market IP and Process IP. This is IP 2.0.

Towards a new definition of intellectual property – IP 2.0

Google's online dictionary defines intellectual property as: "a work or invention that is the result of creativity, such as a manuscript or a design, to which one has rights and for which one may apply for a patent, copyright, trademark, etc." WIPO goes further to say that "Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce."

Inherent in this understanding of IP is the idea of a physical embodiment of IP. It is a work or invention that defines IP. In the days of relatively few competitors in any sphere, 'products' that appealed to the masses and non-segmented marketing, this was probably an acceptable definition.

Times have changed and we are now facing highly segmented markets, 'long tail' markets and highly differentiated products targeted at individual niches. We are also facing accelerated rates of innovation, venture-capital fueled product/market experimentation and disruption in products and markets like we have never seen before. As a result, we need a new definition of intellectual property, one that reflects a new reality, one that can encompass the new types of disruption and innovation that have come to characterize the innovation economy.

In a classical economic model, the old definition of intellectual property was just fine. In the innovation economy, we need to see IP differently. The winners in the new innovation economy are the ones who have embraced the creation of new forms of IP and are succeeding because of it. The ones who are not embracing the new IP are the ones that are stagnating and failing.

The concept of trade secrets expands the definition of IP as it makes possible the embodiment of IP in any form of knowledge, whether physically manifested or not. The Government of Canada expands on the definition of IP when explaining what trade secrets are. "Trade secrets can be formulas, a business or industrial method, processes, programs, source code, a list of clients, marketing plans, or any other information that gives an organization economic value or advantage over other organizations who do not have this information." It is within this definition that we see a new potential to develop IP 2.0. Because of market segmentation, hyper-competition and disruptive innovation, trade secrets become much more important than they were in the industrial economy. In the industrial economy, industrial methods, processes programs, etc. were the critical elements of trade secrets.

It is our contention that an understanding of the market and other marketing knowledge, as well as an understanding of the commercialization process, "gives the organization economic value or advantage over other organizations," and is therefore much more critical to success in the innovation economy. Examples of this abound:

- With a greater understanding of market needs (Market IP), we might have more targeted academic research, research that can easily be commercialized.
- A better understanding of the process of turning inventions that come out at a low technology readiness level (TRL) into technology that can be productized would be valuable IP (Process IP).
- Universities might patent more if they had a better understanding of the potential markets for the inventions (Market IP).
- Universities might transfer IP less often to foreign firms if there were more Canadian firms with commercialization abilities (Process IP).
- Canadian firms might generate better returns from Technical IP if they had better Market and Process IP.

Companies, universities and the government must come to an understanding that IP 1.0 died with the transition from the industrial economy to the innovation economy and, if Canada is to succeed in this economy from the commercialization of intellectual property, we have to balance Technical IP with Market and Process IP within a new IP framework – IP 2.0.

The investor perspective

While governments and companies may not have been thinking of IP in this manner, venture capital investors in technology startups and scaleups have been doing so for many years. VCs evaluate a prospective investment using three criteria:

- Technology
- Market
- Team

Essentially, they are looking at and evaluating a firm's intellectual property. They are asking three questions:

- Has the firm developed and protected a technology that gives them a differential advantage in the market?
- Is that market large enough, and is there a good fit between the market needs and the technology, to be able to drive high growth?
- Does the team understand the process of commercializing this technology?

Venture capitalists have long recognized that all three types of intellectual property are essential to create a successful firm and it is valuable if companies focus their

development of IP more broadly to meet the needs of VCs and the needs of the market. The following describes the different types of IP that form the basis of IP 2.0.

Technical IP

Intellectual Property in the area of technology is comprised of three elements: those technical product features or manufacturing or distribution processes that give the firm a competitive advantage (trade secrets); the features of that competitive advantage that is protected by copyright or patent (patents); and regulatory approvals that the firm has been able to secure.

1. **Competitive difference**

   In whatever market a firm chooses to operate, it must ensure that its products or services are highly differentiated from those of the competition. This might be by emphasizing quality, or speed on some dimension, or by reducing costs. This competitive differentiation is created through research and development and, in a technical field, is the bedrock of a firm's strategy.

   A firm that is not differentiated from its competition does not have any valuable IP or IP worthy of protecting. It is only when a firm develops some means of differentiating itself from its competition, and that differentiation is embodied in a product or service, has Technical IP been created. At an initial level, this IP is protected by trade secrets.

   Numerous reports on Canada's innovation economy have noted the country's poor record of private-sector spending on R&D relative to other Organization for Economic Cooperation and Development (OECD) countries. While Canada is among the middle of the pack on public R&D spending, we rank near the bottom in business expenditures on research and development (BERD). But this finding sheds little light on our IP challenges. A firm may need to perform R&D to enable it to develop technology that is on par with the competitors, and this qualifies as R&D for the purposes of the federal Scientific Research and Experimental Development (SRED) program. Theoretically, this gives the firm a baseline of capability but does not "give the organization economic value or advantage over other organizations," and thus intellectual property that is valuable in the marketplace has not really been created.

The problem with accentuating R&D and equating it to the development of IP is that the R&D may have no value except to reach a baseline wherein it is on par with other firms. This will not create world-class firms out of Canadian R&D. Thus, measuring and focusing on R&D does not mean that IP has been created, and claiming that Canada has an IP problem when it is not doing as much R&D as its competitor nations is not a valid conclusion.

Canada ranks 22nd out of 60 economies worldwide in the Bloomberg Innovation Index, trailing countries like Germany, South Korea, Singapore, Switzerland, Sweden and Israel by large margins. It is interesting to note that the top of this list includes both large and smaller countries, showing that innovation is not a function of country size.

2. Patent protection

IP is created when there is something new and different developed that is embodied in a product or process. This IP can then be protected from the competition by either keeping it secret from the trade or obtaining a patent. As a company can choose to protect its IP in either way, there is no way of concluding from patent data whether Canadian firms are developing enough technical IP.

Surprisingly though, despite opinions to the contrary, a review of U.S. patent filings by over 3,300 Canadian and American venture-backed firms specializing in artificial intelligence, biotechnology, clean tech, and electronics show that while 67% of Canadian companies have been granted U.S. patents, only 54 per cent of American companies have. This means that more Canadian firms are choosing patents over trade secrets than American firms.

Furthermore, among these firms, the median number of patents granted per $1 million of capital to Canadian firms is 3.2, and the median granted to American firms is only 2.4. And this is U.S. patents.

Even though more Canadian firms are more likely to patent, and they receive more patents per dollar of capital than Americans, these Canadian companies have slower growth, with an average financial velocity at 4.0. — less than half that of American firms at 8.9.

Overall, Canadians are investing in intellectual property but not getting the economic benefits. All of the data says that Canadian technology companies are patenting in sufficient volume yet not generating the economic benefits that those companies in the U.S. do. This is occurring because they have Technical IP but not sufficient Market or Process IP to meet increasing needs to be competitive in the innovation economy.

3. **Regulatory approval**

   The third component of Technical IP is regulation. Firms have protected IP when they file for regulatory approval or meet international product standards. In terms of regulation, drug and medical device approval is a well-developed process around the world. In the U.S., the Food and Drug Administration (FDA) has a highly centralized process whereas in Europe the European Commission synchronized the regulations of 28 countries. In Europe, clinical trials are done on a decentralized basis and when trials are complete, approval is obtained from the European Medicines Agency (EMA) for all of Europe. Thus, an American firm can get FDA approval to sell to a domestic market of 328 million people; European firms can get one EMA approval that covers 741 million potential customers. In Canada, a similar extensive approval process covers only 38 million. A firm starting in Canada would be much better served by skipping Canadian approval and gaining more valuable Technical IP by obtaining approval elsewhere.

   Standard setting is another important aspect of Technical IP, helping to ensure that products are functional, interoperable, and safe. China has made standard setting a critical component for international industrial competitiveness. To do this, they have become more influential in international standards-setting bodies. They have also begun to adopt more international standards domestically, thus increasing the chance that products developed in China for Chinese markets will meet acceptance internationally when exported. Some Canadian firms are active in international standards setting, although it is not evident that this type of activity is broadly understood as an essential element in Technical IP.

Market IP

If Technical IP is table stakes, so is Market IP. Market IP is the knowledge that comes from identifying a large market that is ripe for disruption, understanding the needs of that market, and understanding the competition. Good Technical IP is not enough, one must have Market IP if one is to have a hope of developing a major firm.

1. **Market size**

   The first requirement for creating a major firm is to be in a large market. In terms of market type, 88 per cent of the software companies that went public from 2013 to 2020 were selling horizontal applications. The problem with vertical markets is that it is usually difficult to find a vertical market large

enough to support a public company. The second rule about markets is that the best markets are usually consumer or corporate markets, not small- and medium-sized businesses.

Our analysis of the markets served by Canadian companies suggests that Canadians are not creating the kind of research-focused technology businesses that serve large numbers of consumers or a broad base of corporations. This is observed across the life sciences, automotive, electronics and software industries. (Plant, Charles R, ***The Narwhal Project: Research into Canada's Challenges in Scaling Technology Companies, Summary of Findings,*** The Impact Centre, University of Toronto June 2019.).

China has an inherent advantage in being able to create large companies as their local market. With a population of 1.4 billion and 19 per cent of the world's GDP, China has 204 Unicorns, many of which got to their current size just serving Chinese markets. The United States has a similar inherent advantage with 328 million people and 15 per cent of the world's GDP.

If Canada wants to create larger companies, it will need to start building companies that serve horizontal rather than vertical markets, and consumer markets rather than business markets. And it must not try to build large businesses that target the Canadian market alone as the market is just not large enough.

2. Identification of market needs

The second requirement for Market IP is the identification of market needs. For Canadian firms to be successful, they must export. Canada isn't large enough to sustain the development of a world-class technology firm within its own borders, thus at some point a firm must learn to export. To export, a firm must understand the market needs in individual export markets, and that is difficult for firms not born in those markets. Many firms presume that the needs are similar between Canadian and American markets but this is not often the case. Americans buy different things for different reasons because of different market forces that operate south of the border.

American firms tend to be larger and thus operate at a different scale than Canadian firms. As a result, their needs for software will be different. They operate in a different regulatory environment so that their needs for health-care solutions and cleantech will be different. And the level of competition among firms in the U.S. is so much higher that they have distinct strategic pressures that influence their buying. The differences might not always be that great but there is a difference; products and services designed for the Canadian market do not always meet the needs of American markets.

Canadian firms that do market trials in Canada will often need to make changes to their products when selling south of the border or anywhere else for that matter. The problem for Canadian firms in developing export Market IP is that we aren't located in those export markets. Being located in their biggest market makes it easier for American tech firms to develop Market IP.

Estonia has a similar Market IP development problem to that of Canada. With a population of 1.3 million and local venture capital equal to one per cent of Canada's total, Estonia has still been able to produce a company like Skype. It currently has one tech unicorn —Bolt, the transportation network company — which is just one behind Canada's current stable of two unicorns. Estonia credits its experience with Skype, its work on becoming a digitized society and its e-residency program for its success. The country started out with a lack of resources, lack of people, and lack of knowledge but it built Market IP into the fabric of the country by putting cable internet into schools and teaching students about the benefits of information technology.

3. Understanding the competition

The third element in Market IP is the development of an understanding of competitive capabilities and pressures. To develop such an understanding, companies need to face the competition head-to-head, thus they have to go where the competition is. Too many Canadian firms do their market trials in Canada. Not only does this hinder the development of an understanding of market needs, it also hinders the development of an understanding of the competition.

Singapore is a good example of how to use a better understanding of the competition to further tech-company development. This city-state with a population of only six million people ranks fourth in the world as a blockchain ecosystem and fifth in the world in the development of a fintech sector, according to Startup Genome. This has happened because of the country's sandbox program and because of the Singapore Fintech Festival, the biggest fintech event in the world, attracting more than 45,000 attendees from 130 countries. Bringing the world of fintech to Singapore exposes companies to the competition and spurs local innovation.

Process IP

When we look at Process IP, we are looking at the team. Do they have the knowledge and experience to take a firm to success? Do they understand the commercialization process? It is often claimed that serial entrepreneurs do better than first timers. However, research has proven this not to be the case. Research from the Centre for European Economic Research looked at 8,400 entrepreneurial ventures in Germany. They determined that "previously successful entrepreneurs were no more likely to succeed in their next venture, and that previously failed founders were more likely to fail than novice entrepreneurs." So, there may not be Process IP owned by the entrepreneur but there are three forms of Process IP, the ownership of which can accelerate a company's growth.

1. **Does the team know how to scale the technology?**

   Scaling technology applies to every technological venture. Software platforms must be scaled to serve more people. Cleantech inventions must be scaled to become cost efficient. Scaling occurs in the manufacture at scale of any product, whether outsourced or done in-house. And it applies to biotech and pharma in that scaling is the process of obtaining regulatory approval for a discovery.

   A firm will have Process IP when it has a founder or an employee who has successfully scaled similar technology in the past. The more employees that have this skill, the more scaling Process IP the firm will have. Canada is challenged to source individuals with Process IP because there are so few companies in Canada that have successfully scaled. In Silicon Valley, when a firm gets financed by a leading VC, they reach out to their stable of people who have worked at other successful firms and instantly acquire Process IP.

   Canadian companies in the software sector have a fairly well known and straight forward path for scaling technology, and those in biotech have a highly regimented path with much support. Companies scaling in cleantech can count on SDTC for assistance but those in physical technologies, the ones creating hardware, electronics, medical devices, etc., have a fairly complex path to scale technology from invention through to product and then to manufacturing. And unfortunately, they have little government help in developing this type of Process IP.

   As was reported in Physical Technologies: Challenges in Obtaining Government Support for Commercialization, (Plant, Charles R. The Impact Centre, University of Toronto November 2017), there are no government programs that support the early-stage physical technology commercialization without requiring some external matching of funding. And yet, due to the risks associated with

physical technologies, the probability of securing external funding is very low, particularly without the ability to develop Market IP, until product development has reached a stage where customers can understand its potential applicability. Without market validation, venture capitalists and other investors will not support a company. However, without their support, no matching funds are available, so it is easier just to license the technology to a third party who can afford the investment.

While Canada lacks much direct support in technology scaling, German companies can rely on the support of Fraunhofer, one of the leading applied-research organizations in the world with an annual budget of 2.8 billion Euros and a staff of 25,000. They have 72 research institutes, each focusing on different fields of applied science. They earn 70 per cent of their income through contracts with industry, helping clients develop Process and Technical IP.

2. **Does the team have the capability to drive market adoption and growth?**

In addition to understanding the process of scaling IP, a firm must know how to scale markets, and how to drive adoption and growth in those markets. Silicon Valley firms buy that IP by hiring people with direct market development experience in firms that have scaled. For Canadians, this is not as easy.

Research into this type of Process IP (Plant, Charles R, The CMO Search: Where are Canada's Chief Marketing Officers? The Impact Centre, University of Toronto June 2017) found that Canadian-based marketing leaders are less qualified and less experienced than their American counterparts. It found that only 38 per cent of Canadian marketers of tech firms based in Canada had prior experience in high-growth firms. Eighty-five per cent of U.S.-based marketing leaders working for U.S. firms had prior experience at a VC-backed high-growth firm or industry leader. Canadian firms solved this Process IP issue when they hired U.S.-based marketers. In these cases, 83 per cent had relevant experience.

Israel, a country with nine million people, has seven unicorns to Canada's two. This is partially due to the way they develop Process IP, specifically in the area of market growth and adoption. Instead of trying to hire Israelis in Israel to market and sell products to the U.S., they set up shop in the U.S. and hire experienced Americans to do this. A 2013 study showed that 211 Israeli companies had set up shop in Massachusetts and had employed 6,700 people, most locals. This hiring of experienced local talent meant that they were able to purchase Process IP instead of trying to develop it themselves.

3. **Does the team understand the financing process?**

   Finally, the last element of Process IP is the understanding of how to use capital to fuel growth. Since there have been relatively fewer Canadian companies that have become unicorns or gone public on U.S. exchanges, there are relatively fewer CFOs who understand the finance process in Canada as opposed to in the U.S.

   The sufficiency and use of venture capital was examined recently (Plant, Charles R, Canadian Venture Capital Sufficiency: Does Canada Have Enough Venture Capital Funding? The Impact Centre, University of Toronto September 2019.) It was determined that although "Canada is positioned second in the OECD for the amount of VC invested annually, we are in last place at turning this investment into Unicorns. This situation is so bad that even if we were to create four times as many Unicorns, we would still be in last place." This problem is due to the fact that we in Canada have little experience at acquiring the vast amounts of money required to scale and apply that money efficiently.

   The United Kingdom, with 25 unicorns to Canada's two, has developed a venture capital process that is seen as the most successful in Europe. Their companies out-raise those in the rest of Europe by a significant margin but most significantly, in the five years ending in 2018, they were the biggest source of exits in Europe, with sales and IPOs worth $119 billion. The increased level of company funding and successful exits has created a pool of experienced finance professionals who can bring Process IP relating to finance to new startups.

The role of government in IP development

Commonly used productivity and innovation indicators show Canada's innovation economy declining relative to other countries. Despite large public investments, Canada still trails most of the OECD countries on productivity measures. In terms of technology scaleups, data shows that we trail every other country in the world at the rate of unicorn creation. Our fundamental problem is that we are at a distinct disadvantage, and always will be, in developing Market IP because we do not have, and never will have, a large local market. We are at a temporary disadvantage at developing Process IP but can overcome this disadvantage with time.

The Canadian government has played a significant role in efforts to reverse this decline. For more than five decades, we have seen the proliferation of new programs at the federal and provincial levels aiming to spur productivity and the growth of an innovation economy—yet without significant improvements in country-level data. This is, we believe, primarily due to the fact that governments throughout Canada

have focussed almost entirely on supports for companies in the development of Technical IP, with only minor supports for the development of Market IP and Process IP.

Budgetary documents for Canada show a continued and strong focus on R&D. Although innovation is emphasized increasingly, commercialization of research remains neglected. This thinking is analogous to the myth of the better mousetrap: that a better product is all that is needed for commercial success. The first opportunity for the government is to revamp their activities to increase their focus on commercialization and related functions, such as marketing and sales.

Every company attempting to scale needs to develop a balanced portfolio of Technical, Market, and Process IP. And yet we rarely talk about the latter two types of IP. It is time for Canada to fully embrace the innovation economy and for governments to help us in the development of Market and Process IP to complement our development of Technical IP.

Conclusion

The innovation economy has forever altered the way in which companies need to develop intellectual property. To be successful entrepreneurs need to develop plans and strategies, not just for the development of Technical IP but also for the development of Market IP and Process IP. Technical IP is now only table stakes, necessary but not sufficient for success. When married though with Market and Process IP, a firm has the chance to build a highly successful business and potentially dominate world markets.

About Charles Plant

Charles Plant is a serial entrepreneur, innovation economist, university lecturer and consultant. As founder of The Narwhal Project, he is conducting research into what it takes to create world-class technology companies. Plant has written more than 35 research papers and a book entitled Triggers and Barriers: A Customer Perspective on Innovation. He is currently working on his second book: Unicorn Math: Developing an Algorithm for Rapid Growth.

Plant was co-founder and CEO for 15 years of Synamics, a software firm that provided mass calling platforms to telcos. He has been an officer, director and/or investor in more than a dozen technology companies. He has worked for the MaRS Discovery District and has taught at York University's Schulich School of Business and at the University of Toronto. A Chartered Accountant, Plant also has an MBA in marketing and is currently pursuing a PhD in Economics.

About Communitech

Communitech helps tech companies start, grow and succeed. That's our mission, our mantra, our reason for being. Everything we do ties back to collaboration and helping—values that run deep in our organization.

Communitech was founded in 1997 by a group of entrepreneurs committed to making Waterloo Region a global innovation leader. At the time it was crazy talk, but somehow this community managed to pull it off. Today, Communitech is a public-private innovation hub that supports a community of more than 1,400 companies—from startups to scale-ups to large global players.

Communitech helps tech companies start, grow and succeed in three distinct ways:

- Communitech is a place – the centre of gravity for entrepreneurs and innovators. A clubhouse for building cool shit and great companies.
- Communitech delivers programs – helping companies at all stages with access to capital, customers and talent. We are here to help them grow and innovate.
- Communitech partners in building a world-leading ecosystem – making sure we have all the ingredients (and the brand) to go from a small startup to a global giant.

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