Chapter 2

Intellectual Property Management – An American Start-up Case Study

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Abstract: This chapter explores the impact which intellectual capital has on innovation management and illustrates this impact using the example of PuppTech Inc., a technology start-up working on environment-monitoring technology to protect the wellbeing of pets in vehicles. The goal of the authors is to use PuppTech as a tool in the exploration of the impact intellectual capital and its protection has on innovation management within start-ups. First, the concepts of intellectual capital and innovation management are introduced through the example of PuppTech. Next, different types and methodologies of intellectual property protection are defined and discussed, using PuppTech as the main illustrative tool. Lastly, the benefits of protecting intellectual property in regard to innovation management are given, along with a list of common mistakes and their consequences.

Keywords: Start-ups, Information technology, Intellectual property, Intellectual capital protection, Management, Patent law

Introduction

This chapter discusses the issues involved in protecting intellectual property (“IP”) in start-up companies. Typically, start-up companies generate considerable valuable IP

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– but protection of that IP represents a considerable problem with non-obvious solutions. Clearly IP is important in start-ups, although just how critical depends on the nature of the company and the sector in which it finds itself. But IP protection is only one of many challenges confronting a start-up, between developing the product/service, understanding the environment in which the company will be evolving, validating that a market exists and that customers are willing to pay for it, creating a strategy to reach that market, putting together the management team and raising money to fund the costs of these operations. IP protection must compete with these other priorities for the never-sufficient early-stage funds and management time (an even scarcer resource). Understanding these trade-offs is best accomplished by analyzing how “real-life” companies deal with these issues.

To study this problem in a real-world setting, we have examined a case study to determine what steps the start-up did – and did not – take to protect its IP. PuppTech, Inc. is a Denver (CO, USA)-based start-up that provides an example of how IP protection has competed with these other priorities in more than four years since the PuppTech project began. The authors are intimately familiar with this project as one is a co-founder (with his son) and Chairman of the Board of Directors, and thus involved at all stages of the deliberations and decisions concerning PuppTech’s IP. The second has been an intern and is now employee with the company for three years and is currently Director of Communication.

PuppTech background

PuppTech is an “Internet-of-Things” company in its early stages. It has three initial products: (1) the PuppComm, a monitoring device that captures temperature, humidity, and ambient noise and transmits this data to a cloud-based system, including a smartphone application so that traveling dog owners who must leave their dogs alone (e.g., in a parked car) can know the conditions of the dog’s environment; (2) BSCUIT (Breed Specific Climate Understanding Information Technology), an algorithm that calculates environmental risk for individual dogs; and (3) the K9 Weather Vane, a web app that provides current and future local weather information and recommendations as to when it is safe to be outside with the dog.

PuppTech saves dogs’ lives and lowers handler/owner stress. Its integrated hardware/software system helps dog owners understand how environment risks affect dog health and provides information to keep them safe when handlers/owners are absent, reducing stress. BSCUIT is the first tool providing individualized environmental information allowing handlers/owners and businesses serving them to protect the health of dogs. Through this, the handlers/owners can leave dogs in vehicles and know the conditions through a smartphone app, thus lowering anxiety. Businesses serving dogs can establish an optimal temperature range for each dog and receive alerts when temperatures diverge from that range.

The PuppComm also lowers owners’ anxiety by providing passersby with a way to check on the conditions inside the car, thus removing the temptation to call the

police or break the car's window. Owners spend more time with their best friend (often dubbed their "fur baby") by being able to bring the dog for shopping, errands or excursions without endangering them and thus include dogs in many more daily activities.

PuppTech's initial market is consumers, although before targeting the general public, it will go after the "low-hanging fruit" – working dog owners in their individual dog-owning capacity, hunters and dog show owners, as these groups spend much time with and money on their dogs and understand the PuppTech value proposition more readily than the general public. In addition to the consumer market, PuppTech will target working dog owners (e.g., the military, police, border patrol) that have to travel with their dogs and leave them in vehicles in the course of their work.

PuppTech intends to develop the PuppComm into an ecosystem platform to which other pet-related devices (e.g., video cameras, health monitors, treat dispensers) may be connected so that traveling dog owners can use these devices to the same extent as when they are home with their dogs. The PuppComm will also gather data about how dogs experience temperature changes in cars and other environments, for use in the research and the development of additional products and services (data may become valuable assets in themselves).

The development of the PuppComm has not been a linear process and provides a good example of how early-stage businesses must adapt to market conditions. PuppTech's founders initially intended to solve the "dogs-in-hot-cars" problem by developing a portable, ice-cooled air-conditioning unit that could be left in a car while the owner was absent to provide cooling in warm weather. They developed (at a cost of approximately \$50,000) a working prototype, the PuppWaggin', that was effective in keeping a car with a dog inside at a non-dangerous temperature for 90–120 minutes (namely, enough time to do an errand or stop for a meal). PuppTech's management, however, realized that they were not going to be able to attract investment capital to build PuppWaggin' as potential investors balked at the cost and complexity of manufacturing portable air conditioners. Although effective, the proposed cooling solution had no competitive advantage over other portable coolers as dog owners did not want to purchase a large and expensive (some \$500 retail) cooling unit. Moreover, high-end cars such as the Tesla Model S and Model 3 have already "solved" the problem the PuppWaggin' was addressing, and management came to believe that portable air-conditioners could, as car technology advances and becomes less expensive, rapidly become obsolete.

For this reason, the PuppTech team decided to abandon the cooling unit with embedded electronics and "pivot" towards the sensing device (i.e., the electronics alone) and app. PuppTech's current system offers a cloud-based "passerby interface", with a unique identification number sticker allowing those passing by to text and know the conditions inside the car, thereby eliminating the need to break the windows or call the police to save the dog. PuppTech after launching the PuppComm is also offering third-party cooling units to those owners who wanted to keep the car cool. The pivot was successful, as PuppTech was able to raise an initial round of angel funding, and as of this writing (March 2019), has completed a product crowdfunding campaign to launch the PuppComm commercially and raised additional equity investment from a strategic

partner. PuppTech is, as of the time of this chapter, seeking to raise additional equity capital for further development.

PuppTech's intellectual property

PuppTech finds itself in a situation common to many start-ups – it has a clever idea which solves a problem in the market place (dog owners who want to know the condition of their pet when they are not with them, particularly those left in cars that can heat up quickly in warm weather), combining hardware and software in an innovative way, but one that is unlikely to result in a patent. The real protection for PuppTech's IP comes from being first to market and developing faster than potential competitors (as well as building up a community of loyal dog-owners that would be difficult for knock-off firms to replicate).

Threshold questions

In evaluating any business opportunity and the IP required to support it, the authors propose three threshold questions. While the questions are easy to state, the answers require an in-depth understanding of the market and the environment in which the company will be operating.

To what problem currently perceived by our proposed clients do we offer a solution?

While inventors often fall in love with their technology, if the customers do not have a problem or feel a need, the proposed invention, no matter how brilliant, will not gain "traction" (a magic word in start-up circles). A medical analogy illustrates this point. If a person doesn't feel sickness or pain, they would not see a doctor. If they do seek medical advice, they do not care why the proposed treatment is technically better than other medications or devices as they only want the pain to go away. Products that eliminate customers' pain will find resonance; identifying that pain is the critical first step.

This question also emphasizes another key point – customer perception is more important than any objective or underlying "reality". Until a start-up understands how its customers perceive their situation, it will not be able to present its solution in a way that responds to customer needs.

How can we offer our customers the "quiet life"?

The 21st century marketplace grows "noisier" by the day. Potential customers in every domain complain of the complexity of their lives and that they don't have enough time. Products that can simplify customers' lives and lower the levels of stress and complexity

have the greatest chance of breaking through the ever-mounting noise in an increasingly crowded market.

If this idea is so great, why hasn't some organization with more human and financial resources already produce a solution to the problem we propose to solve?

This question forces inventors (at least temporarily) to take on a certain level of modesty. The chances of being able to answer the above two questions with an idea that no one has previously considered are small. If a company thinks an idea can make it the next Facebook (or Amazon, Google, etc.), why hasn't Facebook, with its thousands of bright, ambitious employees and vast financial resources, not already done what the company is proposing to do?

PuppTech has spent years trying to respond to these questions. The answer to the first of the three questions came from the founders' personal experience, hiking in the mountains with their dog and wanting to stop for lunch afterward – and experiencing the stress of worrying about the dog in a rapidly heating car on a warm day. For the second question, while the first instinct in positioning the product was “spend more time with your dog”, conversations with hundreds of dog owners (at trade shows and other dog-oriented events), convinced management that the negatives of worrying about the dog and wanting to know the real time conditions of the dog's environment when the owner is absent were more important than the positives of more companionship. The last question has been the hardest to answer (and management is still not certain why). It appears, however, that the technical challenges of controlling a parked car's environment and the legal implications of leaving a dog in conditions which threaten its safety have kept others out of this space. But the search continues . . .

Types of IP protection for start-ups

For most start-ups, IP protection involves confidentiality agreements, patents and trademarks. While copyright may be important for software companies, this chapter will not consider copyright further.

Confidentiality (non-disclosure agreements)

For all start-ups, IP protection begins with the creation of a non-disclosure agreement (“NDA” – also called a “confidentiality agreement”). An NDA is generally a brief legal document in the form of a contract between the company and the potential recipient of information from the company (the “Promisor”) whereby the Promisor acknowledges that the company regards the information it wants to furnish to the Promisor as potentially trade secrets, and that the Promisor will treat such information as it would its own confidential information and thus use the information being disclosed only for the purposes of the potential business relationship between the company and the

Promisor. Such agreements also often (and should) contain non-circumvention and invention assignment language. Prudent companies will only disclose the most general information without a signed NDA.

In the context of start-up companies, the legal value of such agreements is limited. They are difficult to enforce (McCarthy, n.d.) and rarely result in lawsuits, at least in the authors' experience. They are appropriately used among co-founders, start-up employees, independent contractors, strategic partners and should not be used with potential investors (who see many opportunities and will not want to limit their ability to examine others), lawyers or accountants (both of whom already have non-disclosure requirements through their professional codes). The primary utility is to show that the company takes IP protection seriously and to act as a "shot across the bow" that will discourage promisors from potential competitive use of the information.

Signing such an agreement is commonplace in the US and failure to sign such an agreement is considered a "red flag". For foreigners entering into contact with an American start-up, such an agreement may be their first (and not entirely welcome) contact with the American legal system.

As mentioned above, start-up companies should not seek to obtain an NDA from potential investors. Investors see hundreds if not thousands of deals every year, and a company asking a potential investor to sign a confidentiality agreement will simply result in the investor not considering the deal any further (and the company's organizers being considered hopelessly naïve). Investors live by the "Financial Golden Rule" – that is, "He who has the gold makes the rules"). Showing the deal to a potential investor may involve a risk, but it is a risk that the company must accept if it wants funding.

Patents

A patent is a government-granted monopoly (in the United States, from the United States Patent and Trademark Office ["USPTO"]) to use the information or technology covered by the patent during a limited period of time (in the US, 20 years from the date of the full patent application). In the US (and the law is similar – but not identical – in European and other jurisdictions), to receive a patent the information/technology must meet each of the following four criteria, as shown in Table 1 (Tysver, 2018).

While the US definition of patentable subject matter is among the broadest, it is still controversial as patents for software, medical tests and diagnostics are currently open questions. The subject matter also must not come within one of the exceptions to patentability – abstract ideas, laws of nature, and natural phenomena. What qualifies as patentable subject matter may change from time to time, as new statutes are enacted and new cases decided.

Should inventors get a patent for their new product or idea? The answer is not obvious. According to Richard Harroch in the American business magazine *Forbes*, "Patents are the best protection you can get for a new product" (Harroch, 2017). Others disagree as "Early stage startups tend to worry about patents. Usually they shouldn't" (Crompton, 2017) says Singapore entrepreneur Alex Crompton, while Appster argues " ...in the

vast majority of cases we at Appster recommend that entrepreneurs skip the entire patent seeking process whilst their start-ups are still in their beginning stage” (Appster, 2017). What’s an entrepreneur to do?

Table 1. Definition of different patent types and their utility

Type of Patent	Definition	Utility or Lack Thereof
Statutory	For the USPTO to issue a patent, the subject matter must come within the definition of the US Patent Act Section 101 as to whether the subject matter is patentable.	Patents may be issued for processes, machines, articles of manufacture, and compositions of matter.
New	The invention must be considered “new” or “novel”. An exception in the US exists for disclosures by the inventor within 12 months of filing the application, but “the clock may start ticking” from, e.g., a casual disclosure to a friend who is not under an NDA. This exception is not, however, available in many other countries and is not as robust as it was prior to the effective date of the America Invents Act in 2013, so that prudent inventors file an application prior to any public disclosure. If the invention is deemed disclosed, it permanently loses any possibility of patentability.	The invention cannot be known to the public, described in a printed publication, or described in a published patent application or issued patent.
Useful	The invention must be used in products or services which have a useful purpose.	Invention must work and have some practical utility or application.
Non-obvious	The invention must be a non-obvious improvement over “prior art”, defined as whether it would have been obvious “to a person having ordinary skill in the art to which the claimed invention pertains”.	This criteria is one of the most difficult areas to determine in patent law.

Below is a discussion of the advantages and disadvantages of getting a patent:

Advantages

Among the benefits of having a patent are:

- Patents encourage organic growth. Having a patent increases:
 - Start-up sales growth (51%);
 - Employment growth (36%);
 - The probability of an initial public offering (IPO) (136%); and
 - The probability of being acquired (86%).
- Patents increase the multiple when the company is sold. Companies with good to great patent coverage generate sales of 5–21 times earnings. A 24% premium in market valuation has been attributed to a doubling of a company’s patent inventory.

- Patents attract investor attention. Receiving a patent grant increases the likelihood of venture capital funding by 53% over the unconditional probability. The effect is greatest for companies that had little or no venture capital funding before the patent grant, were founded by inexperienced entrepreneurs, and are in the information technology sector.
- A patent is a monetizable asset. Patents are intangible assets that can be used as collateral, may be depreciated and qualify for research and development tax credits. The mean value of a patent in 3Q2015 was \$288,000; the median value was \$233,000.
- Patents offer first-mover advantages. Patents show innovation and establish credibility with investors and customers.
- Patents are used as stock performance predictors. A number of stock-predictor algorithms include patents as predictors of innovations that can be converted into new products.

Disadvantages

Patent skeptics offer the following arguments (Appster, 2017):

- Start-up patents are too costly, too time-consuming and too restrictive
 - An “extremely simple” patent tends to cost a minimum of \$6000; the total cost of preparation and prosecution is in practice closer to \$60,000.
 - Some 97% of patents generate less revenue than the cost of obtaining them.
 - A basic patent filing can take from 2–5 years to complete; the USPTO reports that the average wait time for the first office action in 2016 was 16 months, and total patent pendency averages 25 months.
 - Patent applications have only a 56% chance of being approved.
- Fast execution is better than a patent. Companies like Google, Facebook, Apple and Airbnb began operations without patent protection (and sought patents only after they were generating revenues). Groupon has been cloned by thousands of other companies but still had its IPO in 2011 and remains in operation. In addition to industry evidence, there has been extensive academic evidence suggesting the speeds at which innovations are publicly disclosed “are related to the pecuniary reward from licensing” those innovations (Link, 2003).
- Businesses change. The head of one of the top US accelerators estimates that 70–100% of new start-ups have a different core idea at the center of their business after the first three months of operations (as PuppTech discovered).
- Other more cost-effective IP protection strategies exist. Some of the more important IP assets that are much easier and cheaper to obtain than patents include:
 - Domain names;
 - User names on social media sites; and
 - Trademarks.

Provisional patents

If a company decides to follow the patent route, in the US most start-ups with potentially patentable IP file a provisional patent application with the USPTO. A provisional patent gives the IP owner a filing date, but it does not require the detailed information that a non-provisional patent application requires and involves a significantly lower fee. A provisional patent application is valid for 12 months; after that time, the IP owner must file a non-provisional application to preserve its rights.

The primary purpose of a provisional patent application is to establish priority for the subject of the application. While the application is not reviewed by a patent examiner, inventors should disclose as much as possible in the provisional application, including drawings, specifications and photographs. Anything not included in the provisional patent application is not considered part of the invention (Quinn, 2017).

The United Kingdom (Go, n.d.) and Australia offer similar possibilities. On the continent, provisional patents as such are unknown, but, as IP owners have the right to make a filing and get a priority date without paying a fee for up to 12 months, the effect is more or less the same.

It is worth noting that in the early stages of developing the PuppWaggin', PuppTech's founders filed a preliminary patent application on February 9, 2016, followed by a full application on February 9, 2017. PuppTech's attorney received initial comments from the USPTO reviewer in May 2018. PuppTech's costs to date for its patent-related activities have been some \$5300. Although PuppTech does not intend to pursue commercialization of the PuppWaggin', its patent attorney indicates that a patent for the PuppWaggin' is likely available, and PuppTech is currently considering whether to pursue the patent application for defensive purposes (i.e., to make it more difficult for potential competitors to offer a cooling solution).

Developing a patent strategy

Every start-up needs a patent strategy (which should be part of a broader IP strategy). The strategy should be written as it forces management to think through the hard questions in developing a strategy. As Dwight Eisenhower said, "Plans are worthless; planning is everything." The strategy should cover both patentable and non-patentable IP (the value of which companies often underestimate at their peril). Even if an idea is patentable, a patent does not guarantee that the underlying idea is commercially valuable.

Some suggestions for inclusion in the patent strategy are (Harrock, 2017):

- Seek patents directed to the core value of the company's innovation. Filing a large number of patents (which inevitably leads to cutting corners) is rarely good value for money.
- Look for patent claims that can be monitored. A company should be able to learn enough about competing products/technologies to determine whether infringement is occurring.

- Consider a global patent strategy early on. Particularly if the company is producing hardware, obtaining patent protection in international markets (even China) may be cost-effective.
- Avoid patent litigation whenever possible. Litigation is slow, costly, a drain on management time and uncontrollable. As appealing as the idea of suing on principle may appear, it is rarely cost-effective.

Trademarks

As noted above, trademarks present fewer technical and drafting difficulties than patents, but the rights can be just as significant – and mistakes just as costly. Choosing company and product names carefully and doing some initial research on domain names, the Internet and with the appropriate trademark registration authorities are an essential minimum.

Definition and key issues

The Business Dictionary defines a trademark as a:

“Definitive design, graphics, logo, symbols, words or any combination thereof that uniquely identifies a firm and/or its goods or services, guarantees the item’s genuineness, and gives [its] owner the legal rights to prevent the trademark’s unauthorized use” (Business Dictionary, n.d.)

A trademark must be:

- Distinctive or arbitrary instead of descriptive or generic (although, if a mark is descriptive or generic, it can still be used as a trademark, but without registration and the same levels of protection by a court as distinctive or fanciful [“arbitrary”] marks);
- Affixed to the item sold;
- Registered with the appropriate authority (in the US, the USPTO) to obtain legal ownership and protection rights.

The key test applied in most jurisdictions is whether the new mark is likely to cause consumer confusion in the marketplace. The “consumer confusion” test is based upon a number of factors, including:

- The degree of similarity between
 - The marks;
 - The underlying goods or services;
- The parties’ channels of distribution and advertising;
- Whether consumers for the two marks are sophisticated; and
- The presence or absence of actual confusion (Huston, 2015).

Obtaining a trademark

In the US, the USPTO handles both patents and trademarks. The owner files an application (usually after doing a search for competing marks) and pays the application fee (a minimum \$225 as of August 2018 (T, n.d.)). Usually about three months later, an examiner will review the filing. If the examiner finds that the application properly describes the product or service, that the mark is not merely descriptive and that the proposed mark is not confusingly similar to existing marks, it will be “published for opposition”. If no opposition occurs within 30 days, the mark will be registered, subject to the mark actually being used in commerce. The USPTO will, however, grant a conditional approval for a trademark based upon an “intent to use”. This “intent to use” declaration may be renewed every six months (with up to five extensions). Once the trademark has been used, the owner files a Declaration of Use, at which time it can continue using the trademark indefinitely (unlike a patent, which has a specific expiration date). In Europe, the procedure is similar, although in many countries the mark will be registered prior to opposition.

PuppTech spent \$675 in its unsuccessful attempt (without hiring a trademark lawyer) to register the “Go Pawsible” trademark; the USPTO refused to take a position until it reached a decision concerning the trademark of “Healthy Pawsibilities” and could provide no timetable as to when a decision might issue. These amounts do not include any of the costs associated with the name change. While the owners did receive preliminary approval for the “PuppWaggin” trademark, soon after such notification, the company decided to abandon commercialization of the cooling product and thus abandoned the trademark application for “PuppWaggin”.

The company name

Choosing an appropriate name is an often under-appreciated and extremely important task. The name should not only be descriptive or at least suggestive of what the company does, but it should be distinctive and memorable. It should also provide the opportunity for growth and expansion into other products and services. Some of the considerations in choosing a name are:

- Search the name carefully at the following sources to make sure the name you are seeking (or a similar name) is not already in use
 - The Internet;
 - The USPTO (or similar organizations in other countries);
 - The Secretary of State or other official registrar in which the founders propose to create the company as a legal entity.

We strongly recommend having a trademark lawyer conduct a search after a company has made a preliminary decision on a name. Trademark lawyers can evaluate far better than any layman whether the company is likely to be able to obtain a trademark and whether use of the name risks infringement on existing trademarks.

- Make sure the domain name is available for the company's proposed web address.
- Verify (and, for companies considering going international, appropriate and easy to pronounce and spell) in other languages; the Chevy Nova ("Chevy doesn't go" in Spanish) is a cautionary tale.

Once the company has completed the above "due diligence" and is convinced that the name is available, it should file a trademark application as soon as possible. Changing a name (as PuppTech learned, much to its sorrow) is a painstaking and difficult process as the further along a company is in its development, the more difficult, painful and costly a name change becomes.

Because of the uncertainty surrounding the name "Go Pawsible", the company decided to change the name of the company to "PuppTech" (and the name of its product to the "PuppComm" when it made the "pivot" from a cooling device with embedded sensors to a sensing device only). The owners subsequently hired a trademark attorney to file new applications for "PuppTech", "PuppComm" and a paw in a blue circle as a logo. These applications have been approved on an "Intent to Use" basis (and PuppTech management suspects that the fact of having an attorney doing the filing, rather than a lay person, was a significant factor in its successful applications). The cost of the PuppTech-related trademark applications to date has been some \$5000.

Trade secrets

The US Uniform Trade Secrets Act (adopted by 47 states and the District of Columbia) defines a "trade secret" as:

- "information, including a formula, pattern, compilation, program, device, method, technique, or process that:
 - Derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use;
 - Is the subject of efforts that are reasonable under the circumstances to maintain its secrecy" (Staff, 2017).

Some of the steps to protect trade secrets include (Aeton, 2018).

- Identifying what trade secrets the company has. The first step in protecting valuable company information is identifying which information is valuable (and, to the extent possible, establishing a valuation).
- Keeping the information confidential. Trade secrets are by their nature intangible and ethereal. Some steps to prevent them from "walking out the door" are:
 - Making sure collaborative efforts with third parties are done under the protection of an NDA;

- Having employees, independent contractors and third-party vendors sign non-disclosure/invention assignment agreements;
- Protecting trade secrets stored electronically with passwords with administrative privileges (and tracking who has such privileges);
- Marking documents leaving the company with a notice that the information contained is confidential;
- Restricting access to documents containing trade secrets;
- Checking and reporting periodically on the status of trade secrets (as some information may inadvertently become public through marketing or testing efforts).

One method for gathering and protecting a company's IP is to establish an online "data room" (Harroch, 2017). This data room should contain:

- Patents and patent applications;
 - Confidentiality, non-competition and invention assignment agreements;
 - Trademarks and service marks;
 - Trade secrets and proprietary know-how;
 - Technology licenses from third parties;
 - Technology licenses given to third parties;
 - Software and databases;
 - Contracts providing indemnification to third parties for IP matters;
 - Open-source software used to create company products/services;
 - Claims for IP infringement, including IP litigation or arbitrations;
 - A list of domain names;
 - Liens or encumbrances on the company's IP;
 - Source code or object code escrows;
 - Social media accounts.
- Excluding trade secret information from public filings. Companies should make sure that they exclude confidential information from public filings (e.g., patents, as these filings, by their nature, make such information publicly available).
 - Creating employee awareness of trade secrets. Companies need to make sure employees are aware of the information that management considers to be trade secrets by talking openly with employees and establishing safeguards to prevent inadvertent disclosure.

Unlike with patents and trademarks, no government entity exists to protect trade secrets. While start-ups can (and should) use caution in deciding to whom and how much to disclose and avail themselves of confidentiality agreements to the greatest extent possible, any protection that such agreements provide is limited at best. The value of such agreements depends (beyond the "in terrorem" effect) largely on the good faith

of the “disclosee” and the ability and willingness of the company to defend its trade secrets legally (which, at least in the US, can be prohibitively expensive).

PuppTech has not yet made an inventory of trade secrets beyond its patent and trademark applications (although it intends to do so post-crowdfunding). It has signed NDAs with all team members (and invention assignment agreements with its employees) and its third-party suppliers.

Protecting IP in developing a start-up

While the value of IP may vary depending on the nature of the start-up, at least for some it may be the most valuable asset the company has (Harroch, 2017). Founders need to address IP protection issues at the very earliest stages – even when the concept is only a vague idea (as the steps below suggest). The steps to protect start-up IP include:

- Keeping the idea separate from employment work. If the potential founder is working in a technological environment, it is likely that their employer may have had them sign an agreement covering non-competition and invention assignment providing that any new ideas and inventions belong to the employer. Founders need to be aware of the agreements signed and the scope of their coverage and to make sure that they do not give any tangible form to an idea that might trigger such agreement.
- Avoiding giving ownership of the idea to others. Some of the best new ideas arise from informal discussions with friends, entrepreneurs or advisers. Offering co-founder status or submitting applications together without a clear understanding of the roles and ownership shares in the idea can cause considerable problems in a later stage. Creating a “pre-nuptial” agreement with such understandings is prudent (if hardly ever done). The terms such an agreement should provide include:
 - Who gets what ownership interest?
 - If one co-founder leaves, can the other(s) buy them out, and on what terms?
 - What are the different roles and responsibilities of each co-founder?
 - How much time commitment is expected from each co-founder?
 - To what compensation (if any) is each co-founder entitled?
 - How are key decisions to be made? (Majority vote? Unanimous vote? Sole discretion of the CEO?)
 - Under what conditions and with what procedures can a co-founder be removed?
 - What assets does each co-founder bring or invest?
 - What happens if one co-founder isn’t meeting expectations? (A common solution is confidential binding arbitration);
 - What is the overall goal or vision of the business?

- Having IP contributors assign their IP to the company. Without an explicit assignment agreement, IP in most cases belongs to the creator, and certain types of IP may require an assignment for the transfer to be effective.
- Hiring employees carefully. New employees represent a risk, particularly if they previously worked for a competitor. Hiring an employee from a competitor may expose the company to the risk of IP infringement litigation. Among the due diligence steps a company should take in hiring are:
 - Make sure that the proposed employee is not covered by a non-compete or invention assignment agreement with an existing or previous employer;
 - Require a written representation that they are not bringing any confidential or proprietary information from:
 - Their prior employer;
 - A third party;
 - Perform detailed, complete reference checks on the proposed employee.

Being careful in using open-source software. While open-source software is in most cases free and may expedite development, its use is often subject to restrictions. Start-up management should read open source licenses carefully to avoid breach of contract or copyright infringement litigation. Not all open-source software licenses are the same; some are more restrictive than others. Also, incorporation of open-source software in a customized start-up product may inadvertently turn the company's proprietary software into open-source software, destroying any IP protection and subjecting the company's proprietary code to public disclosure.

Common start-up mistakes in IP protection

"You should never make the same mistake twice. There are so many new ones to make," (Bertrand Russell) or, as first attributed to American politician Sam Rayburn, "There's no education in the second kick of a mule." Many start-ups have made the mistakes below; new entrepreneurs add nothing to the world's store of knowledge by making them again.

Underestimating the importance of IP

This common mistake is unlikely to survive the first round of contacts with serious potential third-party investors – although by then it may be too late. A few statistics should disabuse even the earliest stage entrepreneurs of this idea:

- IP represents the largest asset class held by American companies – worth some 40% of the value of all assets.

- Among the Fortune 500 companies, IP assets represent a significantly larger portion of value than among other companies – by some estimates, up to 90% (Klinck, 2017).
- Some have argued there are no direct impacts of intellectual capital on innovation, though many who take this view have later clarified that “intellectual capital did have a significant impact on knowledge management and . . . on innovation” (Obeidat 2017).
- Most IP experts, professionals, and academics agree, “superior innovative performance is dependent on a firm’s intellectual capital and its ability to sense opportunities and threats” (Han, 2015).

IP should not be viewed solely defensively as something to protect; entrepreneurs need to see it as a source of value that is part of the company’s competitive advantage.

Misunderstanding the role of lawyers

Many entrepreneurs fear lawyers, focusing primarily on the high bills they receive from them. A lawyer experienced in working with start-up businesses should be one of the first member of any entrepreneur’s core group; not having one is as crucial a hole in the management team as not having a marketing or finance expert.

In the authors’ experience, Americans tend to understand this idea better than Europeans. It is noteworthy that, in the US, if a potential business partner arrives with his lawyer, most businessmen see the lawyer’s presence as an extremely positive sign, as it means that the potential partner is “sold” (i.e., prepared to negotiate a transaction without the need for further convincing) and ready to discuss the terms of the deal. Most Europeans the authors have asked see the presence of a lawyer as indicating a lack of trust. It’s important to remember that an experienced start-up lawyer can help entrepreneurs avoid many pitfalls and structure the business (and the entrepreneur’s thinking) in ways that will make the business more likely to succeed – and to attract investment. Many lawyers (as in PuppTech’s case) will work on an advisory basis at early stage on the expectation that as the company develops, substantial billable legal work will be inevitable, and when those opportunities arise, the marketing that such advisory work represents will turn out to be a good investment.

Using trade secrets or other materials from a previous employer

Many entrepreneurs start their business using trade secrets, customer lists, management strategies, computer software or other information gained from their previous employment. Entrepreneurs must examine carefully any documents they have signed (particularly if these employers have been following the recommendations in this chapter). If a potential entrepreneur has any doubts, consultation with a lawyer, while expensive, may prove to be an extremely cost-effective investment (Guest, 2015).

Failing to create an IP plan

Most business will create a business plan, a marketing plan, a product development plan – but not a IP plan. A good IP plan has two aspects – defensive (making sure that the company does not infringe on existing trade secrets [by, for example, using the ideas of someone who is under an NDA with another organization], patents or trademarks), and offensive- looking at future product development and expansion opportunities and determining the role that IP can play in creating those opportunities (Klinck, 2017). A successful IP plan – that is, one which supports value creation – includes both a plan to manage static (IP) assets and the management of such assets in a way which protects IP without stifling its use within the company (Kianto, 2014).

Not setting up communications procedures among team members

Once the team grows beyond a handful of members, there will inevitably a separation between those creating IP and those making decisions about its protection. Good regular communications with standardized procedures between IP creators and deciders are essential as decision makers can't protect assets they don't know or take steps to minimize the risks.

Failing to hire a lawyer to register a trademark

"An ounce of prevention is worth a pound of cure". Start-ups spend considerable time agonizing over product names and branding strategies without taking the steps to secure the name. PuppTech's example is telling; it tried to save money by doing trademark applications itself and had to undergo a painful name change a year after the initial filing. When it used a lawyer the second time, it got the marks it sought without a problem (despite potential confusing names that appeared to the owners more serious threats than when it did the applications internally).

Not setting up appropriate confidentiality procedures for trade secrets

While companies do not need to go to the lengths that companies such as Coca-Cola and KFC have gone to protect trade secrets, failure to institute proper procedures can result in the loss of control of the company's IP. Once a trade secret is disclosed without protection to any third party, it is gone forever.

Disclosing patentable information prematurely

Inventors may be prevented from getting a patent if the information has previously been disclosed publicly. Such disclosures may occur through written publications, oral presentations, or electronic disclosure on websites or in social media. Premature disclosures may include offers for sale, beta testing, disclosing plans or showing prototypes at a scientific or business meeting, dissertations or other academic articles, grant proposals or filings with the US Securities and Exchange Commission (Evans, 2006). It has

also been established that disclosing – and protecting – IP preemptively can avoid unnecessary legal interactions, which usually take the form of mediations (Inkinen, 2015).

Seeking large-company partnerships too early

It is easy for start-up company management to be dazzled by the possibility of a partnership with an established company in the technology or manufacturing sector. But marriages between mice and elephants rarely work to the mouse's advantage. The problem is particularly true in distribution agreements. It may be very prestigious for a start-up to sign an agreement with an HP or an IBM. However, the agreement, while extremely important to the start-up, will never be a priority for the larger company and risks being ignored. And should the distribution agreement be successful for the parties, at some point the larger company will face the "make or buy" decision – namely, if the large company sees that the start-up's offering is truly successful, it can easily decide to end the agreement (or let it lapse with a slow death) and make the product, with a few modifications, itself. And what small company wants to sue IBM or Microsoft for IP theft?

Conclusion

This chapter has examined how a specific start-up has addressed its IP protection issues, as IP protection must be a significant part of any start-up's development strategy. It is widely recognized that start-ups, being new entrants to their respective markets, produce much of the innovation which occurs in the marketplace. Established companies' tendency toward aggressive self-preservation put start-ups in a more vulnerable position for IP theft or mismanagement. Having an IP strategy doesn't necessarily require spending considerable amounts of early-stage cash, but it does require the company to think through the value of the IP assets it possesses to take proactive steps to protect them. Though IP – and measures taken to prevent the misuse or theft thereof – can seem clerical, or even trivial to some, it is absolutely essential for startups to develop a comprehensive IP management strategy. Start-ups should not become so complacent in the fast-paced activities of their own burgeoning business that IP management is simply made an afterthought.

Many of the steps listed in this chapter are not costly but require painstaking procedures and constant vigilance (rare occurrences in start-ups). The risks of IP loss are considerable and can pose an existential threat. PuppTech's case is illustrative: its path has not been linear, it has made mistakes, without putting the company in peril. The company was advantaged to realize early-on that IP management was crucial to its own long-term success. The authors hope that by understanding the PuppTech experience, other start-up entrepreneurs may avoid some of the blind alleys that PuppTech has encountered.

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