

**Capital Humano para un Sistema de Innovación Prospero
- Marco Teórico y Caso País: Perú -**

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Preparado por: Constanza Pachón, 2015

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Executive Summary

An effective innovation ecosystem has become the central economic driver for many nations and its formation and nurturing is considered an essential step to be taken by any country that wishes to move its economy from factor/efficiency-driven to knowledge-driven. This report addresses the central element of the human capital needed to establish an innovation ecosystem; both in a general sense and in the specific case of Peru. The document starts with a proposed theoretical framework to guide the discussion; namely the identification of the different actors in an innovation ecosystem and the key human capital profiles that need to populate it. The report continues by presenting a series of best practices from around the world for the development and/or strengthening of such profiles. After the general information, the report moves onto the presentation of the findings from the field work in Peru on supply and demand of the noted profiles. Lastly, recommendations based on the current state of affairs in the country are provided for the improvement of its human capital base for innovation.

Section I – The Drivers of an Innovation Ecosystem and required Key Human Capital

This section presents the 7 different drivers of an innovation ecosystem, their specific role/contribution to the system, and the key human capital profiles required for each of these drivers to successfully run independently and to interact with other drivers in the ecosystem. The drivers of this system include: 1) Entrepreneurial Talent, 2) Private Capital, 3) Universities, Research & Technical Institutions, 4) Government, 5) Industry, 6) Support Organizations, and 7) Service Providers. These factors were identified through analyzing existing and developing innovation ecosystems in other countries, including the United States, Israel, South Korea, Brazil, Chile, and European countries, as well as from first-hand experience working the industry at an international level.

The first driver, and arguably most important, is the **Entrepreneurial Talent**. The main role of this driver in the ecosystem is to develop innovative solutions for existing market needs and commercialize them. The key human capital necessary for this driver/element of the ecosystem to thrive include: 1) *Novice Entrepreneurs* – individuals who have a viable idea for product or service, but have no experience building a company and commercializing its offerings. 2) *Experienced Entrepreneurs* – individuals who have experience building an enterprise and commercializing products or services to the market successfully. 3) *Seasoned Business Managers* – individuals that have held operational positions for many years and have the experience to run a business and commercialize products, but have not founded a company of their own.

The second driver is **Private Capital**. The main role of this driver in the ecosystem is to provide entrepreneurs with the funding needed to start and grow their venture and provide the right guidance navigating the market landscape. The key human capital identified in this driver include: 1) *Managers of Non-Dilutive Funding* – individuals that represent traditional financing entities, such as banks, and other kind of organizations, such as foundations, that provide entrepreneurs with loans that need to repaid or non-repayable grants . 2) *Managers of Dilutive Funding* – Individuals who represent investors that require part ownership or equity in the company in order to fund an entrepreneur.

The third driver is **Universities, Research & Technical Institutions**. These entities serve to essential roles in the ecosystem: 1) prepared a qualified labor force across all economic sectors, and 2) facilitate development and transfer of technology to the market. In the first category, the design of the curricula, weight of faculty, and research facilities are fundamental. In the second category, the sophistication of

relationships of the entities with industry, incentive mechanisms to promote commercial research, and set procedures to move technologies out of the entities are the deciding factors for these organizations to contribute efficiently to the innovation ecosystem.

The fourth driver is **Government**. The main role of this driver is to support innovation at its early stages as a funder, regulator, promoter, and facilitator. The key human capital identified in this driver include: 1) *Managers of Funding Programs* – individuals who have the institutional knowledge to move funding initiatives forward within the often complicated government setting, that can also put in place appropriate procedures and structures to effectively disburse public funds to private entities working on innovation and monitor their good use. 2) *Managers of Technical Assistance Programs* – individuals who can themselves, or effectively source the required expertise to, design and manage programs providing entities recipient of public funds for innovation with additional expert assistance for the advancement of their idea into the market. 3) *Managers of Internal Procurement Integration Programs* – individuals who have extensive experience in the technology challenges faced by different areas of the government itself and can work with industry, universities, and other non-government actors to find the solutions needed and acquire them for government use. 3) *Directors & Officers of Regulatory Agencies / Policy Makers* – individuals who develop legal and regulatory frameworks that facilitate innovation, fair competition and quality standards.

The fifth driver is **Industry**. The main role of this driver is to advance the technology frontier of the productive base. This can be achieved by investing in internal research and development processes by which new technologies are created in-house, and/or by promoting open innovation settings that encourages engagement with the tech-driven entrepreneurial base for the joint development of technology solutions. The key human capital identified in this driver include: 1) *Technology Scouts and Corporate Venturing Capital Executives* – individuals who can identify viable technologies and have the business skills to engage entrepreneurs in selling or licensing their ideas. 2) *R&D Managers and Licensing Managers* – individuals who are abreast of all extant research their related to their company's industry and have extensive experience working with IP management and licensing. 3) *Research Scientists, Engineers and Technicians* – the base of in-house research and development.

The sixth driver is **Support Organizations**. The main role of this driver is to offer services to emerging and established entrepreneurs as they navigate the marketplace. These services include: industry events, formalized academies, targeted mentoring, networking opportunities, and showcase forums. The key human capital identified in this driver include: 1) *Personnel in Entrepreneurial Support Organizations* – individuals who are familiar with the industry and can provide entrepreneurs with resources to develop a strong business plan and may connect them to a network that will help them achieve funding. 2) *Mentors and Role Models* – Individuals that can provide expert advice and real-life experience knowledge to emerging entrepreneurs. 3) *Networking Facilitators* – individuals within a specialized industry's community that independently plan networking events to build their own network as it's strategically relevant to their occupation.

The seventh driver is **Service Providers**. The main role of this driver is to provide the professional services network that help sustain and grow the successful entrepreneurs in their business ventures. The key human capital identified in this driver include: *Innovation Project Managers (Gestores de Innovación)*; *Technology Extensionists (Extensionistas)*; *Intellectual Property & Legal Experts*; *Regulatory Experts*; *Marketing, Design & Branding Experts*; *Business Planning & Market Research Experts*; *Accounting, Banking & Finance Experts*; *Grant Writers (Formuladores de Proyectos)*; and

Commercialization Experts. These individuals come together to provide specialized support to entrepreneurs in the complex processes involved in taking their technology to the market.

Section II – Best Practices for the Acquisition/Development of the Key Human Capital across an Innovation Ecosystem

This section presents the best practices from around the world for the acquisition/development of the human capital for each driver identified in Section I. Selected countries that have effectively developed or brought in the human capital necessary for their innovation ecosystem are identified and their tools of use presented. In the overall governments can create more dynamic labor markets to encourage investment. Experience demonstrates that countries that adopt pro-growth investment and immigration policies—which allow for the freer movement of people and employees— tend to be the ones that cultivate a flourishing entrepreneurial ecosystem.

Section III – Offer and Demand for Human Capital towards Innovation in Peru

This section presents the findings from the field trip to Peru under the framework presented in Section I and supported with other punctual data about the Country and the current state of its innovation Ecosystem as it relates to Human Capital. Many macro-economic indicators show that there is still a lot of work to do so that the cultural, political, and socio-economic climate and conditions in Peru truly foster innovation efficiently. However, it has to be recognized that the country has taken very important steps towards this direction in the last decade. The country has instituted innovation promotion policies that go above the changes in political leadership, the promotion agencies are solid and working on strengthening their capabilities and their reach, investment in innovation as percentage of the GNP has increased considerable, and above all, there is a strong sense of long term commitment towards innovation across all actors of the system.

The overall assessment specific to human capital is that most of the profiles required are found in low volume and in low quality; with the exception of the personnel that lead government and some private institutions that promote tech-based entrepreneurship, who exhibit good knowledge of their field, an open mind to change practices and high levels of enthusiasm and dedication. However all actors, even those perceived as having good quality working knowledge, still lack maturity in their personal experience with the topics related to innovation, this in virtue of the fact that the innovation movement is simply too new in Peru and most people involve in the ecosystem are home-grown.

Section IV – Recommended Strategies for the Acquisition of Human Capital

There are basically two strategies for the development and strengthening of human capital for innovation: 1) Nurture the local talent, and 2) Import talent from other countries. There are many different tactics for implementation of either strategy; their applicability depends on the conditions and resources of the nation considering them. This section presents the initial assessment for the main strategy to be use for each profile as well as ideas for implementation tactics. In the overall, most of the profiles can, and should be developed via nurturing the local talent; importation of external talent is recommended for very few profiles.

I. Drivers of an Innovation Ecosystem and Required Key Human Capital

An innovation ecosystem is a complex structure that involves many actors from different areas of an economy. Thus report proposes seven distinct “drivers” for this kind of systems:

1. Entrepreneurial Talent
2. Private Capital
3. Universities, Research & Technical Institutions
4. Government
5. Industry
6. Support Organizations & Individuals
7. Service Providers

Arguably, the entrepreneurial talent is the lifeblood of the ecosystem; without the entrepreneurs the system will not prosper. However, the existence of a good volume of entrepreneurs, or in other words, the existence of an entrepreneurial-minded population and culture, does not guarantee by itself the creation of an innovative system. High quality of projects presented by the entrepreneurs is the key to a thriving knowledge driven economy. Tech-based projects of global scope created in response to a market deficiency are what make all the wheels move. In a nascent ecosystem, Government and Universities play many roles, from creating new technologies, pushing them to market, to financing companies, supporting companies through growth; as the system evolves the other drivers become more sophisticated and play a more robust role.

Figure 1: The Drivers of an Innovation Ecosystem



Source: Pachon, 2015

The success of each innovation system driver and the interactions between them lies ultimately on people. There are many functions that need to be fulfilled; this report presents a detailed list of the most important roles and profiles of the people undertaking them. **Table 1** below offers a summary view of the profiles to be explored throughout this section.

Table 1: Innovation Ecosystem Drivers and related Human Capital at a Glance

Innovation Driver	Overall Role	Key Human Capital
Entrepreneurial Talent	<ul style="list-style-type: none"> - Develop new technologies and commercialize them into commercial applications - Push innovation forward 	<ul style="list-style-type: none"> - Experienced Entrepreneurs - Novice Entrepreneurs - Seasoned Business Managers
Private Capital	<ul style="list-style-type: none"> - Provide funding for start-ups - Provide insight into market landscape - Facilitate market entry for technology companies 	<ul style="list-style-type: none"> - Managers of Non-Dilutive Funding <ul style="list-style-type: none"> o Commercial Loan Officers, o Foundation Grant Managers - Managers of Dilutive Funding <ul style="list-style-type: none"> o Angel Investors, o Venture Capitalists (Partners, Associates) o Corporate Venturing Representatives
Universities, Research & Technical Institutions	<ul style="list-style-type: none"> - Prepare a qualified labor force across all economic areas; and contribute to the development of entrepreneurial talent - Advance science and knowledge by enabling the development of new technologies and their transition to the marketplace; including supporting industry with their technology needs 	<ul style="list-style-type: none"> - Under the Labor Force category: <ul style="list-style-type: none"> o Qualified faculty across all subject matter areas, specifically in STEM. o Innovation Management Faculty o Entrepreneurship Faculty - Under the Tech Advancement category: <ul style="list-style-type: none"> o Technology Developers: Faculty & Resident Researchers; Research Students, Associates, Post-Docs o Technology Transfer Managers o Managers, Qualified Scientists, Engineers & Technicians at Proof of Concept (PoC) o Innovation Project Managers (Gestores de Innovación) o Technology Diffusion Officers (Extensionistas)
Government	<ul style="list-style-type: none"> - Promote science/tech research to advance science and technology (via funding and technical assistance) - Promote the modernization of the existing traditional industrial base (via technology acquisition and diffusion programs with both funding and technical assistance) - Provide legal, regulatory, and labor force framework to foster entrepreneurship and innovation in existing industries 	<ul style="list-style-type: none"> - Managers of Funding Programs - Managers of Technology Assistance Programs: <ul style="list-style-type: none"> o Emerging Entrepreneurs and Established Traditional Industrial Base o Managers of Trade & Export Programs - Innovation Project Managers & Technology Diffusion Officers - Managers of Internal Procurement Integration Programs - Directors/Officers of Regulatory Agencies & Policy Makers
Industry	<ul style="list-style-type: none"> - Invest and perform R&D - Provide marketplace and practical need for technology: acquirers of technology developed outside of internal R&D - Promote higher technological and technical standards across the supply chain 	<ul style="list-style-type: none"> - Innovation Project Managers (Gestores de Innovación) - Technology Scouts - Corporate Venturing Executives - Licensing Managers - R&D Managers - Research Scientists, Engineers & Technicians - Technology Diffusion Officers (Extensionistas)

<p>Support Organizations & Individuals</p>	<ul style="list-style-type: none"> - Provide mentoring and guidance - Assist in development of business planning and commercialization strategy - Help to grow a start-up network and innovation space 	<ul style="list-style-type: none"> - Personnel in (and people available to) Entrepreneurial Support Organizations, Incubators & Accelerators: <ul style="list-style-type: none"> o Executive Directors o Managers of Commercialization Assistance o Business Development & Fundraising Managers o Mentors & Advisors o Role Models - Networking Facilitators
<p>Service Providers</p>	<ul style="list-style-type: none"> - Provide specialized support to help innovators and start-ups navigate business landscape and commercialize their products - Help increase marketability & growth potential of new enterprises - Assist established industries with technology licensing and acquisition, and R&D protection 	<ul style="list-style-type: none"> - Innovation Project Managers (Gestores de Innovación) - Technology Extensionists (Extensionistas) - Intellectual Property & Legal Experts - Regulatory Experts - Marketing, Design & Branding Experts - Business Planning & Market Research Experts - Accounting, Banking & Finance Experts - Grant Writers (Formuladores de Proyectos) - Commercialization Experts

Source: Pachon, 2015

1. Entrepreneurial Talent

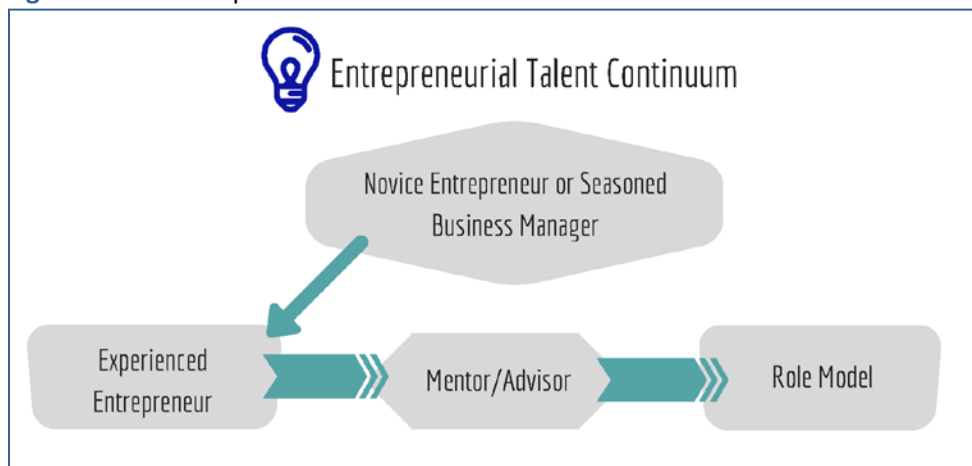
Entrepreneurs are at the center of any innovation-based “ecosystem”. The analogy with the human body may be instructive when discussing the centrality of this class of human capital in driving the development, growth and competitiveness of regions – whether as cities or nations.

As the conceivers of ideas that propel enterprises, they could be considered the brain. As ardent believers, ready to take their ideas to their pinnacle, they are the soul. As the “heavy lifters”, they work to further develop their innovations and may be considered the limbs. All the other drivers of innovation: capital, universities, government, industry, and support organizations contribute to the development of this corpus – the body of innovation. Yet, entrepreneurs are both the protagonists and the beneficiaries of the innovation system.

This report categorizes this central pillar of innovation in three groups. While these are not always mutually exclusive categories, the players in each tend to share certain attributes and display certain characteristics in common.

However, it should be emphasized that many entrepreneurs operate along a *continuum* comprising some or all of these categories in the course of their productive careers. Thus, for e.g., “experienced entrepreneurs” in the first classification presented, may have started out as “novice entrepreneurs” (the second classification); may have served as “business manager” in established companies (operating at a recognized level of effectiveness and/or stature), the third classification; and may, indeed, serve as “role models”, an important role that successful entrepreneurs play in an innovation ecosystem and that is explored later in this document in the section that details Support Organizations & Individuals as another driver of innovation; suffice to say here in the content of entrepreneurial talent that role models is always seen as a source to maintain momentum for ensuing generations of entrepreneurs. This continuum is represented in **Figure 2** below.

Figure 2: The Entrepreneurial Talent Continuum



Source: Pachon, 2015

Nevertheless, because certain shared attributes and characteristics in each of the categories (or at each stage in the continuum) can be identified, it is useful to examine each, to understand the typical profiles of the actors in each, and seek thus to identify and characterize the strategies that a particular region may use to develop, acquire or employ this central cast of actors and create the conditions for their growth through their various stages. We seek, however, to make clear distinctions between tech-based and non-tech based entrepreneurs, where applicable, because while the overall qualities of entrepreneurship pertain to all, there are significant differences in the profiles and qualities of the two groups.

It is also important to note that the readily available literature on entrepreneurial talent focuses almost exclusively in what is presented here as the “novice entrepreneur”; this report goes a step further examining the other two categories.

1.1. Experienced Entrepreneurs

This grouping, by implication, describes, and is dependent on, the varied experiences of many entrepreneurs and on a history of entrepreneurs (and entrepreneurship) in a particular region. Among this group there may even be a sub-group of what are referred to as “serial entrepreneurs”, who are passionate about creating enterprises to resolve multiple problems evident to them, and will start many such companies over a short period (ranging from a few years to a decade). In markets with deep or substantial liquidity, more developed support networks, and exit points for products and services coming from entrepreneurial ventures (in technology- driven industry, for example, where a technology , or combinations thereof, is the principal product or service offering), these entrepreneurs tend to be more prolific than the population of entrepreneurs generally, in starting, growing, and exiting their startups at a point sufficient to give them enough liquidity and experience to start additional ventures, at which they do at an impressive pace.

➤ ***Profile of experienced entrepreneurs***

Experienced entrepreneurs, whether in tech-based or other industries, share the following attributes and characteristics derived from, and frequently driven by, their experience in previous enterprises, in which they either led or were key members of entrepreneurial teams in those enterprises¹:

- Are driven by a sense of prospect, possibility or opportunity. That is, they have a vision that is derived from a specific opportunity or set of opportunities in a particular market sector, or a combination of market sectors. Often, this vision is based on knowledge and experience they have already had, both successful and unsuccessful.
- Are familiar with the normal life-cycle of enterprises: start-up, growth and exit. Frequently, they are also focused on a set of possible exits for the enterprise with which they may associate.
- Have a good sense of the various milestones that need to be addressed, even if they have not generated detailed plans to develop and accomplish all of the milestones necessary to achieve the specific objectives or the grand vision for a specific enterprise with which they may associate.
- Understand, and most often embrace, the importance of execution and team building to accomplish milestones.
- Have a contact base of investors, potential customers and former colleagues, and tend to be more social than the general group of entrepreneurs. In other words, they are more outgoing, and have a circle of people that they count among their key advisors and influencers.
- Have faced various obstacles (general market adoption, financial, team gaps, customer acquisition and maintenance, competition, internal conflict from empowered teams) and may have had to change course or direction, either as leaders of enterprises or as key members of the team.

While all experienced entrepreneurs share the characteristics above (to greater or lesser degree), there are some important differences between those in tech-based industries and other, more traditional industries, which may be relevant to countries with nascent or developing innovation systems. In countries where there is a mature or maturing mix of tech-based and traditional industries, the interplay between human capital in technology-driven and non-technology industries is a dynamic one, and greater opportunities for migration between the two are frequently observed. This is discussed further under “Seasoned business leaders”. In countries that are just starting to ignite their tech-based entrepreneurial base, engaging the *Experienced Entrepreneurs* to engage as leaders of ancient tech-base business becomes a key tool.

➤ ***Differences in the profiles of established entrepreneurs in tech- and non-tech industries***

In technology-driven enterprises, established entrepreneurs confront highly dynamic, fluid markets. Their enterprises are characterized by a high degree of business model innovation, which disrupts standard supply or value chains, and engages more directly with end-users (often, consumers). By contrast, established entrepreneurs in more traditional, or non-technology driven enterprises operate in business environments with more established business models, greater reliance on well-established supply chains, and a more indirect

association with consumers. In extractive industries, for e.g., the supply chain is often dominated at both ends by large companies, who perform both the principal functions of extraction, and the sales and marketing to end-users, or may be vertically-integrated, owning different parts of the supply chain or process in those industries.

Entrepreneurs in technology-driven enterprises, as compared with their counterparts in more traditional industries, are characterized byⁱⁱ:

- Inherent, greater openness to innovation (driven by curiosity) compared with their counterparts in traditional enterprises. These entrepreneurs are often cited for their commitment to identifying and then seeking to resolve problems in a specific industry or a part thereof, which often translates into a greater readiness to innovate.
- Greater tenacity (i.e. ability to withstand failure). In a market that is marked by consistent disruption and thus lower barriers to entry, failure is often expected, and is often the basis for course corrections that leads to further refinement and greater prospects for success. Tech-based entrepreneurs tend to tolerate (if not embrace) failure, and often are able to “graduate” to other enterprises of their own, or to join enterprises which value them for their experience of success and failure.
- Greater tolerance of uncertainty (ability to withstand fear of the unknown). Tech-based entrepreneurs operate in environments where constant disruption is inherent, and hence unknown factors are integral to their assumptions. Such everyday yet critical factors that instill fear may include: fear of making payroll, fear of losing customers, fear of unknown competitors, etc. Their traditional counterparts, on the other hand, operate in environments where compensatory regimes are well established and failure to compensate team members is more likely to lead to failure (and dissolution of the enterprise) and loss of prestige. Also, competitors are, for the most part, established and known. Hence the appetite for risk among experienced entrepreneurs in established industries is often lower.

1.2. Novice Entrepreneurs

Given the growing worldwide appeal of entrepreneurship, and despite the cultural impediments to the profession in many countries around the world, novice, or first-time entrepreneurs are increasingly seen to operate. In countries where research regimes are more established, erstwhile researchers may be drawn to start enterprises around ideas or concepts generated by their research. Conversely, in countries where there is a lower base of research, and a less-developed higher education system, or where research itself is not an established professional field, entrepreneurs may emerge among younger people who are self-driven or may come across an opportunity that has not been well-exploited. These are not entirely mutually exclusive, however. In the former, one may also observe non-researchers who are drawn to starting enterprises based on opportunism and self-drive. However, in the latter, the options are more limited since there may not be a pool of researchers with research-driven concepts or ideas propelling nascent enterprises.

In countries with less developed higher education systems, entrepreneurs may be drawn to more traditional industries, especially in areas with high unemployment or underemployment, where they see this as a chance to make a living e.g. as suppliers of items – be they low-value components or commodities - as part of a supply chain to traditional companies that are dominant or established players in those industries. One trend that is observed in such

traditional industries as agriculture around the developing world is the adoption of innovative practices by novice entrepreneurs around the production of commodities; often this results in higher value being generated in their nascent enterprises, and greater ability to establish themselves as essential to the supply chain. Through events such as the *Ag Innovation Showcase*ⁱⁱⁱ that pulls in entrepreneurs in the agriculture industry, we see social entrepreneurs often emerge in such environments, using knowledge and information around new technologies imported or adapted from other environments. For the most part, these are novice entrepreneurs. (Note: Global entities like the Gates Foundation^{iv} have stimulated the growth of nascent enterprises through the provision of funding for inputs, technical assistance and the promise of scaled deployment, often becoming a conduit for knowledge and information from 'best practice' examples drawn from grantees in other geographies).

➤ **Profile of novice entrepreneurs**

We can characterize the profiles of novice entrepreneurs based on differing contexts: where research regimes are available and supported, and where they are not, or are nascent. As we have discussed, these contexts are not entirely mutually exclusive, and there will always be great exceptions. There is recognition around the world that a key asset of any innovation-based initiative in any region is the pool of researchers in areas of key national or regional priority. By and of itself, however, the existence of such a pool does not guarantee a drive into entrepreneurship or the building of enterprises. Likewise, their absence does not inherently mean that a region or country will not see the growth of novice entrepreneurs. Here again, the distinction between tech and non-tech is important. In the case of the former, such a pool is almost an essential starting point. In the latter, it is a valuable, but not a critical component. Thus, we should separate out the two sets of entrepreneurs.

Tech-based Novice Entrepreneurs, who have chosen to become entrepreneurs as a consequence of their research or scientific knowledge. Note, that there is variation in this group, as discussed below:

- Are almost all driven by a scientific or technical paradigm, meaning that they are focused on building on a knowledge set available to a particular discipline, that will extend understanding, promote knowledge, and create opportunities to resolve problems in many areas (e.g. health, food, materials, etc.). There also exists what may be called "ancillary research", in areas not directly related to specific scientific paradigms, but connected to them, such as data analysis, computational and statistical knowledge, pattern recognition, and economic research, to name a few.
- Have developed an understanding of problems whose resolution potentially holds commercial promise; invariably the impact of such resolution is what drives them into becoming entrepreneurs. Thus, they are motivated more by societal impact than by the lure of compensation.
- Are less concerned about the strictures of tenure and research tracks. For others, they seek to maintain a foot in both camps. For the former, their commitment to enterprise-building is greater. For the latter, they seek to have others assume greater responsibility for the enterprise from the outset.
- Have little understanding of the trajectory of commercialization. Thus, they may be committed to a large portion of their research concept as a commercial opportunity, as opposed to a more aligned and smaller segment of that research (which may commercially be more relevant). In short, their ability to characterize customer demand is low, and it calls

into question their ability to withstand the pressures of enterprise-building without a set of support measures.

Non Tech-based Novice Entrepreneurs, who are in more traditional industries, have the following attributes to a greater or lesser degree, and in some combination:

- Are often driven by the need to make a living. They tend to be more focused on the drive for profit.
- Are more opportunistic. That is, they are more open to “openings” in the overall chain of production, and more attentive to specific opportunities that may occur around them.
- Tend to focus on simpler pathways to the market, especially service-type businesses. Have low or insubstantial knowledge of up-stream and down-stream processes or players, that is, they are not focused on the opportunity to shorten or otherwise bypass traditional supply chains.
- Tend to be individually-driven, sometimes with the support of their families, and not focused on the development of teams or the growth trajectory of the enterprise.

1.3. Seasoned Business Managers

Much attention has been paid, especially in recent years, to the potential for the unleashing of entrepreneurship stimulated by the existence of a group of ‘seasoned’ business managers, in established companies, who may be motivated to take a chance on starting their own business. The logic is reasonable: the lure of entrepreneurship has an effect on those leaders in companies who have risen through the ranks of established companies but feel disconnected from the creativity that is the cornerstone of entrepreneurship. Their experience and deep expertise are strong assets, and though their appetite for risk has been tempered by long years in private industry, they may be encouraged by the global trends that they have been exposed to in their current positions. They are not considered novice entrepreneurs even if they have not in fact started their own business before because they have all the business savvy needed to run a business, they have just been running it for someone else.

The problem, however is just as compelling: many of these people are reluctant to give up seniority, peer respect and comfortable, predictable compensation, including, potentially, options and shares) and dive into an unpredictable, inherently messy activity, with all the uncertainties that come with it. Despite this very real concern, though, the experience of the U.S., Japan, Singapore and Israel, to greater or lesser degree, demonstrates that these leaders are often excellent companion assets to enterprises just getting off the ground, or as vital ‘expert capital’ if not as primary operators of entrepreneurial ventures. In any case, at least some of these seasoned professionals are likely to be closely associated with enterprises focused in industries familiar to them.

The following collection of attributes applies to individuals in this group who may be stimulated to start their own enterprise, as well as those who seek to contribute their expertise to new enterprises, or operate as integral production, sales, or finance professionals in new or more established entrepreneurial ventures. It should be noted that many combinations of arrangements are possible with this group, from consistent, high-risk entrepreneurial activity to part-time but deep engagement or advisory services.

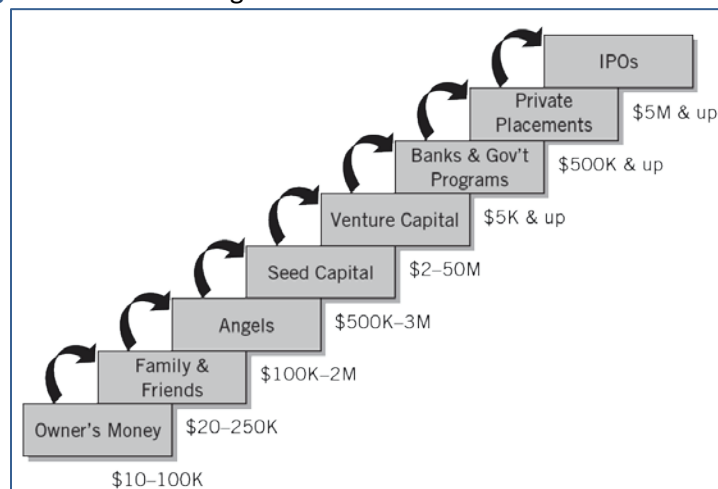
➤ **Profile of Season Business Managers**

- Their experience as business leaders translates into a good understanding of complex business structures and organizations, which in turn are useful reference points for determining how value is generated from outside their companies (outsourced innovation).
- Their knowledge of the markets served by their companies tends to be well developed; though this depends on the position they held in the organization. If they were in the R&D arena, their understanding of the marketing function may not be highly developed; this also depends on how the companies in which they served were organized.
- They have strong opinions about how to generate business value, and this may translate into skepticism about startups, especially on the assumptions driving their business models.
- They may be stimulated by externally-driven innovations that are capable of integration into the products and offerings of companies like the ones in which they serve/served and thus,
- They may be stimulated further by the opportunity to work with smaller companies developing products on the outside that meet these qualifications.
- Many of them express interest in mentoring and other activities, partly to fulfill a need to reconnect (or connect for the first time) with the creative process from which they have been divorced over the many years they have spent climbing the corporate ladder.
- The closer they are to retirement, and the more healthy and energetic they still are, the greater their interest in helping to grow and contribute to the development of companies in specific industries from the ground up.

2. Private Capital

Access to capital at all steps of the financing continuum is fundamental for the development and growth of enterprises and advancement of technology. **Figure 3** below presents the typical levels of investment needed by companies for western developed countries; while this is more typical for tech-based start-up companies, a structure of financing that evolves alongside a company's growth, and that involves different funding actors, is present in any industry.

Figure 3: The Financing Continuum

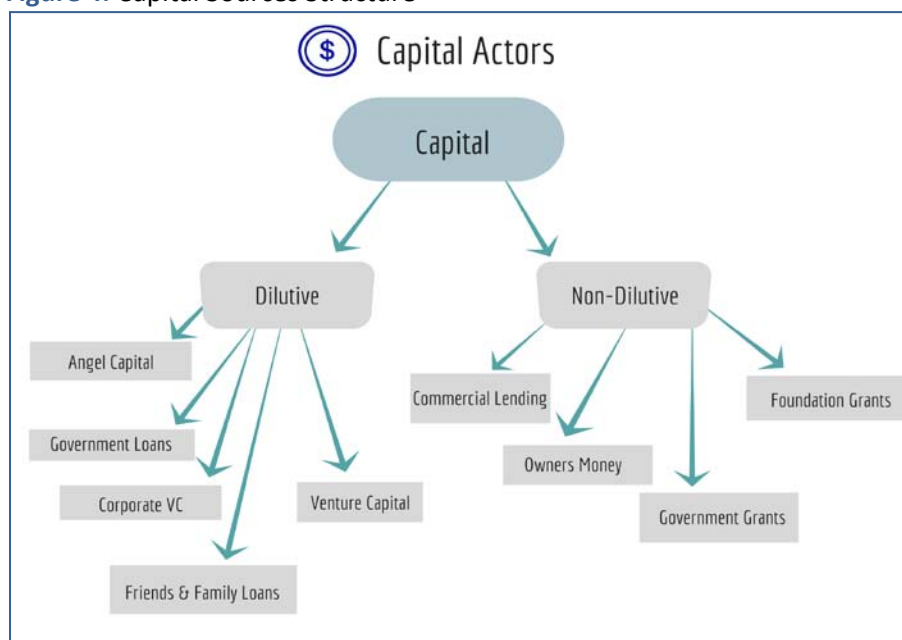


Source: PWC/VC Association, Money Tree Report

A capital structure does not only need the money, it needs the right people to manage that money. Funding institutions, whether public or private, need properly trained people to accurately assess the risk and reward attached to a potential funding opportunity, and to efficiently work with recipients of funds throughout the entire process of a deal; from prospect to completion and operations follow up.

This section of the report focuses on “Private Capital” as a source of funding for new start-up companies and established traditional companies. However, it is important to note that “Public Funding” via government institutions is a major source of funding for any kind of enterprise. This report explores government funding in Section 4: “Government”. As a reference and to illustrate the place the difference human capital explored in this section, **Figure 4** below presents all different kinds of Capital.

Figure 4: Capital Sources Structure



Source: Pachon, 2015

2.1. Managers of Non-Dilutive Funding

Non-dilutive funding in the private sector could be either “debt financing” or “no repayment financing”. The former being more typically offered by commercial banks and cooperatives, and the latter being more typically offered by the government and private foundations. This section explores the sort of human capital needed within all these kind of organizations, except government; which is discussed in Section 4: “Government.”

2.1.1. Commercial Loan Officers

The commercial loan officer within a bank or cooperative develops and manages profitable commercial lending relationships with prospective and existing customers within an assigned market. They manage “debt financing”, meaning that the loan recipient needs to

repay the money back. The more structured institutions will have well delineated practices with different staff serving start-up companies and established traditional companies; and will divide their practice by economic sector (i.e. agriculture, textiles, life sciences, etc). Responsibilities are similar across the board and include: develop and retain commercial business in a portfolio; gather financial and general business information and analyze applicants' credit worthiness; negotiate credit terms and complete loan contracts; maintain technical and professional knowledge; keep informed of industry changes, trends, and best practices, and assess the potential impact on processes and procedures.

➤ ***Profile of commercial loan officers***

In the not so distant past, loan officers would only need a high school diploma; nowadays the industry is more sophisticated and commercial loan officers typically must have at least a bachelor's degree in a discipline such as economics, finance, business, or accounting, and a minimum of five years of experience in commercial lending. Given the potential size and complexity of business loans, it is important for commercial loan officers to have a solid foundation in accounting, as well as "soft skills" such as decision-making initiative. Interpersonal communication skills are also vital for commercial loan officers, as much of their work involves face-to-face meetings with loan applicants, especially in the dynamic marketplace of today, where knowledge and information lead to faster decisions and change itself is much quicker. In this environment, a fresh outlook and perspectives on lending, and new criteria are crucial. On-the-job training for loan officers can include developing skills related to underwriting as well as soft skills training. In addition, industry groups such as the American Bankers Association offer training and certification programs for commercial and other types of loan officers.

2.1.2. Foundation Grant Managers

Foundations are built on values and aspirations. They usually disburse funds on a "non-repayment" basis, such as grants. In the context discussed in this report, funding from foundations is only available to start-up companies, not to established traditional companies (many other kind of organizations and individuals are eligible for foundation funding but that is outside of the scope of this report). They work with their grantees to create social change that reflects their perspectives and goals. They are created as the freest and most independent of all institutions because their endowments (with associated covenants) provides them with freedom from having to raise money as other nonprofits are compelled to do, or to earn it from customers as for-profit companies must, or to answer to voters as governments must. They are free to take a larger view of problems and plant the seeds of far-reaching solutions; that is why many of them are so keen on working with start-up companies. Some responsibilities of a typical grant officer at a private foundation include: develop investment strategies and specific investment opportunities with the goal of advancing the foundation's mission, secure ongoing support for grantees, support program leadership in managing its portfolio, act as interface between the program team and foundation investment committee with regards to risk exposure on the foundation's balance sheet, and actively support and advocate for the development and improvement of the social impact investment industry.

➤ ***Profile of foundation grant managers***

A bachelor's degree in a discipline such as economics, finance, business, or accounting, and a minimum of five years of experience in the area of mission of the foundation, or related institutions. Commercial loan officers do not typically make good candidates for this kind of position as they tend to be exclusively focused on the financial return of a deal, while grant officers need to look beyond financial return and are more interested in social impact. They usually have deep knowledge, learned over the years in foundation work, of equity, loan and guaranty financial structures in this sector, knowledge and background in the focus area of the foundation's program, interest in working with developing countries, ideally with previous transaction experience and exposure to the subject areas of focus for the program, and a demonstrated passion for the foundation's values with commitment to deliver results against the foundation's mission.

2.2. Managers of Dilutive Funding

Dilutive funding in the private sector is usually of the form of "debt conversion" and involves taking some sort of equity ownership in the business they are financing, therefore diluting the business' owner's share.

2.2.1. Angel Investors

An angel investor is a high net worth individual who invests directly into entrepreneurial businesses in return for stock in the companies. Angels typically invest their own funds, unlike venture capitalists who manage the pooled money of others in a professionally-managed fund. Angel investments bear extremely high risk and are usually subject to dilution from future investment rounds. As such, they require a very high return on investment through a defined exit strategy, such as plans for an initial public offering or an acquisition. Angel groups are angel investors who regularly convene as a group, usually in-person, to evaluate and invest in startups. Some angel investors choose to become part of an angel group to gain access to deal flow, and to participate in the startup screening, due diligence, investing, and support process. Many angel investors also choose to participate in these groups for social reasons, to meet like-minded individuals, to learn from others and to benefit from the collective input. Some angel investors enjoy the format of angel groups, which often entail regular meetings, pitches, and other activities; others find that they do not have time to commit or that they would rather not participate in an angel group for other reasons. Some other characteristics of angel investors include: they tend to invest locally, are usually "accredited" investors (i.e. they are qualified under the legal and regulatory definition of accreditation), work in informal and formal groups, sometimes pool investments, provide seed money out of their own capital, which may be vital for unique innovative and scalable ideas, and may expect returns of greater than 10x of the original amount invested.

➤ *Profile of angel investors*

Angel investors are often retired entrepreneurs or executives, who may be interested in angel investing for reasons that go beyond pure monetary return. These include wanting to keep abreast of current developments in a particular business arena and mentoring and making use of their experience and networks on a less than full-time basis. Some angel investors just want to give back to entrepreneurs and support companies that they believe in. Some angel investors want to learn about new technologies, businesses, ideas and

people. Other angel investors look at it as an interesting way to get financial exposure to a high risk-high high-potential return asset category in their portfolio, and to diversify their portfolio. Successful angel investing requires an evolving set of skills. Angels must be prepared for new demands, approaches and opinions by all participants in a deal. In addition to funds, angel investors can often provide valuable management advice and important contacts. Because there are no public exchanges listing their securities, private companies meet angel investors in several ways, including referrals from the investors' trusted sources and other business contacts; at investor conferences and symposia; and at meetings organized by groups of angels where companies pitch directly to investor in face-to-face meetings.

2.2.2. Venture Capitalists

Venture capitalists are financial professionals who finance innovative but potentially risky new companies. They generally work for professionally managed investment funds which are structured as limited partnerships. They make money from management fees and carried interest. At any point in time, the VC will have several “funds” to manage, each with a limited life, typically of 10 years, maturing at various times. The financings are usually concluded by direct investments. Venture capitalists analyze the financial strength and research the potential market for a company's offering. Venture capitalists are frequently involved with the companies that they invest in at an executive level, often sitting on a company's board of directors or otherwise assisting with major business decisions. VCs typically have an investing thesis which is sometimes very broad, or very specific. It may be around investing at a particular stage (seed, Series A-C, growth) and/or particular industry and/or geography. The money managers are known as General Partners, or GPs. The money they are managing is provided by Limited Partners, or LPs. On average around 85% of LP capital is institutional (e.g. pension funds, endowment funds, etc.), with only around 15% coming from high net worth individuals. It is the job of the GPs to manage the capital of the fund and to deliver a risk-adjusted return to their investors, the LPs.

2.2.2.1. VC Partners – Managing Directors

These individuals generate a stream of good investment opportunities and have a keen ability to evaluate opportunities and decide whether to invest. Once they decide to invest, they are able to negotiate the terms of investment for any prospect that exceeds the investment criteria established by the partnership. To gain knowledge of the investment prospects, they tend to serve on boards of directors and help build successful companies, help liquidate investments at valuations that earn all shareholders an acceptable rate of return, and participate in networking and industry events.

➤ *Profile of VC partners – managing directors*

A Partner at a VC firm should have exceptional listening, communication, analytical, management and coaching skills. These professionals must be excellent at the art of persuasion, talented planners, and exceptional team players with a solid network to rely on. They also have extensive experience reading and analyzing financial reports and being familiar with market conditions, enabling the venture capitalist to accurately forecast whether a company has the potential to flourish and grow. Venture capitalists come from a variety of career backgrounds, including technology, consulting,

investment banking, accounting and private equity. Venture capitalists will usually have a bachelor's degree in engineering, accounting or finance, but many also have an MBA or related graduate degree. In addition to familiarity with accounting and finance concepts, the majority of venture capitalists have significant backgrounds in business, experience working with startups, companies in the growth stage, and in highly innovative industries. This experience prepares venture capitalists to make good investment decisions, and may lessen or at least help identify the risks involved in a given venture capital commitment. Venture capitalists may work as individuals or as professionals for a venture capital fund or firm. They almost invariably have an entrepreneurial spirit whether they work alone or for an institutional venture capital firm, since the work involves consistently identifying then working towards the success of early stage companies. Some of the qualities that are beneficial to have as a venture capitalist partner include: demonstrated experience raising funds, industry expertise, operating experience and track record, technical degree, finance and business acumen, negotiating skills, strong venture industry network, strategic perspective.

2.2.2.2. *Associates / Analysts*

The Associate or Analyst at a VC firm will generally be responsible for identifying, qualifying, and analyzing new investment opportunities for the firm. This entails researching technology sectors, speaking with CEOs of fast growing technology companies, executing financial analysis, and helping structure and price transactions. Specifically, the individual will work with the partners to identify investment prospects, review business plans, perform due diligence on prospect companies, research industries and competitors, build financial models and conduct sensitivity analyses. The Associate/Analyst position is usually a 2-3 year position. Upon the completion of the program, it is expected that the Associate/Analyst will transition to graduate school or an Associate/Analyst might be asked to continue at the firm as a Senior Associate, but this should not be the expectation from the onset. The expectations, role and responsibilities of the position are as follows: generate high quality deal flow by proactively identifying investment opportunities through outbound calling in pre-defined technology segments and newly discovered segments; manage deal prospects from first conversation through term sheet to deal close; coordinating resources to assess and win the deal, lead and coordinate deal analysis, financial modeling, and due diligence, form hypotheses on investment opportunities based on both key facts and market intuition; create clear and concise investment memos to the investment committee that convey the key attributes (strengths and weaknesses) of an investment opportunity; continually monitor and investigate macro and micro industry trends to recommend new sectors of technology for evaluation and potential investment; attending conferences and tradeshows to investigate companies and industries, reading industry periodicals to identify new trends.

➤ ***Profile of VC associates / analysts***

- 2-4 years related experience in entrepreneurship, venture capital, private equity, investment banking or consulting with strong references.
- Interest in impact investing.
- Passion for identifying promising high-growth businesses.
- Self-starter, able to initiate projects and work independently.

- Strong record of academic and extra-curricular achievement with leadership skills.
- Excellent interpersonal skills with an outgoing, pro-active personality – comfortable talking with a wide variety of entrepreneurs and eager to make calls.
- Exceptional analytical skills and business sense, with knowledge of financial modeling and analysis.
- Prior success in a team environment.
- Demonstrated knowledge of technology.
- High-energy personality, entrepreneurial spirit and strong work-ethic.
- Ability to manage and prioritize large amounts of tasks.
- Able to source information to help build a thesis around companies / industries / competition.
- Great networking capability.

2.2.3. Corporate Venture Capital Representatives

Corporate Venture Capital (CVC) refers to a corporation investing directly into start-up companies and taking minority positions (but no strategic control). This can be done either ad hoc, in a dedicated pool of funds or in a partnership structure. CVC is unique from private VC in that it commonly strives to advance both strategic and financial objectives. Strategically driven CVC investments are made primarily to increase, directly or indirectly, the sales and profits of the incumbent firm's business. A corporation making a strategic investment seeks to identify and exploit synergies between itself and the new venture to realize the potential for additional growth within the parent firm. Some of the reasons that CVCs use investment as a vehicle include: to obtain a window on new technologies, to enter new markets, to identify acquisition targets and/or to access new resources. The CVC often believes it has a competitive advantage over private VC firms due to what it considers to be superior knowledge of markets and technologies, its strong balance sheet, and its ability to be a patient investor. A recent study indicated that 50% of US corporations active in the field invest primarily for strategic reasons with financial objectives, 20% primarily financial with strategic concerns, 15% purely financial and 15% for purely strategic benefits. Another objective of corporate VC investments is for the companies in the investment portfolio to be linked to the investing company's current operational abilities. A venture with strong links to the investing corporation might make use of that company's manufacturing plants, distribution channels, technology, or brand. It might adopt the investing company's business practices to build, sell, or service its products. An external venture may offer the investing company an opportunity to build new and different capabilities including ones that could threaten the viability of current corporate capabilities.

➤ ***Profile of corporate venturing representatives***

- Technical undergraduate degree with an MBA preferred.
- Experience in venture capital, start-up and/or business development.
- Knowledge of venture capital, due-diligence procedures, term sheet construction and financial analysis.
- Technology aptitude with demonstrated business savvy in focus investment areas.
- External credibility with established network.
- Approachable, team player, curious, fast-learner, network builder, patience, humility, self-confidence.

- Strong negotiation skills.
- Ability to conceive and execute events.
- Readiness to respond to repeated questions.
- Patience to read tedious legal documents and manage outsourced services.
- Past evidence of ability to close tasks - projects, deals, initiatives under tight deadlines.
- Self-starter and able to work with little direct supervision.
- Ability to manage strategic business alliances internally and externally.
- Willingness to take risky stands as an advocate of a new idea and opportunity.

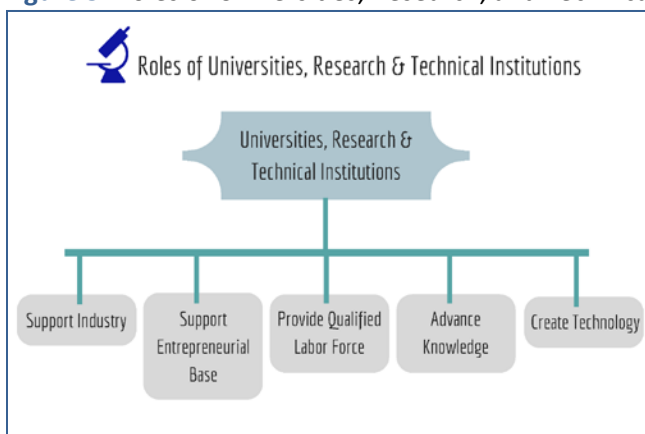
3. University, Research Institutions & Technical Centers

Universities have the mission of teaching broad subject matter in specific disciplines such as the humanities, the sciences, engineering, medicine, business/finance, economics, etc. They are certified to confer degrees ranging from bachelors to advanced degrees. A major subset of these universities conducts state-of-the-art research in the sciences, engineering, medicine, agriculture, etc. These are referred to as “research universities.” Research serves the purpose of generating knowledge; provides a platform to train next-generation physicians, scientists, engineers, and others. Funding for the research is provided by government grants and industry sponsors. The resulting technology, if it is of market interest is commercialized through licensing and startup formation. Similar models exist in other developed countries. Universities are generally tax exempt organizations and as such cannot generate a profit. Besides government and local funding sources, universities receive their support from tuition and returns on their endowments.

The key difference between a Research Institution / Technical Institution and University is the former does not traditionally teach and in some cases the latter engages in contract research (fee for service) paid for by an outside partner.

These institutions as a collective have the primary responsibility of providing skilled and well trained professionals/technicians to all areas and sectors of a nation’s labor force. This is a meta role that is outside of the scope of this report. **Figure 5** below shows the almost daunting list of roles that these institutions have to play in an economy.

Figure 5: Roles of Universities, Research, and Technical Institutions



Source: Pachon, 2015

The main roles these institutions play in an innovation ecosystem in the context of this report, and the key human capital profiles needed for each are characterized below.

3.1. Qualified Faculty in all subject areas, specifically in STEM

These individuals are in charge of researching and developing and testing, new technologies and their applications. It is important to make a distinction between research with the sole intent of advancing science, and commercially-minded research; an innovation ecosystem needs both to coexist in balance, however historically there has been a deficit of commercially-minded researchers in these institutions around the world.

3.1.1. Innovation Management Faculty

Teach and conduct research. Besides research most faculty have a teaching responsibility at both the undergraduate and graduate level. Faculty most often has significant experience in their area of specialization and advanced degrees. They oversee the research activity of graduate students and post docs. Resident researchers are generally individuals with advanced degrees who are on assignment with another university or company for a defined period time. All of these people are highly motivated and are recognized by their peers as being proficient in their profession. Faculty should be able to work with students and communicate well at all levels.

Faculty/Resident Researchers should have a PhD in their respective field and extensive experience (5+ years) conducting research within their specialized area. This individual requires strong writing skills to write grants, and more importantly, to convey research findings in articles that are then published and shared within the industry. Ideally, this individual will attend conferences in their specialized field, allowing them to build deep networks with individuals conducting research in that same field. These networks serve as a collaborative and/or competitive stand point at times, driving research and innovation in the industry. Additionally, they should have the ability to engage both undergraduate and graduate students to work alongside with him/her in carrying out research projects.

3.1.2. Entrepreneurship Faculty

Research students (graduate students) are in training for a PhD or MA degree in a science or engineering. Most have at least acquired a bachelor's degree prior to engaging in research at the graduate level. They must be able to focus, work hard and be persistent in what they do. Most tend to sacrifice their personal lives to some extent during this period. Associates, sometimes referred to as post docs, are PhD-level individuals who have been accepted by a research faculty to work on a project jointly agreed to by both. These are sometimes funded by separate grants. e.g., in the U.S., from the National Science Foundation (NSF) or National Institutes of Health (NIH); in the U.K., from the Science & Technology Facilities Council^v; and in Chile, from Corporación de Fomento de la Producción (CORFO).^{vi} A post-doctoral position affords the opportunity to gain additional experience in the same field or an adjacent one. Like graduate students these individuals must have a passion for what they do. The term is generally one to two years. The pay is low. Most universities outside the U.S. also offer similar programs. In the U.S., it is not uncommon for a graduate student to do post doc work in a foreign university for a set period of time.

3.2. Technology Developers

These individuals are in charge of researching and developing and testing, new technologies and their applications. It is important to make a distinction between research with the sole intent of advancing science, and commercially-minded research; an innovation ecosystem needs both to coexist in balance, however historically there has been a deficit of commercially-minded researchers in these institutions around the world.

3.2.1. Faculty/Resident researchers

Teach and conduct research. Besides research most faculty have a teaching responsibility at both the undergraduate and graduate level. Faculty most often has significant experience in their area of specialization and advanced degrees. They oversee the research activity of graduate students and post docs. Resident researchers are generally individuals with advanced degrees who are on assignment with another university or company for a defined period time. All of these people are highly motivated and are recognized by their peers as being proficient in their profession. Faculty should be able to work with students and communicate well at all levels.

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3.2.2. Research Students/Associates/Post-Docs

Research students (graduate students) are in training for a PhD or MA degree in a science or engineering. Most have at least acquired a bachelor's degree prior to engaging in research at the graduate level. They must be able to focus, work hard and be persistent in what they do. Most tend to sacrifice their personal lives to some extent during this period. Associates, sometimes referred to as post docs, are PhD-level individuals who have been accepted by a research faculty to work on a project jointly agreed to by both. These are sometimes funded by separate grants. e.g., in the U.S., from the National Science Foundation (NSF) or National Institutes of Health (NIH); in the U.K., from the Science & Technology Facilities Council^{vii}; and in Chile, from Corporación de Fomento de la Producción (CORFO).^{viii} A post-doctoral position affords the opportunity to gain additional experience in the same field or an adjacent one. Like graduate students these individuals must have a passion for what they do. The term is generally one to two years. The pay is low. Most universities outside the U.S. also offer similar programs. In the U.S., it is not uncommon for a graduate student to do post doc work in a foreign university for a set period of time.

Research Students/Associates/Post-Docs typically has or is in the process of earning a PhD or MA in their respective field and has some experience (2+ years) conducting research within their specialized area. This individual has a similar profile as the Faculty/Resident Researchers; however, their level of experience and knowledge of the field is reduced.

These individuals also work closely with undergraduate students who help them carry out their investigations, and at times, will assist in teaching college level courses at the university.

3.3. Managers and Qualified Scientist/Engineers/Technicians at University-Affiliated Proof of Concept (PoC) and Entrepreneur Support Centers

These are centers within the university that foster entrepreneurship. Their actual location within a university setting (attached to a particular department, for e.g. physics, engineering, biology, etc.) varies. The projects they host are many but many are aimed at teaching, through a real-world exercise, what is required to create a business and go to market with a proposed technology. These range from business plan contests to proof of concept (POC) challenges. In a business plan contest complete business plans prepared by individuals or teams are judged based on technical merit and likelihood of business success. Similarly, POC challenges are judged but the focus is a little less on the business aspects and more on pragmatic factors and technical validity, however, these factors vary). These contests are open to students and faculty who either want the training or actually have a technology concept they would like see commercialized by themselves and others or both. Good support centers will have on board seasoned technical and business people (including investors) who can coach candidates through each step along the way of proving the validity of their. The same individuals can participate as judges of these contests. Besides training, the contest winners may receive a cash award and further opportunities for mentoring. Trainers and judges are passionate about what they do. It is not uncommon for older, experienced, successful alumni to be participants.

The trainers and judges come from a variety of fields to evaluate these challenges from an outside perspective and provide a critical eye on the technology's potential. They typically hold BA degrees in their respective fields and have experience commercializing technologies in the market, meaning that they have worked in or alongside a company that has successfully commercialized its technology. This first-hand experience gives them the knowledge to evaluate technologies and guide entrepreneurs in their commercialization process. Moreover, these individuals are also well versed in their industry and are up-to-date on the new innovations in their industry, allowing them to identify technologies in these challenges that meet a market need.

3.4. Technology Transfer Managers

The Technology Transfer Office (TTO) is the hub of the university's commercialization activity as well as the interface with the corporate world. This may or may not be true, again depending on the university and how its TTO has evolved. For example, sometimes the grants and industrial sponsored research activity are not a part of the TTO, however, the TTO generally has the last word on IP matters associated with contracts within the university.

The TTO or sometimes the OTC (Office of Technology Commercialization) regardless of university has the mission to review, selectively patent (or choose another appropriate form of IP protection) faculty inventions, market those inventions through licensing or assist startup formation. No two TTOs are identical in makeup, organization or staffing, but generally speaking, all will have to varying degrees the following key human capital within.

3.4.1. Directors of Technology Transfer Offices

The director of the TTO leads and coordinates the activities of the department. The director reports to the Vice Provost or Vice President of Research and has the responsibility of making sure the office operates according to policies set forth by the university. This includes expenditures and apportioning of licensing revenue. Most TTOs are not self-sustaining and are funded out of the university operating budget. However, most of these offices would like to be self-sustaining and work towards that goal by the aforementioned revenues.

➤ ***Profile of directors of technology transfer offices***

There are no stringent rules governing the required backgrounds of the Office Director (sometimes titled the Associate Vice Provost for Research or something similar). There are as many backgrounds as people in the position; some are attorneys, some have no direct legal experience, some have previous industrial experience while still others have only academic experience. Only in a few instances have directors risen through the ranks within a single office. Most have previous experience at another university and established their credentials there and before. A successful director will have the skills to manage groups of diverse people, be well-versed in business affairs, and understand licensing and the challenges of the discipline. The better directors will have had experience completing and negotiating license agreements and will be well-respected within the university and the corporate community. Additionally, the better director will be able to effectively communicate upwards within the university hierarchy and be an advocate for her/his organization.

3.4.2. Technology Transfer Specialists & Patent Agents

Technology transfer specialists are professionals who act to create commercial opportunity by facilitating the transfer of proprietary knowledge (know-how), and align intellectual property rights from an owner (e.g., university) with the interests of another party (e.g., company) specifically in commercializing that technology. In exchange the owner will receive compensation, usually in the form license fees and/or royalties. These professionals must be looking for opportunities to fund research either from industry, or from government projects. They should incentivize their faculty to perform research with a commercialization focus, and maintain relationships with all actors in the innovation ecosystem that could provide commercial opportunities for the installed research capabilities of their institution.

A patent agent is an individual who has received accredited formal training on patenting and licensed to file patents in the patent office (passed the patent bar). In the US an agent is not a licensed attorney so cannot argue cases in a court of law. While it is not uncommon for TT specialists to be have patent agent credentials this does not represent the majority.

➤ ***Profile of technology transfer specialists and patent agents***

The successful TTO will have a mix of individuals with varying backgrounds and experience. Key individuals within the organization can be characterized by having:

- An understanding of the patent process, licensing and IP management in general. Some may be patent agents and in some offices a patent attorney.

- Individuals with a business background. Many offices are staffed with people with technical degrees that also have MBAs or related experience.
- Members in the team with backgrounds each in a specific technology sector or who become competent in a specific sector and typically will have advanced degrees.
- Marketing skills with an aptitude in shopping for technology. Formal training in marketing or a related discipline is a plus. The organization will benefit if these individuals have an outgoing personality and the ability to use social media.
- Individuals with information searching skills including patent searching. These same people should have a good knowledge of internet tools in order to access prior art (at a cursory level), carry out market assessments and price licenses. These are typically technically degreed people who have been trained to access information from the Web and other sources.
- Individuals who are comfortable working with other people outside the university as well as within (faculty) and are capable of negotiating contracts and licenses; having an outgoing personality is a requirement here.
- Ideally some of these people will have industrial backgrounds and have accumulated lists of company contacts over time. These people with an understanding of how the “other side” thinks better equips these individuals to fill the needs of their customers i.e. licensees.

Some or more of these skills will be shared by all personnel in the office. In some instances TTOs will apportion the people according to skills. For instance, some might focus on marketing, others focus on searching and others will deal with faculty, review and vet disclosures and draw up the licensing agreements and deals. The latter are typically referred to as licensing managers. Each licensing manager within an office will likely focus on a specific technology sector e.g. physical sciences, life sciences, agriculture, IT, etc.

A subset of the office will focus on startup creation and will be a source of local resources. Individuals in this group will likely have experience in or be proficient in constructing a business based on university technology. He or she will know the steps that need to be taken and the university’s policies on that matter. Business sense, people skills and connection with the business community are a must for all personnel at the office.

3.5. Innovation Project Managers (Gestores de Innovación)

Innovation Project Managers in the public sector serve the function of working with researchers, technology transfer officers, and in designing innovation programs at the university level. They also facilitate and develop processes of new communication mechanisms between the industry and government through which they are able to collaborate effectively in the implementation projects. Their main distinction from technology transfer officers is that they don’t need to be familiar with the patent legislation or freedom to operate, and they have more management experience. These individuals can be external consultants or internal employees; at universities they tend to be internal employees. That said, in emerging innovation systems, it is common to see market in which consultants design the processes and assists in the selection of the personnel that implement the programs, but they themselves are not responsible for the

execution of the innovation plans per se.

3.6. Technology Diffusion Officers (Extensionistas)

Technology Diffusion Officers are individuals who work with universities and other research institutions in diffusing proven technologies that come from the university or that have been backed by other markets that want to introduce their technology into a specific industry. These individuals have a similar profile as innovation project managers and can also be external consultants or internal employees; at universities they tend to be internal employees. Technology diffusion officers may also have their own market in which they offer direct services to corporations or contract work through two mechanisms: direct contract via corporations or direct contract via technology assistance programs promoted by government agencies or other support organizations.

4. Government

Government assistance, as defined here, represents programs or agencies that are fully managed and supported by the public sector. The government's role in an innovation ecosystem is multilayered, and complex; it has to serve the functions of funder, regulator, promoter, facilitator, and lawmaker. Note that the government as the steward of the national environment for all economic sectors is a meta role that is outside of the scope of this report. Moreover, the government's role in approving regulations and legal policies that directly affect emerging companies is also beyond the scope of this report and will not be addressed directly. However, the government's role as funder, regulator and promoter for activities related to acquisition and diffusion of technology within the existing traditional industrial base, and development of a new entrepreneurial base, and the key human capital needed within public institutions, are the focus of the discussion in this section.

A key indicator of economic growth is the government agencies effectiveness in the commercialization and diffusion of technologies. To achieve this, they typically rely on support organizations and Loan Officers (previously described in section 2.1.1) for the execution of their technology assistance / innovation programs. We see examples of this in US Government Agencies such as the National Institutes of Health and the National Science Foundation that partner with support organizations such as Larta to implement their commercialization assistance programs. It is important to note that government funding in R&D is considered to be a strong indicator of that country's economic standing^{ix}. As countries develop and increase the amount of tax payers' money towards technology, they are setting the foundation for innovation, and in turn, economic growth.

4.1. Managers of Funding Programs

As mentioned in Section 2: "Private Capital", the government plays a fundamental role in the "non-dilutive" sector of capital via its granting instruments. A government grant is an award of financial assistance in the form of money by the federal government to an eligible grantee with no expectation that the funds will be paid back. These are considered non-dilutive funds because in the case of start-up companies, though the government funds the company's technology development, it does not take ownership of any of the company's technologies

supported. There is typically a lengthy application process to qualify and be approved for a government grant. Most recipients are required to provide periodic reports on their grant project's progress. In addition to grants, the government typically provides small businesses with short- and long-term loans with low, constant interest rates that only require interest rate payments during the expansion phase of the company. The U.S. Small Business Administration offers loans for up to \$5 million, depending on the company's eligibility. Companies who receive these loans need to have assets equal to the loan amount or be willing to give up to 20% equity guarantee.^x

Central governments provide grants for a wide range of projects and businesses that serve public groups; these grants (and loans) are key to promoting the increase of productivity in existing traditional industrial bases via funding directed to technology acquisition and diffusion. These funds are also the life line for new entrepreneurs, especially tech-base ones. In the United States, over 26 federal agencies administer more than 1,000 grant programs annually. The Small Business Innovation Research (SBIR) program is an example of government policy focused on stimulating innovation through a research-derived grant mechanism. The SBIR specializes in small businesses looking for funding for high-risk technologies. The catch: Unlike another program (no longer in operation), the Advanced Technology Program, the technology funded by SBIR must meet the research and development needs of the federal government. Initiated by the Small Business Innovation Development and Business Research and Development Enhancement Acts in the US in 1982, the SBIR awards grants \$2 - \$3 billion US dollars per year to both startups and more established companies meeting the official definition of 'small business'. Each federal agency deploys its own program under the SBIR umbrella, specifically designed for the technologies within their specific sector. An example of one of the technologies contracted through the Department of Defense (DoD) is Energy Focus, Inc.'s technology for energy efficient lighting,^{xi} which was installed in all of the DoD's Navy ships to reduce costs.

To a large extent, the U.S. federal government devotes resources to R&D to fund projects that, despite their potential for improving economic growth and people's well-being, would be unattractive for businesses to pursue on its face. Businesses, in turn tend to under invest in R&D because they are less rewarded by markets for R&D, a cost center. Also, the returns from their investment, which the markets insist they consider, are often smaller than the returns to the economy as a whole. For example, the knowledge generated from a basic research project can often be used by other firms within and outside their industry. To make up for this underinvestment, the U.S. federal government has played a major role in funding R&D. Federal support for basic research is particularly crucial because the lack of direct commercial applications from basic research projects—as well as the uncertainty of project success— can deter businesses from performing basic research even though some studies have shown that it is the form of R&D that generates the greatest economy-wide returns. However, the majority of funding for basic research comes from the federal government (50-60 percent), since it is in a better position than the private sector to assume the risks associated with basic research. In contrast, businesses have a greater incentive to invest in development since there is less uncertainty over the commercial applicability of results from development. Industry has traditionally devoted about 75 percent of its R&D spending to development. Despite this distinction, however, the commercial viability of SBIR research grants has now been established firmly, some thirty three years after its founding. There are several reasons for this, including

the operation of commercialization programs offered to SBIR grantees that enable them to find partners and deliver commercial-grade innovations to the marketplace.

Individuals who are grant program directors working for the government have roles that include:

- Planning and administering the relevant program within the framework of legislation, agency policies, missions, objectives and resources, and serve as spokespersons of the program with the scientific, engineering, and business community.
- Implementing new or revising existing policies, developing technical, fiscal and administrative approaches to improve the activities and management of the program.
- Managing and monitoring grants and interagency agreements to ensure fulfillment of commitments.
- Working with the program staff to apprise them on the requirements of programs and sensitize them to the requirements of the small business community (in the case of programs targeting this segment of business).
- Designing, developing, managing, coordinating, and implementing small business solicitations, conferences, publications, reports, and research and study projects (again, for this segment).
- Developing and presenting clear and concise explanations and interpretations of program policies and research program initiatives for small businesses, the academic community, large industrial firms, the investment community, state and local governments, and other federal agencies.
- Manages a staff of program support professionals. Work involves overseeing the processing of proposals, managing logistics/budgets, and ensuring proper analysis is performed of programs and associated work methods to support the accomplishment of the organization's mission.
- Ensures that there is a funded, appropriate effort and responsible person to oversees the business management aspects of grants and cooperative agreements, including review, negotiation, award, and administration, and for the interpretation of grants administration policies and provisions.

➤ ***Profile of managers of funding programs***

Candidates usually have a technology/science background or a closely related field, plus after award of the Ph.D, six or more years of successful research experience, research administration experience, and/or managerial experience in research and development related to the emerging aspects of innovative manufacturing and technologies. Specific experience in the commercialization of innovative products involving technologies in both small business settings and/or in large industrial concerns is sought. Experience in research that applies scientific principles to problems in some of these or related areas while advancing knowledge, is always considered a plus. Some other qualifications include:

- Demonstrated ability to manage a complex federal and/or regional grant program.
- Ability to work and coordinate with internal staff to identify grant funding needs, prepare applications for funding, monitor expenditures, and prepare grant reports.
- Requires face-to-face contact and relationship building through office availability and regularly scheduled meetings with internal staff.

- Ability to effectively communicate, both verbally and in writing, regarding policy statements, procedures, technical, and financial information to different audiences.
- Ability to facilitate agreement among diverse interests, grasp technical matters quickly and problem solve effectively.
- Strong organizational skills; ability to work under pressure; and meet multiple agency, state, and federal deadlines.
- Knowledge and understanding of intellectual property rights laws, guidelines, and policies.

4.2. Managers of Technology Assistance Programs (Innovation Managers)

These programs can be held at the local, state, or federal level and provide traditional business leaders and new tech-based entrepreneurs with the essential assistance to further advance their enterprises. This technology assistance accompanies funding assistance; money alone does not guarantee success of any initiative; support along the way has been shown to be key to increase the likelihood that companies receiving government funding actually achieve their commercialization goals.

The government also provides assistance in diffusing existing technologies that have proven to be effective in the industry. Several programs have been put in place to achieve this and This is accomplished through inviting companies that have successfully commercialized their technologies to present at conferences and other events in which other emerging companies benefit not only from that presenting company's experience, but also from potentially adopting or licensing that company's technology to improve their own; many of these events for U.S. funded companies are found on the National SBIR/STTR Conference.^{xii}

4.2.1. Managers of Technology Assistance Programs for Emerging Entrepreneurs and Established Traditional Industrial Base

Promotion programs of this type are led by managers whose primary function is to select companies for the Innovation Promotion Program and support those entrepreneurs in developing their technologies through the various stages of growth. They are ultimately accountable for selecting companies with viable technologies that can be commercialized to spur further economic growth.

Examples of these programs at the state level include the Massachusetts Technology Collaborative^{xiii} and Utah's Technology Commercialization & Innovation Program.^{xiv} A more prominent example of one of these programs at the federal level are the Commercialization Assistance Programs (CAPs) that are made available to recipient of the Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) grants in the United States (mentioned above). CAPs help grant recipient companies throughout the entire process of building and growing a company.

- ***Profile of managers of technology assistance programs for emerging entrepreneurs and established traditional industrial base***

The Managers of Technology Assistance Programs ideally should have previous experience (5+ years) in business, with a Master's Degree in business administration. This individual requires first-hand experience in the business procedures that are involved in developing a technology or service and taking it to the market. They need to understand the specific business challenges that entrepreneurs in the program are facing. It would be beneficial for this person to have knowledge of the technology industry, in terms of research experience or general experience in working with people within the industry. Moreover, this person should have strong management and communication skills to be able to manage the contract with the companies/ entrepreneurs that they will support in the program. Note that this individual can be supported by technical experts with Master's Degrees in the various fields of science, such as engineering, biology, chemistry, mathematics, etc. who can assist with the specific selection of companies.

4.2.2. Managers of Trade and Export Promotion Programs

Trade and Export Promotion Programs are led by managers whose primary function is to assist small businesses in entering or expanding their presence in the international market. An example of this type of program in the U.S. is State Trade and Export Promotion (STEP)^{xv} within the US Small Business Administration Office. Note that these programs are not specifically designed for technology based companies, but can be tailored for such purposes.

➤ *Profile of managers of trade and export promotion programs*

The Managers of Trade and Export Promotion Programs should have previous experience (5+ years) in business, with a Master's Degree in business administration. This individual requires first-hand experience taking a product or service into the international market to help them to understand the specific challenges the entrepreneurs in the program are facing. If the program is tailored specifically for technology companies, it would be beneficial for this person to have knowledge of the technology industry, in terms of research experience or general experience in working with people within the industry. Moreover, this person should have strong management and communication skills to be able to manage the contract with the companies/entrepreneurs that they will support in the program.

4.3. Innovation Project Managers & Technology Diffusion Officers

Innovation Project Managers in this function work with directly with the government agency leadership that is in charge of promoting innovation design programs/processes. This work creates mechanisms of communication between the industry and the university, which directly facilitates the implementation of collaborative projects between the two. On the other hand, Technology Diffusion Officers in the public sector serve the government agencies to increase the productivity of the already existing industrial base. As previously mentioned, these two key players can be external consultants or internal employees; however, at the government level they tend to be internal employees. That said, in emerging innovation systems, it is common to see market in which these individuals design the processes and assists in the selection of the personnel that implement the programs, but they themselves are not responsible for the execution of the innovation plans per se.

4.4. Managers of Internal Procurement Integration Programs

Internal Procurement Integration Programs are specialized programs mostly applicable to technology acquisition and procurement, and led by managers whose primary function is to quickly identify emerging technologies that the agency can procure in response to the specific priorities, challenges, and scientific needs within the agency. This individual should have the capability to effectively evaluate the overall scientific and technical merit, potential contribution to the agency's mission, and cost assumptions of the technology under consideration.

➤ ***Profile of managers of internal procurement programs***

The Managers of Internal Procurement Integration Programs ideally should have previous experience (10+ years) in the technology industry, specifically dealing with contract management in the technology industry, and hold a Master's Degree in a related field of the agency they're contracted under (e.g., a manager in the Department of Health and Human Services should hold a degree in biology or a related field, as opposed to a manager in the DoD who should hold a degree in engineering or a related field). Moreover, these individuals must have specialized knowledge of the various programs run within the agency that will allow them to identify what technologies are essential for the development of the agency. Some agencies, such as Defense Advanced Research Projects Agency (DARPA) select managers who are specialized in various areas of research of the agency's focus such as: aeronautics, chemistry, computer science, etc.^{xvi} and can work collectively to address the different needs of the agency.

4.5. Directors / Officers of Regulatory Agencies & Policy Makers

The government can also provide companies with legal and regulatory frameworks consisting of laws, regulations, policies, and procedures to ensure that there are a set of standards for safety and market engagement. These legal and regulatory frameworks at the federal level are structured and enforced by offices and agencies within the government.

These regulatory agencies can usually be broken down into two categories: 1) Consumer based agencies that regulate companies to protect consumers and establish consumer trust within the open market, and 2) Market-based agencies that regulate interaction and competition between enterprises, their adherence to law, and their financial dealings. Examples of the former in the context of the United States are: *Food and Drug Administration (FDA)*, *United States Department of Agriculture (USDA)*, and the *Environmental Protection Agency (EPA)* to name a few. Examples of the latter are: *Federal Trade Commission (FTC)* *Securities and Exchange Commission (SEC)* *Internal Revenue Service (IRS)*, *US Patent and Trademark Office (USPTO)*.

These agencies and their functions are provided in this report only for reference as they play meta roles across the whole fabric of a nation, but a discussion of their functions and roles is well beyond the scope of this report.

➤ ***Profile of directors / officers of regulatory agencies & policy makers***

The human capital resources for these specific agencies require individuals who have specialized degrees within their respective industries and subsector, if applicable. These individuals should

hold a Bachelor's Degree and have experience (5+ years) in the industry of the agency they have been contracted under.

5. Industry

Industry is the engine of commercialization and wealth across all technology sectors. During the last 20 years there has been a gradual transition from “Closed Innovation” – going to market with products or services largely embodying a company's own technology – to “Open Innovation” (OI)– acquiring technology from the outside and going to the market based on it or a mix of external and internal products. Companies in all sectors have gone through such a transition to greater or lesser extent, but the most significant changes have occurred in companies not in the consumer products or life science space but in what is referred to as the “technology sector”, specifically information technology, software and computing. It should be noted that the convergence of the sciences has led to a blurring of the lines between various sectors.

The move towards a more open innovation model of R&D is now recognized as almost a necessity by most companies to keep ahead of competition. IP and confidentiality policies had to be rethought and parts of company infrastructure (in terms of people skills and job descriptions) needed to be morphed to accommodate a different way of doing R&D. Companies adopting an OI model and their shift to new R&D strategies have been the subject of many conferences, papers, articles and publications, including blogs and formal presentations.^{xvii}

During the last decade many companies have adopted the principles of OI and benchmarked against other companies who were viewed as leaders in OI. Managers in the middle ranks were often faced with resistance from senior management who needed to be convinced that OI was, in fact, going to add to the bottom line and that the incremental benefits could be measured. This has been occurring against the backdrop of the less than full valuation or understanding of the IP in the decision-making ranks. Meanwhile, legal departments, as expected, focused on all the possible downsides.

In the end, organizational and tactical processes took shape that positioned the newly-thinking company to make the most of its capability by accessing and leveraging, selectively, external technology, IP and in some instances business models.^{xviii} In most large company settings licensing and external collaboration have been going on for decades to varying degrees but the new environment discussed above has required them to create new positions, job descriptions and performance metrics. Moreover, the role of the industry has evolved to not just be potential buyers of the products services that come out of start-ups, but also as the engines of economic prosperity within their countries. This has been achieved by the established industry pushing for the implementation of technology standards within a nation and for higher end technologies within their companies, in turn, increasing the productivity via technology use in their processes and pushing innovation forward themselves by internally developing (or commission the external development of) new technologies.

5.1. Innovation Project Managers (Gestores de Innovación)

Innovation Project Managers in the private sector work with the established industry base,

however, they differ from technology diffusion officers in that they solely work with large corporations. Their primary function is to design, implement internal procedures in R&D and innovation. Examples of these include: the implementation of internal laboratories for researching and developing new products, the creation of open innovation, or processes of corporate ventures. These individuals can be external consultants or internal employees, but given that they have a high level of access to the company's confidential information and the complexity of the processes they create, it is preferable to hire internal employees. That said, in emerging innovation systems, it is common to see market in which consultants design the processes and assists in the selection of the personnel that implement the programs, but they themselves are not responsible for the execution of the innovation plans per se.

5.2. Technology Scouts

Professional technical people who search outside their firm for technology opportunities to either fill gaps in or enhance technology base in their companies. These same individuals may coordinate the internal assessment of selected opportunities and facilitate arrangements for evaluation or, ultimately, acquisition.

Around the world, there has been a general down-sizing of the R&D in many corporations during the last decade; this movement left a talented pool of technical professionals in need of work. Some of these people were let go and found employment in other firms but some were re-tooled to scout needed technology from the outside and then report back to the relevant R&D/business group for evaluation and possible acquisition or license. These same individuals either trained themselves, or were encouraged by their management to get training, in IP patent and licensing skills in order to become savvy enough in the subject so that they are more capable of working in concert with the legal department on contractual and other related license matters. Often the training came from internal legal people or professional organizations such as the Licensing Executives Society or from numerous professional courses teaching IP management for the non-lawyer. Thus, these individuals were designated or appointed as licensing managers and are now commonly referred to as licensing executives. In our experience, working with many large companies, few have hired scouts from the outside. The reason, in part, is that these individuals, being steeped in the culture and organization of their own company are a more credible and trustworthy interface with the external world. Technology scouts work with many parts of the company to understand and shape needs that may be best acquired from the outside, draft "Requests for Proposals" (RFPs) and issue them selectively through network contacts or more broadly through one or more media. Technology scouts also work with the R&D and business units inside the company to determine if, in certain instances, it would be more cost-effective to retain an intermediary, e.g., Nine Sigma^{xix} to assist in the searching and selection process. Technology scouts initiate and create partnerships with academia, research institutes, and, in some cases, national labs. They interface selectively with their research scientists and engineers and other internal tactical people as needed. With guidance from management they may create special strategic relationships with one or more universities to be close to public discoveries which have not as yet been disclosed.

➤ *Profile of technology scouts*

- PhD in Chemistry, Science, Engineering, or related field with 10+ years of experience in the industry.

- Proven technical experience and knowledge with a track record of scouting effective technologies that have been introduced and/or commercialized to the market.
 - Excellent written and verbal communication skills and ability to develop and deliver knowledge-driven recommendations for technology leads to both technical and non-technical personnel.
 - High level competence in performing intellectual property and technical due diligence.
 - Demonstrated ability to detect early state technologies and/or business opportunities.
 - Ability to work in teams and demonstrated ability to collaborate with other organizations.
- Sound understanding of marketing, financial, and business aspects of technology development.

5.3. Corporate Venturing Executives

Some companies have separate departments which interface with startup companies or even SMEs. The goal is seek out and selectively invest in companies that may be good acquisition candidates and are good strategic “fits” with their company. These acquisitions can take the form of a new venture within the company or even a subsidiary. This is a more aggressive model of open innovation but is typically the faster route to increasing strategic and shareholder value. Corporate venture departments vary in type depending on the company. Sometimes a company will have a new ventures department made up mostly of people with a business background and some with technical backgrounds. See DuPont Ventures and the team described therein.^{xx} A department like this works closely with operating units who have the ultimate say on whether an investment should be made, and if so, on what terms. If an acquisition were to occur it is likely a given business unit would take the lead. These same companies may have a mergers and acquisition group which would facilitate the mechanics, legalities, due diligence, etc. of an acquisition. Please see the Innovation Excellence Blog^{xxi} for additional examples of open innovation between large companies and startups.

These executive’s main function is to search, identify, review and invest in startups or other companies that if ultimately acquired would strategically increase the company’s growth potential, goals, and ultimately the bottom line. The same function will likely have at minimum a key role in the acquisition process. There are internet based recruiting groups that advertise such open positions.

➤ *Profile of corporate venturing executives*

Typically, these are senior level individuals within a firm, who understand the company’s goals, may be technically degreed but should have significant business experience and good understanding of the mergers and acquisition process. For a more detailed discussion, please refer to Section 2.2.3. of this report; since these are manager of capital and investment decision makers, their role and profile was discussed in depth in the Capital Section.

5.4. Licensing Managers

Licensing managers are responsible for licensing in technology and IP that has been determined to be of need to the company and the continued management of those accounts. In many firms the same individuals may out-license not-strategic technology to other companies. These

individuals play a central role in ensuring that the company is in compliance with any new regulations regarding licensing specific types of technologies that may have stringent regulations, such as medical devices or pharmaceuticals.

➤ *Profile of licensing managers*

Licensing managers specialize in managing accounts for licensees. Individuals in these roles typically have a bachelor's degree in a science related field and at least 5+ years of experience in working in licensing at the corporate level. Many organizations specialize in this type of training, e.g., The Licensing Executives Society,^{xxii} and offer a variety of web-based courses. Given that these individuals manage a number of teams, it is beneficial for them to have some PMP^{xxiii} or Six Sigma^{xxiv} certification.

5.5. R&D Managers

R&D managers work in concert with the various business groups within the company to assure the R&D (internal and from external) is in sync with the direction desired by the businesses. The R&D manager should not micro-manage the activities of the professionals beneath but needs to be abreast of all extant research initiatives to assure no gaps exist and to remedy personnel issues that may arise. Ultimately, the R&D manager is responsible and accountable to senior management for everything going on in her/his organization. In countries with less sophisticated established industries, the R&D function is usually subordinated to the marketing department; under this structure R&D's role is not to advance the science behind the product/service their company works with, but to fulfill marketing needs. In fact, in less sophisticated industries there is no internal R&D, and the function is outsourced ad-hoc to government and private R&D institutions.

➤ *Profile of R&D managers*

Typically R&D managers will have considerable in-house experience in an R&D function and will have received additional training in IP management and all matters comprising the licensing process. Moreover, they have similar profiles as Innovation Project Managers (described in Section 6.1). Many organizations specialize in this type of training, e.g., INSEAD,^{xxv} and offer a variety of web-based courses. Individuals in these roles typically have a bachelor's degree in a science related field and at least 8+ years in research, scientific or related experience, with supervisory or lead roles preferred. Given that these individuals manage a number of teams, it is beneficial for them to have some PMP^{xxvi} or Six Sigma^{xxvii} certification.

5.6. Research Scientists, Engineers, and Technicians

With some resistance, these professionals increasingly have to accept that external technology and capability exists that may be superior, have greater economic return, be simpler to execute and align more strategically with the company's evolving business direction. They are to be rewarded not so much by what they can discover but what they can hunt and gather externally and co-mix with their own creations. This could mean having to pay more attention to the external academic and corporate world, connecting with like-minded scientists, keeping abreast

of developments portrayed in the scientific press and Internet media and being adept at the use of search tools.

➤ ***Profile of scientists, engineers, and technicians***

A more senior person, generally a college graduate with a combination of experience, technical, business and management training. This individual can effectively work with people without trying to do the job of his/her direct reports.

5.7. Technology Diffusion Officers (Extensionistas)

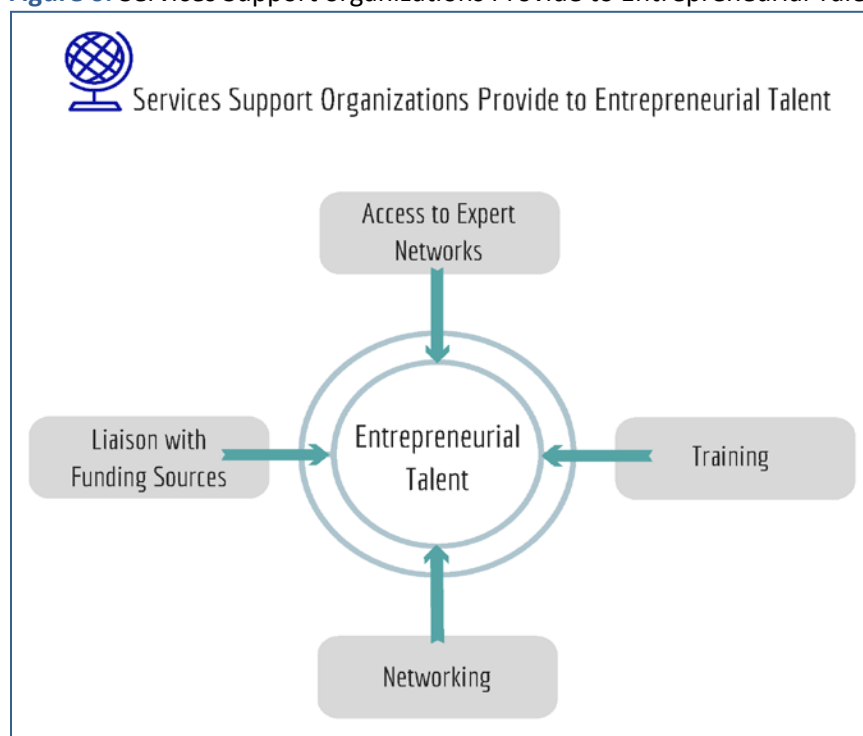
Technology Diffusion Officers are individuals who work with the established industry base to support the increase in productivity in the existing processes (e.g., MyPymes^{xxviii}). Their function is the diffusion of existing technologies that have been proven to be effective and have been used by either larger corporations in the company or within the industry sector of other countries. These can be external consultant or internal employees; nevertheless, given the projected cost and necessity of a high technical knowledge of the needs and advances of different industries, external consultants present a better alternative for small to mid-sized corporations. These technology diffusion officers can then have their own market in which they offer direct services to corporations or contract work through two mechanisms: direct contract via corporations or direct contract via technology assistance programs promoted by government agencies or other support organizations.

6. Support Organizations & Individuals

Support Organizations, as defined here, represent entities other than those that are wholly government managed or affiliated, which are described earlier in this document. They can be structured as non-profit, for profit, or even public-private partnerships, established with entrepreneurs or serving a convening role for increasing the social fabric^{xxix} of a particular regional ecosystem and thus increasing the connections between entrepreneurs, capital providers, talent, and other stakeholders in a community or region. They can play a significant role in a region because of their ability to build trust networks and (in the case of incubators and accelerators) provide cost-effective avenues for start-ups to test their ideas.

Support organizations for innovation regularly utilize the market lenders of services (described in previous sections of this document) for the execution of their innovation programs. Nevertheless, the emerging innovation systems tend to solicit services in a pro-bono form, meaning free services, which is not a sustainable model for business. However, that discussion is beyond the scope of this document and will not be addressed further.

Figure 6: Services Support organizations Provide to Entrepreneurial Talent



Source: Pachon, 2015

The various flavors of these Support Organizations and the human capital resources that activate their management and deployment are provided below.

6.1. Personnel in Entrepreneurial Support Organizations

Entrepreneurial support organizations, especially for technology-related or knowledge-based industries are often member-driven organizations that serve entrepreneurs within a given region. In some cases, they can be specialized initiatives within larger organizations (like Chambers of Commerce or Economic Development Agencies) that have a specific technology-focused agenda. In other instances, they are small private initiatives that are funded by a collection of private and public organizations. The scope of services and activities they provide include:

- *Individualized Educational Events:* webinars, or live seminars/guest speaker events that provide their individual members or local entrepreneurs with insights and shared knowledge around specific topics relevant to early stage company formation, development, and growth. Examples include OCTANE^{xxx} and Bixel Exchange (initiative within the Los Angeles Chamber of Commerce).^{xxxi}
- *Formalized Academies/Tailored Services for Entrepreneurs:* These are characterized by more formal 4 week, 12-week or longer tailored programs that organizations develop for companies on a competitive basis (application and selection) at reduced cost for start-ups or under corporate or other governmental sponsorship. Often, companies are assigned a team of mentors (from industry and capital community) that support the companies toward

achieving a funding milestone or contracted deliverable. Examples of such organizations include Larta Institute^{xxxii} and Launch.^{xxxiii}

- *Funding:* In some instances, these types of organizations have tapped into local resources or private donors to build a “fund” associated with their services. It allows the organization to not only provide educational services or mentoring, but also to help scale up early stage tech ventures by investing in their development. For example, JumpStart^{xxxiv} has developed a small fund for regional companies in Northeast Ohio. Ben Franklin Tech Partners^{xxxv} in Pennsylvania does the same.
- *Networking and Company Showcase Forums:* Convening events with the purpose of building social networks among entrepreneurs, investors, large companies, and professional service providers. At times, the networking is part of an overall event, which features presenting start-up companies to a gathered group of investors or potential partners. All of the cited organizations hold networking and showcase-type events to foster regional goodwill, support business development efforts, or demonstrate impact. BayBio^{xxxvi} is one organization that provides such services to its members in addition to being an advocacy organization.

It is important to note that the above services are not exclusive and several of the organizations cited above provide a subset or combination of all of the above services to their community of entrepreneurs. In one instance (JumpStart), they have sought to “franchise” the model developed in Northeast Ohio to other regions across the US such as Duluth, Central Georgia, Akron, and Detroit.

6.1.1. Executive Directors

Organizations of this type are led by Executive Directors who function as the CEO with principal responsibility for the fundraising, operations and strategic direction of the organization. They are ultimately accountable for performance and staffing decisions, including the recruitment and careful development of a board of directors.

➤ *Profile of Executive Directors*

The Executive Director ideally should be someone who has had previous experience (10+ years) either as a successful businessman/entrepreneur (or founding and growing a venture), with a PhD or Master’s Degree. However, this individual should not be strictly an academic. They need to have the credibility and persona to know the first-hand experience of building a business to relate to the myriad of entrepreneurs they will be advising/supporting. The Executive Director is the “face” of the organization and needs to have very polished interpersonal and public speaking skills as they will be guiding various groups (entrepreneurs, investors, external stakeholders, their own board, and employees) toward a common goal of serving their core function. The individual should be prepared and encouraged to relish the challenge working with few resources, often taking on several tasks themselves as they build the organization. It is a mistake to place someone in the Executive Director role if they come from a large company and enter the position with the same expectations common to a hierarchical highly segmented business culture where all work is delegated and the manager simply oversees without a hands-on approach.

6.1.2. Managers of Commercialization Assistance Programs

Manager-level individuals that oversee Commercialization Assistance Programs handle the day-to-day activities of the “program” and ensure that they are operating on task, on schedule, and on budget. They are sensitive to program adjustments that need to be made based on market realities or shifting trends.

➤ ***Profile of managers of commercialization assistance programs***

The ideal individual in such a management role should have a B.S. or M.S. degree (preferable) and ideally 5+ years of experience in a project management role. They should exhibit the qualities to think strategically beyond being just in “execution” mode—toward how the program should/can evolve and improve over time. A Commercialization Assistance Manager will interface often with mentors, entrepreneurs, and an external client and therefore should also be adept at presenting and interacting with these different group-types. They should be competent at developing reports and presenting in a public forum or smaller groups on the program they oversee.

6.1.3. Business Development/Fundraising Managers

As the Entrepreneur Support organization grows or market conditions indicate a favorable climate to pursue growth, the Executive Director may look to bring aboard someone (at the Manager level) dedicated to the revenue generation and fundraising function. This Manager is responsible for developing short and long term plans for the generation of revenue and/or building an endowment that will ensure the sustainability of the organization. The Manager also is in charge of marshaling the assets (human capital, intellectual, and other) to execute on the plan and engage the support of the Executive Director and board to achieve those goals.

➤ ***Profile of business development/fundraising managers***

Qualifications for this individual are a B.S. degree at a minimum, with M.S. degree preferable, with a background in business development or sales and demonstrated track record of building partnerships and relationships with customers. Strong references are critical for this individual, as they (along with the Executive Director) will be principally externally facing to the outside community.

6.1.4. Mentors and Advisors

In many cases, in order to execute on the training, mentoring, or educational services offered by the Entrepreneur Support organization, it would need to rely on a committed group of local mentors. Mentors function as the primary interface with the entrepreneur, working on behalf and under direction of the Support organization. Depending on the assigned activity, mentors either work in groups (2-3 mentors supporting one company) or on a one-on-one basis assisting the entrepreneur in reaching their next round of investment, positioning for customers/partners, or to overcome critical business or technical milestones or challenges that limit company growth. Mentors are not full-time and often volunteer their time in this capacity. For this reason, the Support organization needs to have an active and diverse base of mentors across a variety of functional expertise areas that mirror the entrepreneur base that they seek to serve.

➤ ***Profile of mentors and advisors***

The mentor engaged by the Support organization serving tech-based entrepreneurs should principally have technical backgrounds (B.S. with M.S or PhD preferred) and experience in the business of translating an idea/technology into a product adapted to end users and with the process of commercialization. They should be seasoned individuals with the experience to command the respect of the entrepreneurs they are advising. A first-year MBA student, for example, is not a good fit. In the recruitment of mentors, care should be taken to ensure that the mentor is intrinsically motivated/energized in their role by the continual interaction with the entrepreneur, is able to adapt and work with the entrepreneurial mindset, which can be at times unstructured, chaotic, pulled in multiple directions, and passionate about their product, service or technology. The mentor should be “bought in” to the mission of the Support organization and committed to giving their time and resources to building a thriving ecosystem. It is this long-term thinking that needs to be sought and cultivated in the mentor to maintain them as a partner in the effort.

They are motivated by the prospect of accessing quality deal flow and allying themselves with an organization that aggregates the best companies that are capable of disrupting large industries and markets. The personalities of advisors/mentors are characterized by individuals that enjoy the fast-paced nature of a start-up and are willing to open doors to their own networks for the entrepreneur. Most incubators and many accelerators do not compensate mentors, who derive their value instead from the access and influence they wish to provide to start-ups and to gain an early view into opportunities for investment or strategic value to themselves. However, this model of unpaid mentors and advisors is often not sustainable.

Organizations such as Larta (described in section 6.9) that provide companies access to these networks that provide companies with guidance and connect them with investors are an important resource for companies. Moreover, these organizations are also models of a sustainable practice in that they incorporate the mentors and advisors in their network by being selective in their recruitment of companies, then turning around and leveraging those same companies as future prospects for investment to their extensive network of fortune 1000 companies. It is important to note that organizations such Larta that has been around for over 21 years take time to build. Their time in the technology industry has allowed them establish a recognizable name and through that develop strong connections within their network.

6.1.5. Role Models

The importance of role models for entrepreneurs cannot be understated. Anecdotally, it has had a powerful cumulative effect on the growth of entrepreneurship in various sectors in the U.S., Israel, India, many countries in Africa and, to a lesser extent, Europe. The key values that role models convey are the possibility of great achievement in specific sectors, plausibility of the entrepreneurial urge, principles of growth, personal qualities such as leadership, charisma, persuasiveness, and tenacity in light of various obstacles that specifically form part of the story told by these people. They also provide testimony to the joys and perils of the entrepreneurial journey, and serve to inspire and to attract imitative behavior and commitment. In countries that lack home-grown role models for various reasons, members of the Diaspora comprising nationals of those countries who have achieved success in other locations also make for role models. This is increasingly the case in Africa, where several nationals from across the continent have succeeded in starting

businesses, growing these businesses overseas and then returning to their regions; in some cases their philanthropy has been focused on growing opportunities for young people (e.g. the Mo Ibrahim Prize in Africa), in others their global stature translates into entrepreneurs in their home countries seeking to emulate them in various ways. Many instructive examples may be found in India and China, before their own ascendant economies grew such people locally (these then become local role models in their own right). Here we are focused on ‘positive’ role models, that is, those whose achievements and ‘stories’ convey prospect and promise. There are also ‘negative’ examples of successful entrepreneurs whose personal behavior and characteristics make them less attractive as role models to current and ensuing generations of entrepreneurs. So while business aggressiveness and competitive zeal are desirable qualities in a role model, arrogant and dismissive behavior towards subordinates erases any positive benefits that a particular person’s professional career may otherwise convey.

➤ ***Profile of role models***

They are almost universally interested in “giving back.” which translates to different activities, including philanthropy (as noted above), commitment to service organizations that are focused on entrepreneurial education, as speakers in numerous venues, and as judges and mentors in entrepreneurial contests.

6.2. Personnel in Incubators & Accelerators

Incubators serve companies for longer periods of time with some serving as real estate providers (office space only) and others including mentoring, educational support, and networking/showcase events. For the latter, they can be thought of as accelerators, which blur the line between both models. Typically, classic incubators assist companies for a longer period of time. They can be funded through universities that enable them to offer their services at low cost to entrepreneurs. More recently, the term “incubator” is used less often and organizations that went by that designation are now calling themselves accelerators (described in more detail below) as they are enhancing their offerings with funding and coaching. One reason for this is that incubators would support or subsidize companies for an extended period of time that ordinarily would have folded if forced to take their product to market quickly to “test” its viability. The evolution of incubators has seen many morph into shorter-term programs or academies that are designed to quickly test ideas and fund the best. One organization that still uses the incubator term is LACI (Los Angeles Cleantech Incubator).^{xxvii} UCLA’s Summer Accelerator Program is an example of a university-affiliated organization that would have typically used the term incubator. Be Great Partners uses the term “co-working” space, instead of incubator.

Accelerators assist entrepreneurs to develop their idea further into a scalable business. They support companies for a short period of time, which is typically 3-4 months, during which companies need to relocate to the Accelerator’s place of operation. They are competitive in their selection of companies that are accepted into the accelerator (usually running two cycles each year) and typically provide funding from \$30K to \$120K in exchange for 6%-8% equity stake in the company. In addition most accelerators also provide mentoring from seasoned experts, demo day events, networking, and services (e.g., legal support, executive recruitment to build the team, accounting, etc.). Accelerators are geared to help the entrepreneur quickly determine

a “go/no go” decision on whether their business has the potential to scale and grow and then to help the start-up secure their first level of funding in rapid fashion. Examples of accelerators include 500 Startups,^{xi} TechStars,^{xii} Y Combinator,^{xiii} Amplify,^{xliii} and Surge.^{xliv} Some Accelerators focus on specific technical sectors such as digital media/internet, healthcare, or cleantech, while others are broader in the types of companies they accept. They are funded in various ways: some are initially self-funded and managed by high net worth entrepreneurs who have exited a previous start-up, others have tapped into regional/state funding, and others are affiliated with venture funds who have allocated a portion of their fund to support the accelerator to generate smaller investments across a larger pool of companies.

Incubators and accelerators shared similar needs for human capital; below are some of the key functions that need to be filled.

6.2.1. Executive Director

The top management role (often called General Manager, CEO, or Managing Partner) of the accelerator/incubator is primarily responsible for the overall operations of the entity, maintaining the roster of services at a high level to ensure the best prospects to apply, and for developing alliances with service providers (as sponsors or other supporters) that can provide services to start-ups accepted into the accelerator/incubator. They also function as the main interface with companies, negotiating the terms of each company’s entry into the accelerator/incubator and shepherding their progress during the 3-4 month period of their tenure at the facility.

The Executive Management of the incubator is characterized by someone who has a background in venture investing or successfully exiting a previous company (or both), and thus has developed a strong network and respected following among his/her peers. This is not surprising because the structure of the accelerator is set up to mimic a fast paced start-up environment of rapid development and testing of the product. The placement of someone in leadership who understands this process with practical experience is important to build credibility with incubator/accelerator participants and with stakeholders that are invested in the success of the enterprise (e.g. See YCombinator’s list of leaders^{xlv} and their previous experience in founding startups). The investment acumen is also important because companies will need to be held to strict standards similar to a VC fund where the VC also serves on the board as an active member. The Executive Management position typically has someone with a B.S or M.S in finance or a technical degree with a background in venture investing or track record as a serial entrepreneur. The persona of this leader needs to be a strong personality, active speaker and visible on the community. They need to be more than just an operations person functioning in the background because the success of the accelerator depends on projecting a strong offering to lure the best prospects into the accelerator/incubator, and for attracting the best talent as mentors or advisors who desire to be affiliated with an entity that will generate tomorrow’s high growth companies.

6.2.2. Entrepreneurs in residence

Some Accelerators/Incubators employ full-time individuals to serve as Entrepreneurs in Residence that function as co-CEOs or active board members with a small number of companies, to help founders in building the company.

Entrepreneurs in residence are generally seasoned businesspeople from industry or former founders of successful start-ups that are in search of their next start-up opportunity and thus have the time and experience to share on their journey with other entrepreneurs. While usually possessing an advanced college degree in the sciences, their educational pedigree is not as important as their real world experience in growing and selling a venture.

6.2.3. Mentors and Advisors

Advisors and mentors that affiliate with an accelerator/incubator differ slightly from those that partner with Entrepreneur Support Organizations. They are similar in that their function is to help the start-up company and entrepreneur rapidly build a prototype, minimize technical, market and management risk and open doors to customers. But they differ slightly in duration. Advisors and Mentors in the accelerator/incubator environment serve as a “bench” of experts and former successful alumni with managerial expertise that early stage companies can call upon for help in addressing critical issues. They are more short-term, with some of them being affiliated in a specific market segment that is aligned with the focus of the accelerator/incubator (e.g. senior executives from large healthcare and medical device companies or web/mobile applications serve as mentors/advisors to an accelerator focused on serving start-ups in that sector). For example, Amplify features a roster of such mentors^{xlvi} on their website with experience in the entertainment/media space. Similarly, SURGE in Houston is an accelerator focused on energy and has a similar roster of advisors/mentors^{xlvii} that reflect their sectorial focus. For the more developed accelerators/incubators with a large number of alumni, access to this pool of seasoned entrepreneurs is often more valuable than the funding or space that is provided. For example, YCombinator has a pool of 1,600 alumni entrepreneurs that have experience in product development, company formation and fundraising.

As described above, Advisors and Mentors come from various backgrounds: successful entrepreneurs, seasoned business executives from larger companies, or active venture capitalists or investors. They are motivated by the prospect of accessing quality deal flow and allying themselves with an organization that aggregates the best companies that are capable of disrupting large industries and markets. The personas of advisors/mentors characterize individuals that enjoy the fast-paced nature of a start-up and are willing to open doors to their own networks for the entrepreneur. They are typically not compensated by the accelerator/incubator and derive their value from the access and influence they can provide to start-ups and early view into opportunities for investment or strategic value to their own organizations.

6.3. Networking Facilitators

This function could be performed as a function within the previously mentioned orgs, but they could be independent also dedicated just to his function.

Another actor in this ecosystem are independent organizations or trade associations that are dedicated to building community via networking events among the general entrepreneur community or within specialized technology sectors. Examples include LAVA (Los Angeles Venture Association)^{xlviii} or MeetUps^{xlix} that aggregate people in defined special interest groups for networking and social events. SoCalBIO^l is an example of a trade association that also fulfills this purpose.

Social Group organizations are largely run by a core of volunteer committees or self-organizing groups of people that maintain the cohesion of the group and plan the strategic direction of the entity. More developed organizations of this type have formal boards and specialized committees and gala events. Committee leaders are typically professionals in either investment or professional service provider firms and see their involvement in such organizations as strategically relevant to their occupation in that it builds their network and credibility. Trade Associations have the same volunteer structure, but will usually have a full-time Executive Director at the helm that leverages the work of volunteers.

7. Service Providers

Service providers fulfill a critical role in the ecosystem of a tech-based economy that nurtures innovation and equips entrepreneurs. This category is comprised of domain and subject matter experts (law, design, accounting, etc.) that lessen the friction between start-ups and domain or operational challenges that limit their growth and development. They are client-facing organizations and thus focused on advising their customers and advancing their success in the market. In a knowledge-based economy characterized by early stage companies, service providers are confronted with the need to adjust their business models and offerings to reflect the characteristics/profile/demands of startups. This is described in more detail later in this section. Collectively, these individual service providers can be thought of as Professional Services Networks that together help a region sustain and grow successful entrepreneurs.

The major Service Provider categories active in an Innovation Ecosystem are briefly surveyed below with a description of their contribution. In a separate section below, we also describe best practices employed by various providers to optimally serve such an ecosystem.

7.1. Innovation Project Managers (Gestores de Innovación)

Innovation Project Managers in the private sector work with the established industry base, however, they differ from technology diffusion officers in that they solely work with large corporations. See Section 5.1 for a detailed description.

7.2. Technology Diffusion Officers (Extensionistas)

Technology Diffusion Officers are individuals who work with the established industry base to support the increase in productivity in the existing processes. See Section 5.7 for a detailed description.

7.3. Intellectual Property & Legal Experts

Professionals in the legal field function are vital to helping entrepreneurs characterize, protect, and enforce infringement on their innovative and novel methods and inventions. Startups by nature are not able to erect barriers to entry like wide distribution channels, a large sales force, and sophisticated plants and facilities. They trade in innovations and thus the protection of those innovative ideas via patents is vital to helping them build a “hedge” of protection around

them. Beyond patents, these experts help entrepreneurs draft and review agreements and protect them from being unfairly treated.

7.4. Regulatory Experts

Individual consultants with specific knowledge of regulatory processes support the ecosystem by helping entrepreneurs avoid costly mistakes in developing regulatory strategy (food, biologics, chemicals, drugs) and the timing of activities associated with regulatory filings, negotiation, and responses to inquiries on such filings. Entrepreneurs operating in regulated industries often do not fully understand or have the domain knowledge to navigate such matters and rely on a network of experts to develop smart planning and appropriate timing.

7.5. Marketing / Design / Branding Experts

Marketing experts and design/branding consultants support the execution aspect of the entrepreneurial enterprise. In a crowded field of competitors (large and small) the function of these experts lies in their ability to convey value to customers in a simple yet compelling and attractive package that includes messaging, form and function, brand personality, features that are elegantly designed and presented, etc. In order to differentiate itself from its competitors, key features, design and functionality coupled with strong branding can extend a startup's competitive advantage. An oft-quoted phrase in the tech industry is that 90% of the buyers use 10% of the features but 100% are motivated by a strong brand and design.

7.6. Business Planning and Market Research Experts

Niche services like business planning and market research are part of the fabric of an innovation ecosystem. These specialized service providers help startups early on in developing pitch documents and competitive analysis that are incorporated in the commercialization plan and other external-facing documents provided to investors or partners. These individuals or firms sometimes are focused on specific end-user markets (healthcare, agriculture, software) and bring those end-user perspectives to the entrepreneur that would otherwise be very difficult to obtain.

7.7. Accounting, Banking, and Finance Experts

Expert financial advisors help entrepreneurs plan for growth in a tight capital and resource-constrained environment. They are critical to maintaining the viability of the enterprise until first customer revenues appear and support planning for the hiring of key executives and investments in human resources and equipment. They also help the entrepreneur translate their business vision into objective pro forma financial statements that are credible and reasonably convey future growth to investors or other capital providers. Accounting experts support the development of financial/accounting systems that become useful if companies pursue government procurement business or other client-acquisition strategies where external audits are common.

7.8. Grant Writers (Formuladores de Proyectos)

Expert writers in this area have specialized knowledge of what is necessary to comply with the

funder's guidelines for specific grants, whether they're from the government or a private foundation. They should be up-to-date with the policies and politics related to the proposal and should know how to make your grant proposal application competitive. Individuals in this area of expertise need to have some experience in the technology industry, however, their strength lies in their ability to write persuasively and concisely to not only address the concepts for the grant but to spur an interest in funding the company's technology. They must have at least a bachelor's degree in writing or a relevant industry, as well as at least 2 years of experience in fundraising.

In the past, postdocs or researchers themselves were in charge of grant writing, but that has been changing with the increasingly competitive nature of grant submissions. Now several organizations exist solely to provide these services. In the U.S., the American Grant Writers' Association^{li} and Global Grant Solutions^{liii} are companies that exist solely to provide grant writing assistance, as well as workshops on how scientist themselves can improve their grant proposals. Additionally, more specialized organizations exist as well that focus on helping companies obtain specific type of funding; FreeMind^{liiii} specialized in providing assistance with obtaining non-dilutive funding (previously described in Sections 2 and 4 of this document).

7.9. Commercialization Experts

Consulting professionals in the technology industry who have first-hand knowledge on how to take technologies to the market both at the local and international level. They work closely with emerging entrepreneurs to effectively refine their business model, providing them with the resources to assess the viability of their product and network to execute their business plan. These organizations have been contracted by the government to directly work with companies receiving R&D funding (see section 4.2 for details), but they are also contracted directly by companies.

➤ *Overall Profile of services providers*

Individuals who provide assistance to technology entrepreneurs in small businesses don't need to be experts in technology, but they do need to be well versed in their respective industry. For example, it's not necessary for an accounting expert to know everything about technology because his/her focus will be on managing the books, a practice consistent across all companies. However, these individuals must have a bachelor's degree or a certificate of specialization in their respective field/practice and at least 4+ years of experience. Moreover, they should have an open mindset to learn new ways of implementing their practices and applying the already established professional concepts in their field to the technology industry. As time passes, these individuals will become experts in working across the technology industry and may become specialized in that industry.

II. Best Practices for the Acquisition/Development of the Key Human Capital across an Innovation Ecosystem

It needs to be understood that attraction and retention of talented human capital cannot occur in a vacuum in isolated sectors of the economy; the country as a whole needs to enable an environment that will make it attractive for its own people, as well as for foreigners, to enter different levels of the work force across all productive sectors. The best practices and strategies that governments can implement to create this sort of economy and national environment is well beyond the scope of this report; this section will only focus on examples of strategies used around the world for the acquisition and/or development of the types of human capital described in Section I.

That being said, however, a general discussion of the overall conditions that countries must secure for the attraction of human capital is presented below as background, and to contextualize the discussion that follows.

According to the IBM Institute for Business Value, growth for cities and countries in the twenty-first century will increasingly be driven by people – the skills and knowledge of a highly educated, innovative workforce – and by the ability of citizens and economies to absorb, commercialize and extend innovation^{liv}. Governments that want to innovate and grow will need to plan, invest and work to improve their core systems with this in mind. There are a few basic steps and consistent guiding principles to help direct them.

1. Decide what your city or country should be – determine its brand
 - Identify the differentiating strengths that will attract skills, knowledge and creativity.
 - Create a strategy that emphasizes these strengths.
 - Prioritize investments in core systems: transport; government services and education; public safety and health; as well as energy, environmental sustainability, urban planning and design, in line with the strategy.
2. Adopt policies conducive to skills, creativity and knowledge driven growth
 - Attract internationally mobile talent by enhancing quality of life services and services responsiveness to changes in demand.
 - Create a domestic talent base by offering education services and training, with significant emphasis on investing in education infrastructure.
 - Enable better opportunities for deploying skills and abilities to help citizens realize their potential by using better deployment of data collection and analytics on changes in the labor force and skills supply and demand.
 - Retain the existing base of talent to reduce potential “brain drain.”
3. Optimize around the citizen
 - Begin to shift from standardized, uniform services to a model for the delivery of tailored services that meet individual needs.
 - Create digital linkage across city core systems and the analysis and actions triggered by patterns in the data.
 - Develop a clear and transparent system of user fees and charges that reflects the real costs of providing citizen centric services, thus encouraging both more direct demand for services management by the citizens and lower costs burden on public finances.

Today, high-growth companies increasingly look for locations that allow them to have access to a diverse and global talent pool. To attract these companies, countries need to invest in human capital to build and retain a workforce not only with the skills startups seek but also to help build businesses and innovate for the future. Countries can kick start investment in human capital by creating flexible labor markets that attract people with a variety of skills and experience; supporting education for an IT and innovation workforce; and promoting diversity in the workplace.

Governments can create more dynamic labor markets to encourage investment. Experience demonstrates that countries that adopt pro-growth investment and immigration policies—which allow for the freer movement of people and employees—tend to be the ones that cultivate a flourishing entrepreneurial ecosystem. Silicon Valley in particular has benefited from the skills and experiences of entrepreneurs from around the world. Over half of the startups in Silicon Valley have one or more immigrants as a key founder. On the other hand, inhibiting flexibility of labor markets can result in uncertainty for investors and companies alike. For example, most venture capitalists are critical of what they see as inflexible labor policy in Europe, and cite it as one of the reasons they are hesitant about investing money in European startups. They argue that venture capitalists invest in companies with uncertain futures, and that the money they invest cannot be locked up in managing a workforce that may not be the right one when a company needs to change its course. At the same time, firms in some countries report difficulties in finding and attracting the right talent for open roles. In some countries, one solution to this dilemma may be to make it easier for companies to attract skilled labor from outside their home country. Immigration reform could enable companies to attract underutilized talent from other countries, simultaneously having a positive impact on unemployment rates in the originating country (for example, the H1B program in the U.S. has been very successful in filling skill gaps that exist in the U.S. At the same time, they have provided avenues for increased revenue, lower costs and opportunities for companies that employ this visa holder, and have enabled companies in their home countries to extend their reach by ‘exporting’ talent to operate on assignments embedded in their client companies). However, in some countries with high unemployment rates, it has been difficult for governments to navigate around domestic economic policy to focus on immigration policies. In countries where attracting talent is a problem, a high-skilled immigration policy can provide visas for people with technical skills and successful entrepreneurs while allowing more innovators to contribute to their economy. As Reid Hoffman has said, “Immigration is key to any entrepreneurial ecosystem”. Carlos Espinal, partner at Seedcamp says, “One quick way of bridging a shortage in staff in an area is to create immigration policies that allow for talented and capable individuals to enter the country and its labor force without major hurdles.”

Recognizing talent – skills, knowledge, creativity, and innovation ability – as a more important driver of sustainable growth implies significant changes in thinking by governments about how to manage and improve their cities and countries. It shifts the thinking from appealing to mass audiences to focusing on individual citizens. Modern information technology makes this seemingly daunting challenge not only practicable, but also, over the long term, cost effective and prudent.

The following section presents some of the best practices used around the world for the acquisition and/or development of the types of human capital described in Section I.

1. Entrepreneurial Talent

As discussed above, the three groups we have identified in this central pillar of innovation are not mutually-exclusive, and are part of a continuum, along which members of each group may progress in the course of their careers. The provided classification and breakdown of profiles was intended to provide greater clarity on the common attributes and key characteristics of each group and to identify the differences between sub-groups within each classification (specifically, tech and non-tech based entrepreneurs). This information and the insights we provide will prove useful in typifying the situation on the ground in any country context.

It is clear and evident that the U.S. remains the brightest beacon and the greatest exemplar of best practices in many areas of innovation, including entrepreneurship. This is due both to scale and scope, as well as the extraordinary interplay in the U.S. between all the factors of innovation, specifically human capital in all its dimensions. In the U.S., no group is so dominant that this interplay becomes ineffective, driven by any one set of imperatives. Government, for e.g., plays a “precursor” role (i.e. it invests in funding R&D at pre-market and, hence riskier stages, in the case of tech-based entrepreneurship, in manufacturing assistance through a network of centers throughout the U.S., in stimulating partnerships with industry to build capacity in specific areas like national defense and in community projects via a well-established procurement process prior to the development of industry in rural areas, for e.g.), but it also involves the subsequent involvement and engagement of a range of other actors, including those capital providers (private, other public) and support organizations in order to be considered relevant and important to all the actors in the system.

The following presents the best practices and strategies across all the three classifications of entrepreneurial talent.

An economy either has a history of entrepreneurs succeeding, failing, then trying again, in a virtuous, on-going cycle of developing enterprises, or it does not. For a base that lacks this pool of entrepreneurs, there are two options: grow one’s own, a process that may take generations (except in certain knowledge fields as web-based applications –‘apps’ for short – or as spin-offs of traditional enterprises as, for e.g. Corona has done in Colombia), or ‘import’ such entrepreneurs from other locations (regions, countries, etc.) as proxies and role models, to serve as part-time mentors and ‘instructors’ for brief periods that enable **novice entrepreneurs** to gain confidence from the insights provided by more experienced entrepreneurs. This is what many countries have done, “parachuting” in talent to fill gaps in the talent pool and hope to stimulate new enterprise formation as a result. Singapore recognized two decades ago the deep lack of talent for innovation that its economy exhibited. The country started what has become one of the most successful examples of massive talent importation; attracting top notch researchers and applied research professionals, including executives for extended stints in the city state. The intention was clear: to impart an awareness, understanding and know-how to students and/or participants in incubators, to researchers and government managers and to policymakers on effective and efficient methodologies and approaches to innovation, and to build confidence in the trajectory of on the ground projects by inserting commercial or outcome-oriented thinking. This is the clearest example of a deliberate policy of importing talent to serve as proxies for role models and to accelerate the creation of local champions.

Despite Singapore's history of innovation, it has produced only a few well groomed, mature companies that serve as breeding grounds for **experienced entrepreneurs**. But its **support organizations**, especially **government** programs like A-Star and Spring, send well-informed managers from these agencies to advocate for company innovations (especially in the life sciences) with large pharmaceutical companies resident in the U.S. and Europe, and strike licensing and co-development deals. Singapore is a good example of the limits of novice entrepreneurship without the benefit of deeper pools of entrepreneurial talent and a system that can cycle through these enterprises. Culturally, Singapore is also known to be more risk-averse and more linear in its approach to entrepreneurship than, for e.g. Israel. It has world-class faculty at its universities, two of which are in the top 20 in the world. But that has not translated into a flourishing entrepreneurial ecosystem and this despite an enlightened approach to the import of temporary talent.

Home-grown traditional industries have also been a source of talent for innovation. The diffusion of knowledge and information as the world has shrunk has the potential of increasing the pool of people from and in those industries that may be interested in becoming mentors for novice entrepreneurs (a twist on our classification of "**seasoned business leaders**" or, even more significant, joining together for the purpose of pursuing entrepreneurial prospects themselves. While new to running entrepreneurial companies, they may have more experience and more background in enterprise skills, such as finance, marketing, etc. Also, these people are likely to create enterprises based on their ability to develop new approaches in service to traditional enterprises, for e.g. new productivity tools that may be too small or too insignificant by themselves for larger traditional industries to adopt, or they may focus on design or other knowledge-intensive activities that may be better developed outside the traditional industry/ies.

Israel is an example of a country with small home markets and few natural resources, whose entrepreneurs benefit from early and continued exposure to more **experienced entrepreneurs** in target markets such as the U.S. In Israel's case, novice entrepreneurs have access to great technical talent resident in its universities (e.g. Hebrew University, Tel Aviv University, Technion University and specialized institutions like Weizmann Institute), and a deep pool of capital and enterprise talent drawn from the Jewish Diaspora, especially in the U.S. Many U.S. companies have operations in Israel, thus further building the bridge between Israel and the U.S. Israeli companies are able to assemble teams in the U.S. comprising experienced executives (seasoned business leaders) and experienced entrepreneurs, who in turn are able to secure investment from established capital sources and continued assistance from support networks. This is a virtuous circle in action. The range of Israel's achievements is impressive: from technology- and manufacturing-intensive industries like aircraft and weapons systems (bolstered by a long-standing history of collaboration with the U.S.) to medical devices, and from generic pharmaceuticals to agriculture. Israeli companies are particularly adept at applied innovation, seeking consistently to translate technology concepts into products both at the lower end of the value chain and higher up that value chain. Indeed, the Israeli case has recently been touted as the "Israeli Tech Miracle", however nothing about it has the sudden, out-of-the-blue, characteristics of a miracle; the results the country is able to enjoy nowadays are the results of the concerted efforts started about three decades ago and a historical relentless entrepreneurial mindset deeply rooted in the Israelis.

South Korea has long been a knowledge economy, boasting some of the most technical advanced companies in the world; however, it was – and still is- an economy for the big companies, the ecosystem is not the most advantageous for the emerging start up. Many efforts have taken place to

take advantage of a large Diaspora concentrated in specific “hot spots” in the U.S., including the largest population of Koreans outside Korea, in Los Angeles, for the benefit of start-up in South Korea, however the results have not been impressive. Despite the fact that a number of start-up Korean entrepreneurs connect directly to the American ecosystem (many in specialized “labs” set up by passionate, interested Koreans resident in the area), and are able to connect with deep pools of technical talent resident in South Korea itself. The issue with South Korea, and one often cited by talented Korean entrepreneurs, is the predatory nature of the large *chaebol* in South Korea, which seek to “snap up” technologies created by emerging entrepreneurs before they have a chance to fully realize economic value, and which have been known to pressurize smaller companies developing products or technologies that may compete with the offerings of a large company. Though Samsung has a robust R&D system, both in Korea and in Silicon Valley, and assorted corporate venture arms, it has largely been unable to breed entrepreneurs from within. This phenomenon of spinning out entrepreneurs from large companies is actually less common than one might suppose. Many entrepreneurs with strong backgrounds in both technical and non-technical areas choose to remain inside large companies like Apple and Samsung, where their contributions are well-rewarded in multiple ways. This is true even in Silicon Valley.

However, Silicon Valley has a history of churn, i.e. the constant creation and destruction of enterprises, and large pools of available entrepreneurial talent to drive company creation and growth to dizzying heights. So, both **experienced and novice entrepreneurs** are abundant in the region, along with strong, long-standing **support organizations**, and of course its famous **capital providers** (venture capital firms). Experimentation, acceptance of failure, role models across the landscape of industries, are all major features of Silicon Valley, and as such are hard to create; indeed it is hard to build a Silicon Valley, though it doesn’t stop many regions from attempting to do so. (Inevitably, they find themselves attempting to do from the ‘top down’ things that need to develop more organically). The interplay of human capital in the region is one of the most profound organic developments in the history of entrepreneurship. Indeed, many have argued that the “secret sauce” in Silicon Valley is not the connectivity, or the large pool of capital, not even the talent technical pool, instead it is the acceptance of failure as a natural feature of the entrepreneurial endeavor. This lack of resistance to failure in business is deeply rooted in the American mindset and that is harnessed at its best in Silicon Valley. It is precisely this characteristic in the mindset of the population what is often lacking in economies trying to create innovation ecosystems. Public programs can rarely change perceptions of failure as a shameful state.

One source of human capital that has become a story unto itself is the “imploding company.” In Silicon Valley in the late 1950s, Shockley Semiconductor’s implosion was caused by the defection of a handful of key talent (the “Traitorous Eight”) that went on to form Fairchild Semiconductor, from which was born a range of others, including Intel Corp. , and Silicon Valley as we know it was born. In San Diego, Eli Lilly’s purchase of Hybritech led to the creation of a class of millionaires who went on to start companies in fields that had been near and dear to their interests in the life sciences. That in turn, led to the emergence of a highly successful cluster in the human life sciences in the San Diego region, bolstered by the area’s university, UCSD and by specialized institutions like Burnham and Scripps.

Other Case Studies:

Brazil's Rio Grande do Sul developed industrial sectorial programs based on innovation theory and competitive strategy, using Michael Porter's "diamond model" for the competitive advantage of nations. The goal was to stimulate development of different industries with innovation and technology as central drivers. Start-Up Brazil is a government-funded program, which attempts to produce a tangible economic impact and homegrown success stories sooner rather than later. The results of these policies are still being debated; innovative companies have indeed being created but the range of impact of their technical offerings is perceived as limited on a global scale. In addition all economic sectors have been affected by the lack of continuity in support programs.

In Chile, the National Council of Innovation recognized the challenge of developing a long-term strategy for innovation—goals, objectives, and a program to achieve them—in a world of accelerating change. This led them to anticipate future waves of change, and identify "strategic orientations," areas of caution and opportunity that may help create a framework for actions in the present. This exploration identified several areas of inquiry and opportunity related to talent. For example, the advancement of digital technologies offers opportunities to reduce the costs and improve the quality of education, but also prompts questions concerning the purpose of education and, especially, how educational quality should be defined. Similarly, Chile's National Council of Innovation also identified the need for a new type of engineer—a "designer-engineer" or "designer as engineer"—and the need to incorporate design into other disciplines to educate individuals to better synthesize, in a back-and-forth process, the world they seek to affect and the components and tools they have to do it. They also identified the importance of entrepreneurial disposition and entrepreneurs as transformers in a world of change, not just in the ability to invent and develop companies, but also in renewing social lives through a product or service, political achievement, an institution, or cultural event. Another interesting example is Start-Up Chile. The government created this pilot program in 2010, which brought 22 startups from 14 countries to Chile, providing them with a temporary 1-year visa to develop their projects for six months, with possibility of extension. This program has supported a total of 750 projects in 3 years, from 65 countries. However, it is still too early to tell if this program has encouraged immigrant entrepreneurs to take up residence in Chile or more Chilean entrepreneurs to start companies. Moreover, one of the key issues with the import of entrepreneurial talent is the misalignment of interests; governments want to ensure that the effects of the enterprises "spill over" into the economy, prompting other startups, which in turn leads to a melting pot of ideas, talent and outcomes; on the other hand, the principal motivation of the entrepreneur being attracted to relocate (in the case of Chile, for e.g.) is financial. Removed from a more entrepreneurially-developed environment, it is more plausible that these enterprises will fail than succeed, because the principal drivers of value are rarely concentrated around financial incentives alone.

On April 1, 2013, the Canadian Government opened their doors to entrepreneurs from around the world with their office launch of a first-of-its-kind Startup Visa. Currently, more than two years into the program, less than ten of these visas have been awarded to business, and the return on the investment to promote the program has been heavily question in the country. Similar to the case of Startup Chile, the premise behind this policy is somehow flawed; that visa, small seed capital, and tax incentives are a good incentive for "the most promising startups". The truth is that the most promising companies would not have issues raising capital across borders and their products are often of global reach, or easily adaptable to local clientele, so that the noted incentives are not so

interesting. A good company would not opt to participate in government programs that require burdensome applications and oversight when they can raise capital elsewhere. This type of programs often end up only attracting entrepreneurs that already have a personal tie with the offering country.

In the UAE knowledge-driven industries are increasingly important as these city-states diversify their economies and seek to turn their resource-based competitive advantage into a human capital-based advantage. For example, the UAE is developing the talent base needed to become a frontrunner in clean energy and sustainability. Through the Masdar Institute, it is developing specialists for the green economy. The Institute's rich R&D environment is drawing some of the brightest minds to the UAE. Offering Masters and PhD degree programs, the Institute has an explicit focus on sustainable energy studies. Harvard Business Review identified Masdar as a world best practice in developing the clean technology industry. Also in the UAE, the Khalifa Fund was launched to create a new generation of Emirati entrepreneurs by instilling a culture of investment among young people, and supporting entrepreneurial projects. To strengthen the capacity of entrepreneurs, the Fund has a system of support services such as training and consulting services. UAE also launched the Sheikh Mohammed Bin Rashid Establishment for Young Business Leaders, with a vision of nurturing business leadership, and entrepreneurship in small and medium enterprises. The challenge for this region is to overcome the lag its domestic work/entrepreneurial force in terms of skill set, this lag being the result of the massive importation of talent that took place for the best part of the last two decades. This is an example of the risk of importation without clear path for skill transfer onto the domestic assets. The parachuting of talent has certainly paid off for the development of local capacity in many industries in the UAE, but these benefits have not spilled over to the human capital needed for innovation.

The United States has emphasized building scientific and engineering talent to boost the country's innovation capacity. The America COMPETES Act includes several provisions to strengthen U.S. science, technology, engineering, and mathematics (STEM) education and to develop future STEM talent, for example, by increasing the number of teachers qualified to teach high level STEM courses, and increasing the participation of minorities underrepresented in STEM. This is an example of a country that is already a magnet for immigrant talent, still recognized the need to breed a domestic skilled base to fuel the future rounds of the innovation economy.

Also in the United States, the Council on Competitiveness along with Lockheed Martin Corporation launched the National Engineering Forum (NEF) to address the future of engineering as a driver for the U.S. innovation economy. NEF held a series of regional dialogues with academia, business, government, the media, and students to discuss issues such as: how to develop American engineers skilled in multiple disciplines, re-thinking industry-university-labor-national laboratory collaborations to create a more capable cadre of engineers, developing new education paths for students who want to study engineering, and better leveraging of regional resources to cultivate engineering talent.

Despite the abundance of this type of programs in the U.S., the reality is that the country is facing a crisis in regards to the uptake of STEM education from the younger generations and it cannot count forever on being able to attract this talent from elsewhere; this posing a threat to the entire innovation system of the country.

While there exists no specific U.S. visa program for entrepreneurs, there have been proposals recently for a "Startup Visa" for non-U.S. citizen entrepreneurs who can attract investment from a qualified U.S. investor. The Kauffman Foundation analyzed the job-creating potential of one current legislative proposal and the results were impressive. The conservative estimates project that a startup visa could create between 500,000 and 1.6 million new American jobs in 10 years, making it an attractive component of a new "jobs act."

What lessons can we draw from these experiences of practices and "best practices?"

1. Large companies that are supportive of a value chain of innovative suppliers (in traditional industries) or external innovation (in knowledge-intensive industries) are vital components in the drive to deploy human capital. Programs like Chile's Startup Chile, that seeks to incentivize entrepreneurs from across the world to relocate to Chile and to take advantage of public funding, need to be viewed cautiously. If funding or other such public incentive is the primary driver, often the entrepreneurs being attracted are likely to be temporary and impermanent. This is especially true of countries with small home markets.
2. Home-grown entrepreneurs, whether novice or experienced, should, instead, be encouraged, if not incentivized, to connect and formally associate with deep pools of expertise and talent in larger target markets, as Israel and Korea have done. They gain insight, knowledge and connections by so doing. They attract attention on behalf of their home countries, and may attract investment to their home countries from those larger markets, where investors are exposed to a level of achievement hitherto unknown to them, and find the economics and environment to be more conducive to smaller investments which may lead often to more impressive results (doing more with less). This can to the creation of a "virtuous circle," as more firms start up, business leaders are attracted to new sources of technology and ideas, invest their time and money in these enterprises, which in turn brings in additional capital. This is what happened in Israel, between 2002 and 2010, and has led to Israel being proclaimed "Startup Nation." (The title of a famous book by Dan Senor and Saul Singer, 2009)
3. Seasoned business leaders, drawn from established companies, are potential sources of domain and functional expertise, market knowledge and management capability. They are unlikely to support either novice entrepreneurs if there is a lack of alignment between their expectations and the trajectory of novice-led enterprises. Thus support organizations should be focused on training entrepreneurs and developing tools grounded in real business expertise for their benefit.
4. Support organizations are critical players in the development, deployment and acquisition of entrepreneurial capital. This is true in universities, where teams of entrepreneurs collaborate and/or compete in business plan competitions sponsored or organized by support organizations whose members may include experienced entrepreneurs, investors and seasoned business leaders. This is equally true of government promotion programs targeting entrepreneurs, which may stimulate the creation of new enterprises funded and or promoted by governments playing a national or regional role as advocates of strategic areas of development; it is also true of commercialization assistance intermediaries, either as stand-alone entities or as subsets of organizations like chambers of commerce. They help to bridge the gap between technical development and industry interest. Without their "translation" help, most entrepreneurial

talent is unable to efficiently allocate scarce resources, and enterprises often take much longer (and thus spend more resources) seeking to reach targets that intermediary organizations are familiar with, and have more credibility with. It is critical, however, that support organizations are led and managed by savvy people that have a solid understanding of the business and technology landscape in their countries. This know-how should translate across all the fields of business expertise. Encouraging seasoned business people to either volunteer their time or provide opportunities for specific projects to be undertaken by collectives of entrepreneurial firms operating in concert with support organizations is an innovative way to jumpstart a region's innovation ecosystem. In Israel, many seasoned business people have also been attracted as mentors and angel investors (and as limited partners in venture funds) to startups with innovative ideas.

5. Top-down systems, that seek to prescribe solutions without reference to the cultural histories, values and assets of their entrepreneurial and human capital base in order to conform to an image of an idealized system (like Silicon Valley) almost never succeed beyond providing bragging rights for governments. The history of innovation is littered with failed projects of this kind, the most recent being Skolkovo in Russia.
6. Likewise, incubators, that tend to be insular, have rarely demonstrated broad value in the effort to deploy human capital for the purpose of growing or developing entrepreneurial talent. Yet, many countries still believe that incubators have spinoff potential that can jumpstart an entrepreneurial economy. Larta Institute's research into incubators and accelerators, published by the Kauffman Foundation for the Global Entrepreneurship Congress in Liverpool, UK in 2012^{lv}, discusses in detail the difficulties that clustered environments focused inside incubators have faced in enabling their entrepreneurs to confront a dynamic marketplace. Thus, the answer does not lie in building or funding more incubators.
7. Capital is attracted to entrepreneurial talent that is aligned with market need, customers and, critically driven and successful teams. Unfortunately, capital is rarely a precursor, and is the last piece in any attempt to jumpstart entrepreneurial talent. Making public money available for enterprises and for the purpose of applying innovations developed in research regimes is a good use of public funds, but it needs to be predicated on experienced people making "intelligent bets." Here again, seasoned business leaders can play a role if one were to establish clear rules governing conflict of interest and lack of self-interest to motivate their involvement as reviewers, mentors and potential supporters of entrepreneurial talent. Here again, Israel and Singapore have experimented with using seasoned business leaders as reviewers for grant programs. In the U.S. several states, like Massachusetts, use reviewers from across the country to review their grant applications. Also, in the U.S., the State Department's GIST program (Global Innovation in Science and Technology) makes grants to entrepreneurs with valuable innovations in many fields in many countries around the Arab and Muslim world, and invites reviewers from around the world (individuals with a good understanding of the marketplace and a broad and not necessarily deep knowledge of the technology area). The focus is on applied innovation, where business model, resource allocation and use, IP and commercialization profile and plan are critical success factors. The reviewers are supplemented by local S&T managers in governments, who "shadow" the reviewers and learn the non-trivial skills of making discerning decisions on grants, especially in science and technology.

2. Private Capital

Capital may be referred to as the “mother’s milk” of innovation, providing much needed sustenance for an innovation economy. As discussed in this Report, the system on which capital is built and expended can be deep and complex. However, many countries do not have the luxury or ability to build such deep capital structures, and may rely for a period on government funding, both non-repayment (principally, grants) and term-payment (in the form of loans). In many countries, government loan guarantees are a preferred mechanism, where the credit and word of the government backs commercial underwriting by conventional instruments like bank loans.

2.1. Managers of Non-Dilutive Capital

2.1.1. Commercial Loan Officers

Commercial officers in the context of Innovation support manage not only private banks’ lending instruments but act also as liaison to government lending instruments. In the U.S. the Small Business Administration offers packages of loans (“504” loans being the most popular among them) through a consortium of accredited banks and other lending institutions. In Malaysia, commercial paper is made available via government regulation, and while collateralized, the banks are permitted to have lower loan-loss ratios in making these loans, especially in sectors considered to be of national strategic interest (like palm oil and processing for e.g.).

Many countries have a reasonably long tradition of banking and commercial lending. But in the context of a dynamic, innovation-driven economy, bankers and especially commercial loan officers need greater “immersion” in understanding at a fundamental level the long and winding path that enterprises spawned in this environment are likely to have, in most sectors of the sciences, in particular. Obviously, experienced entrepreneurs, whether emerging from established businesses with strong business and operations skills, or from previous successful businesses from which they have exited, have a lower risk profile than novice entrepreneurs, in general. However, in an innovation-driven economy, success is accompanied by failure as much as it is by success. If the total record of an individual or team is assessed, the risk profile of any enterprise is likely to be higher than is tolerated by most banks.

There is no straightforward formula to get around this problem, but, as with many of our findings, especially in the Entrepreneurial Talent section, it should be tackled through exposure, education of the class of people, and validation from other sources than the untested word or plans of the entrepreneurs themselves. In Israel, the Chief Scientist’s Office disburses large circumscribed ‘grants’ that are repayable only if the enterprise leaves the country. Meanwhile, the government’s grant/loan programs encourage non-asset based lending to many knowledge enterprises, through a combination of lines of credit, equipment loans (collateralized by the equipment itself), tacit guarantees from venture capital investment that was made into the firm, and business validation from established business customers. The risk profile is thus lowered, and better terms than would otherwise be obtainable are possible. In traditional industries, where conventional lending is easier because of the extensive collateral carried both on and off the balance sheets of larger companies, their suppliers are also able to obtain loans more easily based on purchase

orders over a defined period of time. But countries with nascent knowledge economies, with transitions occurring in various segments of business, the approach that is best adopted is one where government offers a targeted set of guarantees against a basket of loan products offered by a consortium of banks committed to investing in knowledge enterprises. New rules of loan worthiness will need to be drawn up, but there are many examples from countries like Singapore, Israel, Australia and Finland. In Australia, the Superannuation Fund, which is a mandatory retirement fund, managed under government auspices by professional fund managers (much like CalPERS in California), operates like a national “piggy bank” for the purposes of directing loans from specially designated banks to smaller enterprises in knowledge sectors of the economy.

What can we learn from the experience of innovation-driven economies so far as non-dilutive capital is concerned?

1. Bank Managers, overseeing commercial loan officers, need to be recruited as part of a drive to encourage service professionals to “sponsor” companies. In the U.S., SCORE, the association of Retired Executives, that provides mentoring services to many tech and non-tech companies, has secured sponsorship from many leading banks, who are able to pool capital to make available favorable lending terms to these businesses. It is unlikely that this would have occurred without the engagement of bank management, for whom the publicity serves the marketing purpose of being perceived as good corporate citizens. Bank loan officers, drawn from a new cadre of younger people, who, while schooled in traditional banking and finance, are drawn to the excitement offered by innovation-driven enterprises, should be the front line of this effort. Training programs or “embedded executive in training” programs should be offered on a rotating basis to up and coming loan officers through banks like Silicon Valley Bank, Foursquare Bank, and others. For very good reasons, such a system of sponsorship and exposure presupposes the existence of strong support organizations.
2. Support Organizations need to be encouraged to form around the concept of shared knowledge, mentoring services, group purchasing plans, lower-threshold loan programs, supplemented by bank oversight and monitoring of entrepreneurs by loan officers who agree to devote part of their time under a corporate commitment to national priority areas. Leaders of these support organizations should be recruited from among business leaders from larger companies and from service providers, on an intermediate term basis, as part of a “national service registry” where assignments are rotated, particularly for non-line executives with broad strategic responsibilities. They would operate as “chairpersons”, devoting their time to bringing in business support (thus to provide external validation and even subtle peer pressure) for increased lending. The next tier of line executives in these support organizations would typically include service professionals in accounting and other firms, specialists from sectors which are covered by the support organization in question (for e.g. noteworthy programmers, senior coders and IT sector consultants from consulting firms, to serve IT-related support organizations, accomplished hospital administrators in health care, especially those with a mindset oriented to new technologies and methodologies etc.) and even professional recruiters, who may be enticed to join on a part-time basis to contribute their own contacts from across the business landscape.

3. Government loan guarantee programs should be developed, as we have discussed, and here again, the managers and developers of these programs should be trained both in-country (bringing in experts from other countries, especially Chile, Colombia, Mexico and the United States, all countries that have engaged with these programs, the former three more recently, and the latter over many decades), and externally, with cross-discipline training being a key component of this exposure and training. This may include, for e.g. training with government agencies (SBA, for e.g.), and training with banks that offer the loans, coupled with study visits to recipients of such funding (the enterprises themselves).

2.1.2. Foundation Grant Managers

Foundations come in different sizes and types. As discussed, they make grants, increasingly to small companies and traditionally to non-profit organizations, and their criteria are typically less restrained by some of the issues that constrain government programs. Thus they are a good partner for entrepreneurial development. Typically, foundations operate around the world, and having (a) local in-country foundation(s) is generally desirable because of their implied commitment to local development, especially human capital. Inculcating the right skills in their grant managers, while maintaining the latter's' passion, sociability, and attractiveness to the potential grantees and to the business leadership and thought leadership of the country is a critical need.

Foundations typically recruit people from industry, across many functions (often an R&D or domain expert in the sciences, if the foundation works in those areas), and also from academia. While there are some specific grant skills that have evolved in terms of emphasis and focus, and criteria are established in consultation with foundation trustees and/or boards of governors, training is performed internally. Depending on the focus and sophistication of the Foundations, they also network with other foundations, and the pool of talent available is actually quite deep and wide. As we have discussed earlier, grant managers need to have a background in the sector of choice and commitment to detail and management of grant functions, within the mission and mandate of the foundation. Thus, training in these functions is an on-going effort, supplemented by external networks. Kauffman Foundation typically engages foundations across the world, focused on entrepreneurs, and has visiting executives and line staff trained through specific programs. This targeted networking of grant managers should be a key activity of foundations.

2.2. Managers of Dilutive Funding

Angel and venture capital professionals need to upgrade and specialize, for reasons discussed in further detail above. Where either is nascent, they will grow only to the extent that there is a pool of entrepreneurs and deals to make their investments worthwhile. Many approaches and programs exist.

2.2.1. Angel Investors

The existence of wealthy individuals who have been successful in specific industries and are keen to expand their involvement beyond their own companies (from which many have exited) is the basis for the development of angel capital. Several options exist for angel capitalists to organize their investment theses. The U.S.-based Angel Capital Association

offers training programs, including in-country, specifically oriented to emerging angel investors. Whether these individuals operate individually or as part of an investment club, such exposure will help jumpstart any initiative to organize angel capital investors.

2.2.2. Venture Capitalists

Silicon Valley firms often have “training” programs for both associates and partners. The latter seek out other partners in established funds around the world to understand deal structures, socialize their own deals, and gain knowledge about the sector as it has developed in more established environments.

Associates are inculcated in “venture discipline” by other, external firms, only to the extent that there is interest in investing in their country of origin. Israel offers many examples of firms that established outpost offices to “train” local associates on the job. This is predicated, always, on the availability of venture-worthy investors on the ground. In Israel in 2003-4, Sequoia Capital established an early outpost office, recruited local managerial talent emerging from established industry (like Israel Aviation Industries, or Teva, and others) as potential partners, who in turn recruited associates from universities (recently-minted MBAs, for example) and, through the “socialization” and networking process discussed in this Report, this led to the development of savvy venture investors. It is important to note the role of support and trade organizations in Israel during that time, including the Israel Life Sciences Association which provided the forums, conferences, and networking events that enabled deals to be discussed and showcased.

2.2.3. Corporate Venture Capital Representatives

Large corporations and mid-size companies alike are inherently competing in a global economy that is characterized by greater talent mobility and increased externally-developed innovations. They need to tap into these sources of innovation, and develop processes to match the best practices in place in many parts of the developed and developing world. Especially for companies with limited home markets, this is crucial.

1. Governments can also play a role through their promotion and other programs in encouraging their incumbent companies to seek and source external technologies that will enhance their own strategic directions and their global competitiveness, either from within the country or from external sources. This practice, and mindset, will be influential in enabling larger companies to become more associated with locally grown innovations.
2. Corporate executives, in key scouting or business development or marketing functions, should be encouraged to attend showcases and networking events featuring entrepreneurially-developed technologies or non-tech, knowledge-based innovations. One key practice would focus on recruiting them as judges, panelists and mentors for programs targeting knowledge-based enterprises.
3. Tax credits, specific to investment in external innovation in smaller companies or sponsorship of programs targeting such enterprises, could be considered as part of a broader initiative aimed at attracting corporations to either expand or establish the function or effort internally.

Some additional resources that regions around the world commonly use to develop the capabilities needed for successful human capital in VC firms and Corporate VC arms are:

4. Venture Capital Institute^{lvi} - The Venture Capital Institute (VCI) attracts professionals from around the world who benefit from the practical training and from the relationships they build with their peers in the industry during the course. They attract professionals from venture capital, corporations, partnerships and other institutions.
5. Kaufmann Fellows^{lvii} - The Kauffman Fellowship is a two-year program dedicated to innovation investing. While working full-time at an investment organization (including venture, angel, accelerators, policy, corporate, and impact), Fellows receive a structured curriculum^{lviii} with an individual development plan, executive coaching, facilitated mentoring, and peer learning and networking – with a focus on giving back and on one’s responsibility as an emerging leader in the industry.
6. IBF Corporate Venturing and Innovation Partnering Conference^{lix} – This conference offers corporate investors and business development executives the unique peer-to-peer opportunity to hear insights on how corporate venturing programs are structured and best practices for gaining a competitive advantage through corporate venturing.
7. Latin American Private Equity & Venture Capital Association^{lx} – This is a non-profit association formed to spur regional economic growth by advancing venture capital and private equity investment. This is accomplished through programs of research, networking, investor education, the promotion of best investment practices, and the advocacy of sound public policy. Similar organizations exist in the US (NVCA) and Europe (EVCA). The NVCA has a sub-committee called the Corporate Venture Group which focuses on best practices for Corporate Venture Capital.

3. University, Research Institutions & Technical Centers

3.1. Technology Developers

Knowledge-based institutions focused on education, research and specialized technologies, are part of a global network of peers. Since the best researchers are always in touch with their peers, one recommendation is for universities, operating within a publicly-funded initiative, to tap funds focused on enabling researchers to use their sabbatical year (as in the U.S.) outside their home country, seconded to a foreign institution with eminence in the field. Another recommendation is for applied researchers to do shorter stints at proof of concept centers, specialized units in departments at foreign universities and research institutions and/or corporate-funded initiatives in institutions in or outside the country. Weizmann Institute and Hebrew University in Tel Aviv, Danforth Center for Plant Sciences in St. Louis, University of California, Berkeley, Davis, Los Angeles and San Francisco campuses, all have well established programs for visiting post-doctoral and applied researchers in a number of areas. This applies to faculty and researchers in technical institutions

3.2. Managers and Qualified Technical people at Proof of Concept and Entrepreneur Support Centers

There has been a proliferation of such centers across the world. Some are specialized in particular technology areas (like the Smart Grid Energy Research Center at UCLA on power and wireless infrastructure, or Entertainment Technology Center at the University of Southern California), others are focused on intra-mural programs that blend various research concepts in search of early market validation (like the MIT Media Lab). Here again, the key practice that should be adopted is the “circulation” of researchers and managers of nascent or less-developed POCs and Entrepreneur Support Programs into more established environments, under sponsorship of national governments and national corporate champions. Many centers around the U.S. and in Europe (Wageningen University in the Netherlands is a good example) are open to such “exchange” programs, as are specialized centers in Silicon Valley, Los Angeles and Cambridge, Massachusetts. Many countries, ranging from Finland to Korea, from Taiwan to Israel, have active programs that bring their managers to learn, first-hand the practice and art of developing and managing these initiatives. Israel, in particular, has now developed a strong cadre of such professionals that have established momentum in their own right.

3.3. Technology Transfer Managers

It should be noted, though it is outside the scope of the current report, that technology transfer is a complex process, involving interaction between several players, so it is best analyzed as a system – the ecology of research, development, innovation, commercialization, marketing and distribution. Thus, though it may be simple enough to describe “best practices” and strategies for the acquisition of human talent that will fulfill the roles involved in technology transfer, it is far better to look at the overall environment in which this important system operates. As the principal officers in technology transfer offices at universities, Technology Transfer Managers play a critical role in developing, mining and transacting licenses, start-ups and collaborative research at universities and centers of higher learning. They need to determine whether a particular technology has a possible market opportunity, what it will take to further develop it by an outside party, what the optimal price point would be, and whether or not to engage in a start-up formation around a specific technology.

3.3.1. Directors of Technology Transfer Offices

Since this position presupposes the existence of technology transfer offices, the lack of them in any country context would require an intensive effort around: establishing the policies and possible arrangements derived from the specific assets of the institutions. Directors would typically be recruited from larger companies who have a history of in-and-out licensing. In Israel, the most successful technology transfer offices are actually not situated within the university itself but rather outside, as autonomous or semi-autonomous entities. This approach actually may be a better alternative; it may succeed in attracting better candidates from larger companies, specifically more senior executives whose roles have been to oversee business affairs to do with licensing and negotiation. Also, specialized training programs in the mechanics and deal structures associated with technology transfer are now available through multiple venues and organizations.

3.3.2. Technology Transfer Specialists and Patent Agents

The former are versed in specific technologies as the name implies, and since they have technical and business backgrounds, they are recruited from industry sources, and have post-graduate or past research affiliations. In a nascent environment, the technology

transfer system needs to be more developed before functioning tech transfer specialists are engaged or are effective. In the interim, motivated individuals who are passionate about certain fields (which have broad market appeal), could be invited into universities from industry to gain insight into the applied research regimes available. In addition, collaborative research projects often yield good people from industry. UCLA and several other institutions have “Meet the Researcher” events, several times each quarter, specifically designed to stimulate contact with research groups, and to unearth some technology concepts that may be worthy of licensing by interested parties outside the institutions.

Patent agents, who are not necessarily IP lawyers, are key to any effort to “mine” the patent landscape that may exist in a particular field. Because their work involves both technical due diligence (regarding a particular technology’s association with “prior art”, for example) and business prospects (freedom to operate analysis), they necessarily have legal backgrounds and also are expert at targeted searches. Thus, smaller law firms may be tapped to provide this service on behalf of institutions that do not have staff to fulfill this role, on retainer or on a project-by-project basis. They tend to be lower cost alternatives.

4. Government

In order to attract and retain the best and brightest, it’s imperative that the overall mission behind the work is understood. The greatest asset government agencies have is the sense of higher purpose that can be instilled into talent. Mastering this along with key engagement strategies will provide an effective, efficient and happy workforce.

The best practices employed by governments on acquiring or developing talent in key management roles described above vary depending on the general function the roles within each subset, which is how they are outlined here.

4.1. Managers of Innovation Promotion Programs (Funding & Technical Assistance)

These individuals can be recruited from other countries that meet the aforementioned qualifications or can be developed within the country by selecting individuals that have obtained degrees from graduate business schools and who have experience in the technology industry, or who have participated in an international entrepreneurship training programs such as Tel Aviv’s Entrepreneurship, Innovation and Business in Israel program.^{ixi} These short technology training programs will help the individual familiarize themselves with an emerging technology industry to know what support they need to provide technology entrepreneurs with that will help guide them through the barriers entrepreneurs will need to overcome.

4.2. Agency Personnel for Legal and Regulatory Frameworks

These individuals are recruited and promoted from within the agency, once the individual gains a sufficient amount of experience. However, for specific agencies there are certain processes and training programs that these individuals must complete. An example of this is a Patent Examiner for the Patents and Trademarks Office.

Patent Examiners

These individuals review patent application submissions. They must be familiar with all aspects of laws, rules, and procedures in the examination of patent applications. These individuals should hold a Bachelor's Degree in engineering or science related field, as well as a general understanding of science and technology to make accurate assessments of patent requests.

In the United States, these individuals typically receive specialized training by the patent office on reviewing patent applications. This is also the case in the European Patent Office, in which these individuals have the aforementioned qualifications and are required to complete a 2-year training program to become patent examiners.^{lxii}

5. Industry

5.1. R&D Managers; and Research Scientist, Engineers, and Technicians

Obtaining talent: Traditionally, industry will obtain technical staff talent from universities. In building an effective R&D team, where there are scarce resources, the strategy taken can involve a mix of importation of talent with building in-house or in-country capacity. Example: a senior R&D leader is recruited to develop the R&D function in a company. They are recruited for their experience and understanding of process. As the department or group expands, junior engineers are hired from the university setting or from technical teams of competitor companies. They are hired for their experience at some degree, but for more of their potential to contribute to the company and R&D group.

Training & Developing Talent (once obtained): Professional organizations and strong internal systems of personnel assessment & review fulfill the role of helping to maintain a technically competent staff. Organizations like the American Association of Clinical Chemistry^{lxiii} and the Industrial Research Institute^{lxiv} fulfill a critical function to advance training and development—both on the technical side, but also in building the technical staff's professional networks with colleagues in other industries.

5.2. Technology Scouts

Obtaining talent: Large companies that embark on an open innovation initiative look within and outside their own organizations for such talent. If internal, typically from the technical staff because they need to assess the science/technology and also be adept at interfacing with the internal Corp. R&D group that will likely also review an externally derived tech solution/product. Large companies also recruit such talent from competitors or VC firms. Organizations like Siemens TTB have a team of scouts or “innovation partners” with profiles that come from both of these avenues. Additionally: instead of growing the talent in-house (or to supplement in-house talent), large companies sometimes contract with external consultants to “import” this know how into the organization. In the life sciences, organizations like Strategic Intelligence^{lxv} perform this service for larger healthcare clients.

Training & Developing Talent (once obtained): Individuals in this function develop their skills by attending conferences that have “training” tracks focused on building successful scouting

platforms, best practices in forging alliances with start-ups, and how to best measure the impact and strategic value of their role. Annual conferences like IBF's Corporate Venturing and Innovation Partnering Conference^{lxvi} (CVIP) provide such venues for upgrading and building their know-how. Part of a tech scout's professional development is building his/her networks. To that end, they attend conferences (BIO, CVIP, etc.) and forge relationships with universities to stay close to the engines of innovation.

5.3. Corporate Venturing Executives

For a detailed discussion, please refer to Section 2.2.3. of subsection II of this report; since these are manager of capital and investment decision makers, the best practices for development of this people were discussed in depth in the Capital Section.

5.4. Licensing Managers

Obtaining talent: Licensing departments in large companies are primarily built by importing talent from other organizations who have the know-how of process, relationships, and management skill to develop an effective practice. Once a foundation is set, organizations sometimes recruit internal technical staff, and equip them with the proper certifications to function in an associate role. Another method of obtaining talent is through recruitment of academic tech transfer professionals with licensing experience.

Training & developing talent: organizations like the Licensing Executive Society^{lxvii} have formal education/certification training programs for ongoing development of licensing professionals.

6. Support Organizations & Individuals

The best practices employed by these entity types (Entrepreneurial Support Organizations, Incubators and Accelerators, and Social Groups/Trade Associations) to acquire talent in the key management vary depending on the function of each role. They are described below by role across various entity types because of the general similarity of the audience that they serve.

- **Executive Directors:** Executive Directors generally are recruited to run entrepreneur support organizations from either the large company setting (senior or upper management) or from a senior role in an economic development organization.
- **Managers of commercialization assistance programs:** Managers in this role are program specialists with strong project management skills and knowledge of the tech sectors and markets in which their programs operate. Individuals with the right skill set in this role have previously served as analysts or within the research capacity of a larger firm and thus have sectoral knowledge.
- **Business Development/Fundraising Managers:** Business Development leaders and fundraising managers are acquired by scouting for individuals with sales responsibility and partner development activities within either a large or small company setting.

- **Roster of Advisors/Mentors:** For mentors that are sought for a longer term (3-6 month) mentoring program, it is preferable to engage consultants who can carve out a portion of their time to the effort. For mentors/advisors in an accelerator setting, they can be acquired by seeking out investors, licensing/strategic alliance/technology scouting representatives in large companies, and successful entrepreneurs.
- **Role models:** institutions like SCORE^{lxviii}
- **Entrepreneurs in residence (EIR):** Talent for Entrepreneurs in Residence is acquired by recruiting an entrepreneur that has recently exited a company and is in the process of evaluating their next move. In this capacity, the EIR role offers a good opportunity to oversee a small number of companies as a type of co-CEO with the entrepreneur.
- **Incubator/Accelerator Leadership:** Leaders of incubators/accelerators enter the role through the investment route (former VCs or Financiers), as successful entrepreneurs that have exited their most recent company.

7. Service Providers

Most all of the individual “actors” in the service provider network described in Section I (IP lawyers, accountants, designers, marketing experts, etc.) are already present in many economies. The skills sets are already in place, or should be secured via the nation’s educational system. However, the transformation that will impact their contribution to an Innovation Ecosystem lies in two areas: 1) the region’s ability to “activate” such providers in ways that bring them in contact with startups, and 2) the ability of the service providers themselves to innovate and pursue new business models that depart from a “business as usual” approach when interacting with entrepreneurial startups and company founders. The implementation of these best practices at the individual (human capital) level within service providers can make a significant impact.

- *Activation of the Service Provider Network:* A strategic imperative is transforming service providers from an individual collection of firms/individuals with few linkages to entrepreneurs to active participants in Entrepreneur Support organizations, Incubators/Accelerators, and in other “networking” oriented programs. Their engagement in such entities helps them better grasp deal flow opportunities and the merits of “plugging” into such initiative, where the tradeoff of their time can yield long-term benefits in the long run.

III. Oferta y Demanda de Capital Humano para la Innovación en Perú

En la Sección I de este reporte se presenta el marco teórico para el análisis de la oferta y demanda de capital humano necesario para el buen funcionamiento de un sistema de innovación. Claramente varios de los perfiles presentados no se encuentran en sistemas emergentes; pero son mostrados como un horizonte al cual aspirar, ya sea mediante el desarrollo de aquellos perfiles tal como son presentados, o en forma adaptada a las realidades de una nación en particular.

En esta sección se presentan las principales observaciones encontradas en el trabajo de campo en Perú, el cual estuvo compuesto de entrevistas personales con más de 40 actores activos en el sistema de innovación del país; actores representando todos y cada uno de los siete motores de innovación propuestos en el marco teórico de la Sección I. Estas observaciones son a su vez suplementadas y apoyadas, en lo posible, por data específica encontrada en el país. Esta sección continúa la presentación dividida en los siete sectores y para cada uno se postula una evaluación del estado de madurez general del motor, oferta institucional, y condiciones de oferta y demanda de capital humano.

Cabe recordar que en la evaluación del capital humano se tiene un enfoque dual por el cual se analiza personal necesario para el mejoramiento tecnológico en la base industrial existente, al igual que aquel necesario para el emprendimiento dinámico de alto impacto (de base tecnológica).

Como se presenta en la Sección I, la función de desarrollo y comercialización de nuevas tecnologías es compartida entre los emprendedores, la industria y las universidades, quienes reciben apoyo monetario, técnico, de capacitación y de servicios para los esfuerzos de innovación por parte de las firmas de capital privado, el gobierno, las organizaciones de apoyo y los diferentes prestadores de servicios. Las relaciones de oferta y demanda de capital humano al interior de estos motores de innovación, en cualquier sistema de innovación, están enmarcadas dentro de macro estructuras socio-económicas de una nación que afectan su funcionamiento. Con esto en mente, y como preámbulo a la presentación de la información referente al capital humano para innovación, es importante notar brevemente el contexto macro-económico que ha regido la evolución de los esfuerzos Peruanos en los temas de innovación, al igual que importantes fallas sistémicas, identificadas por los actores entrevistados que afectan su efectividad y que pueden afectar la implementación y el impacto de nuevas políticas/instrumentos que se recomienden para el desarrollo del sistema de innovación.

Contexto macro-económico de la evolución de los esfuerzos por incentivar la innovación en Perú

Después de la profunda crisis de los 90s, Perú ha mostrado una recuperación remarcable en muchos de sus índices socio-económicos. El Producto Bruto Interno (PBI) y el Producto Bruto Interno por habitante (PBIph) han aumentado establemente desde el año 2001. El PBI pasó de \$137.5 mil millones en 2001 a \$371.3 mil millones en 2014 (Paridad de Poder Adquisitivo a precios internacionales actuales), mientras que el PBIph pasó de \$5,215.00 a \$12,06.80 en el mismo periodo. En el aspecto social el logro más notable ha sido la reducción de la pobreza de 54.8% de la población en el año 2001 a 23.9% en el año 2014.^{lxix}, creando una clase media más robusta y aumentando el poder adquisitivo del país.

A principios de la década pasada la necesidad de promover el rezagado sector de la ciencia, tecnología e innovación (CTI) se hizo evidente. En el año 2004 se generan dos leyes de promoción de este rubro: 1) la Ley de Canon para que los gobiernos regionales cuenten con fondos para fortalecer las capacidades de las universidades en las regiones que cuentan con explotación de recursos naturales extractivos, y 2) la

Ley Marco de Ciencia, Tecnología e Innovación Tecnológica que otorgó al Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (CONCYTEC) la misión de conducir las políticas del sector y la formación del Sistema Nacional de Ciencia, Tecnología e Innovación Tecnológica (SINACYT).

Durante el año 2006 se crearon dos fondos de apoyo a la CTI, el Fondo de Investigación y Desarrollo para la Competitividad (FIDECOM), que contaba con US\$65 millones y el Programa de Ciencia y Tecnología (FINCYT), conformado por US\$36 millones. El FINCYT empezó a operar el 2007, el cual estuvo orientado a promover la capacidad de innovación e investigación de las empresas en la colaboración entre empresas, universidades e institutos públicos de investigación, y duró hasta el 2011. El FIDECOM recién empezó a operar en el año 2010, desde el Ministerio de la Producción (PRODUCE)^{lxx}.

Durante el 2011 se realizó la primera Encuesta Nacional de Innovación en la Industria Manufacturera, los resultados mostraron niveles muy bajos de inversión por parte de las empresas en investigación y desarrollo interno: la inversión en I+D en las empresas encuestadas fue solo del 3% de su gasto total en innovación. De las empresas que innovan, solo el 37.1% protegen sus innovaciones de la competencia y dichas prácticas se concentran en pocos sectores: bebidas (85% protegen), prendas de vestir (68.7%) y fabricación de sustancias y productos químicos (66.1%), mientras que solo 10% de las empresas que fabrican productos elaborados de metal, excepto maquinaria, protegen sus innovaciones^{lxxi}.

Las diferentes encuestas encuentran las deficiencias en oferta de capital humano calificado como razón fundamental para los bajos niveles de innovación. La encuesta también encuentra que los trabajadores con post-grado solo representan 2% del total de trabajadores de las empresas y aquellos con estudios universitario completo solo 12%. También se ha encontrado que el nivel de difusión de información acerca de los programas gubernamentales de apoyo a la innovación es muy bajo; menos del 10% de las empresas conocen y han postulado a programas de apoyo al emprendimiento y 12% a programas de subvención a la innovación financiadas por FINCYT, FIDECOM, FONDECYT o AGROIDEAS.

El año 2011 el nuevo gobierno revitaliza el apoyo a la CTI en el país y aprueba la segunda operación del Programa de Ciencia y Tecnología (FINCYT 2) por un monto de US\$100 millones. En el año 2012, la Ley de Presupuesto del Sector Público incluye un Fondo Marco e Intangible para la Innovación, Ciencia y Tecnología (FOMITEC) de ~US\$100 millones. Claramente la inversión pública en CTI ha crecido más que el PBI en los últimos años, pero aún están por niveles muy por debajo de los promedios en la región; según la Red de Indicadores de Ciencia y Tecnología -Iberoamericana e Interamericana- (RICYT), en el 2013 Colombia invirtió 0.52% de su PBI en Actividades de Ciencia y Tecnología (ACT) y 0.25% en I+D, Brasil invirtió 1.66% en ACT y 1.23% en I+D, mientras que Perú invirtió 0.08% en ACT^{lxxii}. Según el World Economic Forum, a pesar de la mejora de competitividad, los indicadores de innovación se han mantenido rezagados con respecto al resto del mundo. En el informe del año 2015-2016, Perú se ubicó en el puesto 69/140 en el Índice Global de la Competitividad, pero en el pilar de innovación ocupa el puesto 116/140^{lxxiii}.

Los indicadores dejan claro que aún queda mucho camino por recorrer para que el Perú se pueda posicionar como un jugador importante en el mundo del desarrollo económico con base en el conocimiento. Sin embargo, hay que reconocer el gran progreso que el país ha hecho en los temas de innovación en poco más de una década. Esto incluye políticas de promoción sostenibles que presentan continuidad incluso con cambios de gobierno, instituciones relacionadas que se están solidificando, fuerte incremento en la inversión de recursos del estado con miras a porcentajes del PBI en línea con

otros países de la región, y una noción y compromiso general fuerte a través de todos los sectores económicos con la necesidad de mover la economía en dirección a la base de innovación.

Algunas condiciones sistémicas que pueden afectar cualquier estrategia de impulso a la innovación

Actitudes de disposición socio-cultural, prácticas empresariales, y marcos políticos y legislativos, pueden afectar la aplicabilidad de estrategias de apoyo a la innovación al igual que su esperado impacto. A continuación, se presentan algunas de estas condiciones sistémicas observadas en el Perú:

1. Condiciones que dificultan la creación de índices adecuados para la evaluación de la actividad emprendedora innovadora:
 - a. Falta de información confiable, actualizada y robusta: los censos, encuestas manufactureras, encuestas de educación, etc. son muy rezagados con la data más reciente presentando un atraso de tres años en relación al año corriente.
 - b. De acuerdo a los representantes de la industria local y emprendedores entrevistados, estos grupos prefieren la figura de secreto industrial sobre la figura de patente como instrumento de protección de propiedad intelectual; esto debido, según los entrevistados, a la falta de confianza en la capacidad del ente regulador para proteger la información proporcionada durante una protección de patente y de asegurar procesos efectivos de restricción en caso de que la patente sea infringida.
 - c. Los miembros de la academia entrevistados reportan que las relaciones de investigación colaborativa entre industria y academia no se reportan y son usualmente hechas bajo contratos entre las empresas y miembros de facultad a nivel individual, sin envolver a la universidad como tal. Por tanto, los reportes de actividad de transferencia tecnológica desde las universidades son incompletos.
2. Políticas de inmigración que dificultan la importación de talento calificado por periodos extendidos de tiempo. Tanto representantes de gobierno como de industria reportaron casos anecdóticos que ejemplifican dicha dificultad.
3. Políticas gubernamentales que sacrifican eficiencia por igualdad. De acuerdo a actores entrevistados con gran experiencia en los asuntos de formación e implementación de políticas públicas, en el Perú se encuentra que:
 - a. Existe poco apoyo político a la selección de sectores productivos líderes y la mayor inversión en su apoyo. Promoción sectorial es una práctica de desarrollo económico probada alrededor del mundo, pero difícil de implementar en Perú.
 - b. La mayoría de los programas públicos no escogen regiones líderes; por el contrario, los recursos concursables se hacen disponibles a todas las regiones.
 - c. Se reporta una cultura de emprendimiento por el emprendimiento: Programas de promoción que se enfocan en el emprendimiento como una opción válida para cualquier persona/idea, cuando algunos sectores de la población no tienen las condiciones mínimas para ello. Esto conllevando el riesgo de generar una generación de emprendedores deficientes y una fuerza laboral débil (ya que el trabajador no invierte suficiente tiempo como empleado para refinar sus capacidades y ensanchar su red de contactos).

4. Carencia de un sistema robusto de estándares de calidad y normalización. No hay especialistas en la certificación de normas para el uso de tecnología de punta. Esto dificulta la transición de proyectos de innovación en tecnología de prototipo a producto comercializable ya que se hace difícil presentar mejoras por eficiencia y calidad de un producto en contra a un estándar aceptado existente.
5. Profunda aversión al riesgo; evaluación en la que coinciden la mayoría de los diferentes actores entrevistados:
 - a. Al interior de las agencias gubernamentales: creando instrumentos que resultan demasiado engorrosos para los postulantes y con agentes políticos continuamente cuestionando la validez de la inversión pública en empresa privada.
 - b. En la sociedad en general: quebrar/fracasas no es visto como parte del proceso emprendedor, lo que lleva a que los capitales disponibles se dirijan a proyectos más tradicionales y que sea muy difícil disolver compañías.
6. Preferencia general a ser dueño del 100% de un proyecto pequeño, que dueño de un porcentaje menor de un proyecto grande. Deficiencia reportada con preocupación por los inversionistas entrevistados. Este tipo de actitudes son contrarias a los sistemas de escalamiento de empresas ya que restringen la participación de capital de riesgo externo en proyectos interesantes. Según el Global Entrepreneurship Monitor: Perú 2013, el 81% de las empresas en Perú concentran la propiedad en un solo propietario^{lxxiv}.

Algunas brechas de comunicación que afectan las relaciones entre los actores del sistema de innovación.

1. Brecha histórica entre industria y universidad: los representantes de la academia y de la industria coinciden en que la universidad no sabe que quiere la industria, la industria no sabe que ofrece la universidad. Igualmente, los tiempos de respuesta de las universidades no van de acuerdo a las necesidades de la empresa.
2. Brecha histórica entre gobierno e industria: las siguientes características de dicha relación disfuncional fueron reportadas en su mayoría por los empresarios (grandes y pequeños) entrevistados y luego corroborada por los representantes del gobierno.
 - a. Cultura de desconfianza entre actores:
 - i. El gobierno no confía en las empresas: los procesos para la otorgación de fondos de promoción, al igual que para la aprobación de incentivos tributarios por actividades de I+D son muy engorrosos y requieren la presentación de demasiada información considerada como secreto por las empresas.
 - ii. Las empresas no confían en el gobierno: los empresarios no confían en la idoneidad del personal del gobierno que evalúa las propuestas de innovación y solicitudes de incentivo tributario; ven la exposición de su información confidencial en los procesos de aplicación como un alto riesgo para la seguridad de su compañía.
 - b. Falta de mecanismos de seguimiento a mediano y largo plazo: los programas de promoción no son diseñados con este tipo de mecanismos desde su inceptión y por ende no crean avenidas de reporte de las compañías hacia el gobierno; y por su lado las compañías no encuentran interés en compartir información de progreso con las

agencias promotoras. Todo esto dificulta la evaluación del impacto y la eficacia de los programas.

- c. Bajo alcance de difusión de la información acerca de los programas de promoción del gobierno en el área de innovación: Por ejemplo, los fondos FINCyT y FIDECOM son percibidos como buenos pero muy poco conocidos, lo que conlleva a que las empresas postulantes sean las mismas.
3. Brecha naciente entre las diferentes agencias de promoción del gobierno: los potenciales recipientes de apoyo por parte de los programas de promoción que fueron entrevistados (universidades, empresas, inversionistas) encuentran los instrumentos en el mejor de los casos repetitivos y superpuestos, y en el peor, conflictivos.

Con este contexto macro socio-económico del Perú como referente, a continuación, se presentan los hallazgos específicos en relación a la oferta y demanda de capital humano para la innovación en el país. La **Tabla 2** presenta un resumen general de la evaluación del volumen y calidad de la oferta de los diferentes perfiles.

Tabla 2: Resumen de la disponibilidad de los perfiles claves para la innovación en el Perú

Motor de Innovación	Perfiles de Capital Humano Claves	Disponibilidad en el Perú	
		Volumen	Calidad
Talento Emprendedor	<ul style="list-style-type: none"> - Emprendedores Novatos - Gerentes de Negocio Experimentados - Emprendedores Experimentados 	Alto Medio Bajo	Baja Alta Alta
Capital Privado	<ul style="list-style-type: none"> - Para financiación no dilutiva: <ul style="list-style-type: none"> o Oficiales de crédito comercial (especializados en emprendimiento de base tecnológica) o Gerentes de programas de “grants” a nivel de fundación privada - Para financiación dilutiva: <ul style="list-style-type: none"> o Inversionistas Ángeles o Venture Capitalists (socios/analistas) o Gerentes de programas de inversión de riesgo corporativa (Corporate Venturing) 	Nulo Bajo Medio Bajo Casi nulo	N/A Baja Baja Media N/A
Universidades, Institutos de Investigación y Centros de Apoyo Técnico	<ul style="list-style-type: none"> - En la categoría de entrenamiento de la fuerza laboral: <ul style="list-style-type: none"> o Profesores de cátedra calificados en ciencia y tecnología o Profesores de cátedra en gestión de innovación o Profesores de cátedra en herramientas de emprendimiento - En la categoría de creación y transferencia de tecnología. <ul style="list-style-type: none"> o Profesores investigadores de planta y estudiantes investigadores o Oficiales de transferencia tecnológica o Gerentes y personal técnico en centros de prueba de concepto o Gestores de Innovación o Extensionistas 	Bajo Bajo Bajo Bajo Casi Nulo Bajo Bajo Bajo	Baja Baja Media Media Baja Media Baja Baja

Gobierno	- Gerentes/directores y personal de soporte de programas de financiamiento	Bajo	Alta
	- Gerentes/directores de programas de asistencia técnica		
	o Para programas de emprendimiento y productividad de la base industrial existente	Bajo	Media
	o Para programas de comercio internacional y exportaciones	Bajo	Baja
	- Gestores de Innovación y Extensionistas	Bajo	Medio
	- Gerentes de programas gubernamentales de adquisición interna de tecnología	Nulo	N/A
	- Directores y oficiales de agencias de regulación	Bajo	Media
- Legisladores capacitados en el tema de políticas de promoción a la innovación	Bajo	Media	
Industria	- Gestores de Innovación	Bajo	Baja
	- Rastreadores de Tecnología (Technology Scouts)	Casi Nulo	N/A
	- Ejecutivos de Inversión Corporativa de alto Riesgo Externa (Corporate Venturing)	Casi Nulo	N/A
	- Expertos en Licencias y Adquisiciones	Bajo	Media
	- Gerentes de I+D	Bajo	Baja
	- Investigadores, Ingenieros, Técnicos	Bajo	Medio
	- Extensionistas	Bajo	Bajo
Organizaciones y Personas de Apoyo	- Personal interno, y personas externas, en centros de apoyo al emprendedor, incubadoras y aceleradoras		
	o Directores ejecutivos	Bajo	Media
	o Directores de comercialización	Casi Nulo	
	o Directores de desarrollo de negocio	Bajo	Media
	o Mentores y modelos de role	Medio	Alta
	o Personal de apoyo	Bajo	Baja
	- Facilitadores de networking	Casi Nulo	N/A
Prestadores de Servicios	- Gestores de Innovación	Bajo	Baja
	- Extensionistas	Bajo	Baja
	- Expertos Legales en Propiedad Intelectual	Bajo	Alta
	- Expertos en procesos domésticos e internacionales de regulación y certificación	Bajo	Media
	- Expertos en comercialización	Bajo	Media
	- Expertos en diseño estratégico, mercadeo y manejo de marca	Bajo	Alta
	- Expertos en Investigación de mercado y planeación de negocios	Bajo	Media
	- Expertos en finanzas y contabilidad	Bajo	Media
	- Formuladores de proyectos (grant writers)	Medio	Media

Parámetros: Las clasificaciones por volumen y calidad son apreciaciones subjetivas derivadas de la experiencia empírica internacional, no de un análisis estadístico riguroso. Para las clasificaciones por volumen se tuvieron en cuenta los siguientes rangos: Nulo: zero personas, Casi Nulo: 1-3 personas, Bajo: 4-30, Medio: 31-100, Alto: 100+ .

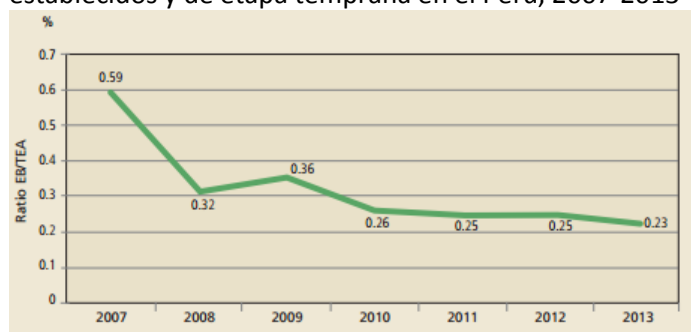
Fuente: Pachon, 2015

1. Talento Emprendedor

Dependiendo de a que actor del sistema de innovación se le pregunte, se encuentran percepciones encontradas acerca del tamaño y la calidad de la base emprendedora en el Perú. Sin embargo, el balance es positivo: si se encuentran emprendedores en el país; tanto en emprendimiento dinámico

de alto impacto como en industria más tradicional. El problema con la base emprendedora no es en si la cantidad de emprendedores, es la calidad de los proyectos que estos proponen al mercado, el alcance e impacto económico, y la viabilidad y supervivencia de los mismos.

Figura 7: Evolución de la relación de emprendimientos establecidos y de etapa temprana en el Perú, 2007-2013



Fuente: GEM, Encuesta a la Población Adulta (APS), 2013

innovación, mientras que el mismo rubro llega sólo al 7% en los EB. Estas cifras confirman que aunque la población peruana es emprendedora en general, la calidad y sostenibilidad de los emprendimientos es muy baja.

De hecho, como muestra la **Figura 7**, el reporte Global Entrepreneurship Monitor: Perú 2013, destaca que la relación de Emprendimientos Establecidos (EB) a Emprendimientos de Etapa Temprana (TEA) no solo es muy baja, sino que también ha disminuido en los últimos años. Llegando a que sólo el 23% de las empresas nuevas sobreviven el umbral de los tres años y medio de maduración. Este reporte también encuentra que en el 2013 sólo 20% de los TEA están en el área de

Existen muchos problemas de cómo “mapear” la oferta de emprendedores de base tecnológica. De acuerdo a los testimonios de los entrevistados, las entidades gubernamentales de promoción se han enfocado mucho en los emprendedores de la industria digital, lo que hace que la evaluación general de la calidad de los emprendedores de base tecnológica sea en muchas instancias reducida a la evaluación de las ideas y las capacidades de gestión de los emprendedores en TICS. Lo cual genera dificultades ya que se encuentran varios problemas con el perfil de los emprendedores de TICS: las ideas que están presentado no son de alcance mundial (muy parroquiales), sus prácticas gerenciales son pobres, y sus tasas de éxito muy bajas. Por otro lado, si bien el volumen de innovación en las ciencias duras es bajo comparado a sistemas de innovación más desarrollados, ejemplos claros son encontrados a través de las empresas de mediano y gran tamaño. Por ejemplo en el sector líder del agro, el Instituto Nacional de Innovación Agrario (INIA) y sus estaciones de experimentación agraria^{lxxv} incluyendo los proyectos comunitarios de Sierra Productiva y Sierra Exportadora^{lxxvi} son ejemplos que se citan constantemente. Se han hecho varios esfuerzos para este proceso de mapeo, o identificación de la base emprendedora innovativa en el país, y el perfil del emprendedor Peruano; específicamente la Encuesta Nacional de Innovación en la Industria Manufacturera 2012^{lxxvii}, el estudio Global Entrepreneurship Monitor: Perú 2013^{lxxviii}, y el estudio del estado del emprendimiento dinámico en el Perú del Banco Interamericano de Desarrollo (Kantis, 2015). Estos estudios presentan excelente información sobre las condiciones sistémicas socio-culturales para la formación de la mentalidad emprendedora, y datos estadísticos del emprendimiento en general, pero aún falta data acerca de la cantidad y calidad de talento para emprendimientos de base tecnológica.

Los perfiles de capital humano específicos para la innovación que se postularon en la Sección I de este reporte son (véase Sección I para las respectivas definiciones detalladas):

- *Emprendedores Novatos*

- *Gerentes de Negocio Experimentados*
- *Emprendedores Experimentados*

El segmento de **emprendedores novatos**, como se presentó anteriormente, está conformado por aquel sector de la población que le apuesta por primera vez a construir una empresa y que no tiene por lo general las capacidades y/o experiencia gerencial para el manejo adecuado de una compañía. En cuanto al emprendimiento por oportunidad de mercado (en oposición al de necesidad), esta categoría de talento potencial está mayoritariamente representado por los recién graduados de diferentes disciplinas, y para la formación específica de empresas de base tecnológica, por los graduados de escuelas de ingeniería, ciencias, y negocios. La oferta en el Perú de graduados de estas disciplinas de entidades consideradas serias es baja en relación a la región. Según el Índice Global de la Competitividad del World Economic Forum 2015-2016^{lxxix}, Perú se ubicó en el puesto 82/140 en la categoría de educación superior y entrenamiento, 117/140 en disponibilidad de científicos e ingenieros, y con el grave indicador del puesto 137/140 en la calidad de la educación en matemáticas y ciencias.

La formulación de estrategias para la promoción del número de estudiantes en las ciencias y las ingenierías está más allá del alcance de este reporte, pero en la siguiente sección se presentan estrategias sugeridas para incentivar y mejorar la actividad emprendedora en la base de emprendedores novatos existentes.

En relación a los **gerentes de negocio experimentados**, varios actores del sistema de innovación reportan que actualmente en el país existe un gran número de personas entre los 35-50 años, que están interesados en salir de la vida corporativa tradicional y emprender, personas con grandes capacidades e incluso acceso a capital. Estos no se clasifican como novatos, ya que sí tienen las capacidades y experiencia gerencial para el desarrollo de un negocio. Existe sin embargo una falta de mecanismos que proporcionen a estos individuos información acerca de a qué tipo de emprendimientos se pudieran apuntar. Se percibe que las iniciativas del gobierno están actualmente muy enfocadas a la promoción del espíritu emprendedor y los proyectos de innovación entre los jóvenes recién egresados de la universidad y no se ha atendido este segmento de potencial talento emprendedor. Lo cual es grave ya que la experiencia internacional, como se discutió en la Sección I, muestra que el porcentaje de nuevas empresas innovadoras es creado por este tipo de perfil, no por los recién egresados (novatos)^{lxxx}.

En cuanto a los **emprendedores experimentados**, se reporta que en el Perú existen pocos emprendedores seriales en el área de base tecnológica, pero si los hay en aéreas más tradicionales de la actividad económica. Incentivar a los primeros para la creación de otras nuevas empresas, y a los segundos a estudiar la creación de empresas relacionadas a sus sectores, pero de base tecnológica es el reto para las políticas de promoción.

2. Capital Privado

El mercado de capital de riesgo para emprendimiento en Perú es muy pequeño; existen pocos fondos de inversión de alto riesgo (Venture Capital-VC); los domésticos: Alta Ventures, Concordia Capital, Wayra Ventures, KapitalZocial (crowdfunding); los otros fondos VC que tiene presencia en el

país son representaciones locales de fondos internacionales, como Axon capital de España, y Abraj de Qatar. Aunque no existe data oficial en el número de financiaciones que se presentan al año y su valor, representantes de estas firmas reportan que, tanto en volumen como en valor, los movimientos siguen siendo muy pequeños.

Iniciativas del BID para vitalizar este mercado no han sido fructíferas en gran parte por la falta de los perfiles requeridos para este motor^{lxxxii}. En conversaciones con emprendedores y con representantes de las pocas firmas de capital de riesgo, se hace evidente un problema de flujo de proyectos de calidad, lo cual acompañado al problema cultural mencionado anteriormente por el cual el peruano prefiere ser dueño 100% de un proyecto pequeño, que dueño socio de un porcentaje menor de un proyecto grande, hace que la figura de financiación más común sea el préstamo, no capital por patrimonio. Familia y conocidos se percibe como la fuente de capital no gubernamental número uno. El Global Competitiveness Index tiene a Perú como 43/140 en el rubro de acceso a capital de riesgo^{lxxxiii}, lo que apoya la percepción de que el problema para la falta de dinamismo en este sector empieza con el bajo volumen de proyectos financiables de calidad.

Los VCs locales y extranjeros encuentran muy difícil armar un portafolio de proyectos ya que no existe en el Perú una plataforma que agrupe todas las propuestas de innovación presentadas por los emprendedores. Se tiene la percepción de que las iniciativas de las diferentes entidades del gobierno están desconectadas y que es difícil encontrar la información entre los diferentes programas de apoyo y los emprendimientos prometedores que estos descubren.

Por otro lado, existe muy pocos bancos, o entidades tradicionales de financiamiento que entiendan el mundo de la innovación y el emprendimiento; por esto no existen en Perú productos salientes de la banca de inversión tradicional que sean ofrecidos para emprendedores.

Los perfiles específicos de capital humano propuestos en la Sección I de este documento son:

- *Para financiación no dilutiva:*
 - o *Oficiales de crédito comercial (especializado para emprendimiento de base tecnológica),*
 - o *Gerentes de programas de “grants” a nivel de fundación privada*
- *Para financiación dilutiva:*
 - o *Inversionistas ángeles,*
 - o *Venture capitalists (socios y analistas)*
 - o *Gerentes de programas de inversión de riesgo corporativa (Corporate Venturing)*

De acuerdo con los gerentes de los fondos de VC y los emprendedores entrevistados, no existen en Perú los *perfiles de capital humano para la financiación privada no dilutiva*. Si bien claramente existe una oferta moderada de profesionales en la banca de inversión tradicional, dado que no existen aún instituciones que creen instrumentos diseñados específicamente para la financiación de emprendimiento de alto riesgo, no se encuentran profesionales en este sector dedicados a entender y realizar operaciones de este tipo. Por otro lado, en Perú no existen aún grandes fundaciones privadas que ofrezcan capital de arranque para emprendimientos de alto riesgo, tampoco existen agentes que sean versados en los procesos de aplicación y manejo de “grants” otorgadas por las grandes fundaciones internacionales (ejemplo: Gates Foundation, Rockefeller Foundation, etc.), por

ende, no se conocen casos de emprendimientos de base tecnológica que hayan recibido grants de dichas fundaciones.

La oferta de **capital humano para la financiación dilutiva** comienza con **inversionistas ángeles**. Se encuentra que en el Perú si existen personas con los perfiles potenciales para ser considerados ángeles, pero no son activos en la búsqueda de oportunidades, y todavía tienen un perfil de aversión al riesgo. Se reporta interés por parte de empresarios exitosos y acaudalados de entrar en el mundo de la inversión en emprendimiento de alto riesgo. Si bien el número de millonarios (patrimonio neto de más de un millón de soles) en el Perú es muy bajo como porcentaje de la población, 0.015% (4,768 personas) en 2014 de acuerdo a la Superintendencia de Banca y Seguros^{lxxxiii}, con sólo 9 individuos considerados como multimillonarios (patrimonio neto de más de US\$1,000 millones)^{lxxxiv}, dado el tamaño del mercado y el flujo existente de proyectos financiables, estos bajos números no representan un problema. El reporte de BID en los esfuerzos por crear una red dinámica de inversionistas ángeles, presenta que se pudieron identificar más de 40 inversionistas interesados y acreditables como ángeles^{lxxxv}. El problema reportado tanto por los actores entrevistados, como en el reporte de BID, es que dichos inversionistas no tienen aún el conocimiento, y la disposición, necesarias para entrar completamente en el mundo de inversión de alto riesgo. Aunque estos individuos son por lo general empresarios muy exitosos, todavía basan su perfil de inversión en proyectos más tradicionales, en modelos de mercado ya probados; lo cual va en contra del perfil general de un inversionista ángel de alto riesgo.

En cuanto a los perfiles de **personal requerido para firmas de Venture Capital**, los gerentes que se entrevistaron reportan que la capacidad de análisis de los proyectos presentados, de negociación de términos de financiación, y acompañamiento de las empresas financiadas, recae básicamente en los gerentes actuales; que es muy difícil encontrar personal de apoyo ya que por lo pequeño del mercado, las firmas VC no cuentan con presupuestos para atraer personal de la banca de inversión tradicional y entrenarlos en las particularidades de la inversión VC. De acuerdo al Censo Nacional Universitario del 2010, sólo el 0.91%^{lxxxvi} de los estudiantes de post-grado está cursando estudios de alta finanza y son inexistentes los estudiantes enfocados en análisis de riesgo. No obstante, esta estadística, la percepción general es que sí existe una oferta de personas calificadas y con experiencia que podrían servir en cargos tanto gerenciales como de apoyo en firmas VC; habría que atraerlos de la banca tradicional y crear mecanismos de entrenamiento en inversión VC.

La oferta de personal calificado para ocupar **gerentes de programas de inversión de riesgo corporativa** (Corporate Venturing) es extremadamente baja, esto en virtud probablemente de que, en el Perú, existe sólo un caso reportado de gran empresa que tenga una división de Corporate Venturing –Wayra- el brazo de inversión en emprendimiento de alto riesgo de base tecnológica de la multinacional Telefónica de España. De hecho, el gerente de Wayra fue importado de otro país para liderar esta división. Como se discutió en la Sección I de este reporte, los líderes de programas de Corporate Venturing tienen que tener la capacidad dual de conocer y entender a fondo los retos tecnológicos que su empresa, y a la vez ser versados en los mecanismos de identificación, financiación y seguimiento de emprendimientos externos que puedan ayudar a resolver dichos retos tecnológicos de la empresa. Dado el estado del mercado de esta figura, la oferta no está por debajo de la demanda; sin embargo, a medida que las grandes empresas empiecen a considerar Corporate Venturing como una opción viable en fortalecimiento del negocio existente, dicha demanda aumentará y la oferta no estará a un nivel adecuado.

3. Universidades, Institutos de Investigación, y Centros de Apoyo Técnico

Como se discutió en la Sección I de este reporte, las universidades, los centros de formación técnica, y las instituciones de investigación y soporte tecnológico, tienen dos funciones principales que cumplir en un sistema de innovación: a) preparar una fuerza laboral calificada, b) promover y facilitar el desarrollo y transferencia de nuevas tecnologías, incluyendo apoyo a la industria en sus necesidades tecnológicas. A continuación, se presentan observaciones de campo acerca de la oferta y demanda de capital humano en estas dos categorías; incluyendo, un análisis de la oferta institucional en Perú, sus productos más relevantes a un sistema de innovación, y la oferta de capital humano relacionado.

3.1 Oferta Institucional y capital humano para el desarrollo de una fuerza laboral calificada

En el Perú existen 133 universidades, de las cuales 50 son públicas, 1 municipal y 82 son universidades privadas. Solo 76 universidades son institucionalizadas, mientras que el resto están en proceso de institucionalización. 31 universidades institucionalizadas son públicas y 45 privadas^{lxxxvii}. No obstante, estas cifras, la percepción general es que las universidades que ofrecen formación de calidad no son más de 20. El país también cuenta con Institutos Tecnológicos Superiores; cuyo nombre en sí es inadecuado ya que muchos no tienen nada que ver con formación tecnológica, y en general son vistos como de bajo nivel. Según el Índice Global de la Competitividad del World Economic Forum 2015-2016^{lxxxviii}, Perú se ubicó en el puesto 82/140 en la categoría de educación superior y entrenamiento.

En cuanto a los programas de formación más relevantes para la innovación como tal, la carencia de programas de formación a nivel de Doctorado y Post-doctorado en las áreas de ciencia y tecnología es muy evidente, aunque este tema está fuera del alcance de este reporte, cabe notar que el gobierno Peruano ya ha desarrollado varios instrumentos para la promoción de este tipo de formación y la repatriación de profesionales peruanos ya formados a este nivel que no se encuentran en el país actualmente.

En conversaciones con representantes de diferentes sectores de la industria en todos los tamaños de compañía, al igual que con personal gerencial de centros de apoyo industrial, se concluyó que existen graves falencias en los programas de formación de ingenieros y técnicos. En primera instancia la apreciación general es que la formación de ingenieros y diseñadores, es muy general y teórica y cuando estos profesionales son presentados con problemas aplicados del día a día empresarial (ya sea al interior de una compañía o en un centro de apoyo técnico a la industria) se quedan cortos. Se evidencia la falta de líneas de formación sectorial especializada, vía módulos electivos, en estas carreras universitarias. Por otro lado, técnicos especializados son pocos, en general se percibe que hay poca demanda en la formación técnica y aquellos con acceso a educación formal optan por carreras universitarias formales así sea en instituciones de bajo nivel. La formación técnica de calidad se encuentra en iniciativas que vienen de la industria misma, no de las universidades. Otra falencia observada en los programas de formación de ingenieros y técnicos es que estos programas por lo general no incluyen módulos en gestión de innovación. Esta omisión genera que los ingenieros y técnicos carezcan de las herramientas gerenciales mínimas para poder desarrollar proyectos integrales de

innovación dentro de la industria o que puedan comunicarse efectivamente con actores sin formación técnica.

Cabe anotar que estas falencias en la fuerza laboral afectan sobre todo a empresas de la base industrial existente y a emprendimientos de base tecnológica en ciencias duras. Los emprendimientos en TICs no se ven generalmente afectados por estos problemas en la formación de ingenieros y técnicos ya que el insumo que estas empresas necesitan son menos especializados; programadores talentosos, los cuales si se encuentran en Perú.

En cuanto a los programas especializados en la gestión de innovación, se encuentra una apreciación casi unánime a través de los diferentes actores del sistema de innovación, de que la calidad en general es baja y los programas de calidad no suplen la demanda. Existe una oferta variada de programas y cursos de gestión de innovación, pero solo dos se consideran serios: la maestría en gestión y políticas de la innovación y la tecnología de la Pontificia Universidad Católica del Perú y la maestría en políticas y gestión de la ciencia, tecnología e Innovación de la Universidad Peruana Cayetano Heredia; sin embargo la apreciación general es que estos programas si bien han hecho una buena labor para la formación de gestores para el sector público, se han quedado cortos para la formación de gestores para la industria y para las universidades.

Los programas de promoción de capacidades emprendedoras son muchos, el gran problema es que, con excepción de los pocos programas más serios, dichos programas tienen un corte más inspiracional que práctico, es decir que se enfocan en el desarrollo del “espíritu emprendedor” y no en el desarrollo de las capacidades prácticas que un emprendedor necesita para el manejo del día a día de una empresa. El problema aquí es dual, primero es que el enfoque en el espíritu emprendedor crea una falacia por la cual se vende la idea de que todos y cualquiera pueden ser emprendedores, cuando la evidencia muestra que el verdadero espíritu emprendedor es una característica innata no aprendida. Segundo los programas para equipar a los verdaderos emprendedores con las herramientas mínimas de gestión son muy generales y carecen de atención uno a uno.

Los perfiles de personal a cargo de la instrucción en los programas de formación discutidos al interior de las universidades y otras instituciones de formación son:

- *Profesores de cátedra calificados en ciencia y tecnología*
- *Profesores de cátedra en gestión de innovación*
- *Profesores de cátedra en herramientas de emprendimiento*

La apreciación por parte de varios actores del sistema de innovación, incluyendo representantes de las universidades y centros de formación como tal, es que actualmente **la oferta de profesores de cátedra en todas estas categorías** es escasa para cubrir la demanda. Las universidades de mayor prestigio acaparan los buenos profesores, y en todo caso son muy pocos los que hay.

3.2 Oferta Institucional y capital humano para el desarrollo y transferencia de nuevas tecnologías, y apoyo a las necesidades tecnológicas de la industria

Como se discutió anteriormente, las universidades comparten las funciones de investigación, desarrollo y comercialización de nuevas tecnologías con los emprendedores y la industria; así mismo, tradicionalmente las funciones de apoyo a las necesidades tecnológicas de la base industria existente, reside principalmente en las universidades mediante convenios de investigación patrocinada, y centros de prueba de concepto y valoración de nuevos productos. Otro tipo de instituciones a cargo de estas funciones, son los laboratorios y centros de investigación sectoriales del gobierno; ejemplos de estas instituciones son: EMBRAPA para la agricultura en Brasil, IICA para agricultura en Colombia, red de laboratorios federales en EE.UU, NASA en EE.UU. En el Perú existen 14 Institutos Públicos de Investigación que realizan I+D, con el ejemplo reconocido como el más exitoso siendo el Instituto Nacional de Innovación Agraria (INIA), específicamente sus estaciones de experimentación agraria. Finalmente, los centros específicamente dedicados al apoyo tecnológico a las empresas independientes de las universidades, completan la oferta de instituciones en esta función. En Perú, estos centros especializados son los Centros de Innovación Tecnológica (CITEs). Actualmente existen 17 CITEs con 4 de ellos (Madera, Pesca, Cuero y textiles, y Pisco) liderando el grupo; estos centros son de enfoque puramente sectorial. También existe otro número de CITES casi-gubernamentales de menor impacto. Los CITES prestan servicios de diseño y desarrollo de productos, laboratorio de calidad, prueba de concepto y valoración de nuevos productos, capacitación y otra asistencia técnica para problemas puntuales.

Aunque en Perú existen ejemplos de universidades con muy buenas capacidades para la investigación, se encuentra que la oferta general de investigación y transferencia tecnológica en el conjunto de universidades del país es actualmente muy baja para poder crear una masa crítica de flujo de innovación saliendo de las universidades. En relación a nuevas tecnologías desarrolladas al interior de Instituciones Públicas de Investigación, la firma consultora Advansis de Finlandia, en el estudio encargado por FINCyT: Diagnostico del desempeño y necesidades de los Institutos Públicos de Investigación y Desarrollo del Perú, concluyo que los institutos por lo general, no están cumpliendo en su función de generación de investigación pura actualizada y las operaciones de transferencia tecnológica y comercialización son muy bajas; se dedican por el contrario más a la elaboración de bases de datos, y normas de funcionamiento de los sectores a los que sirven^{lxxxix}. Dicho bajo desempeño debido a restricciones presupuestarias, y la poca capacidad de atraer investigadores calificados. Cabe también anotar que los CITES no realizan investigación para el desarrollo de nuevas tecnologías propiamente, en vez, desarrollan innovación en procesos productivos existentes por petición expresa de un cliente de la base industrial existente. Los CITES han cumplido así una función de “extensionismo” dentro de sus respectivas industrias; introduciendo materiales y maquinarias, y otras tecnologías ya probadas en otros mercados a la industria nacional.

En cuanto al personal requerido al interior de las instituciones en cuestión en sus funciones de desarrollo y comercialización de tecnologías, y apoyo tecnológico a la industria, las categorías contempladas en la Sección I de este documento son:

- *Profesores investigadores de planta y estudiantes investigadores*
- *Oficiales de transferencia tecnológica*

- *Gerentes y personal técnico en centros de prueba de concepto*
- *Gestores de Innovación*
- *Extensionistas*

Se encontró que la oferta de **profesores y alumnos asistentes de investigación** con las calificaciones avanzadas para realizar desarrollo de nuevas tecnologías no es adecuada para que estas instituciones puedan alimentar el sistema de innovación con un flujo regular de nuevas tecnologías. Así mismo, el sistema de incentivos al interior de las universidades no promueve esta labor; específicamente, las exigencias de cátedra no permiten el tiempo adecuado para la investigación, y por lo general el investigador debe procurar los fondos de financiamiento de los proyectos de investigación sin participar monetariamente en dichos fondos.

En el Perú son muy pocas las universidades, centros de investigación aplicada, y centros de apoyo tecnológico a la industria que reportan tener unidades de TT. Igualmente las reglas y procedimientos que gobiernan las operaciones de TT no han sido desarrollados en la mayoría de estas instituciones. No hay en el Perú **Oficiales de Transferencia Tecnológica (TT)** calificados para liderar adecuadamente oficinas de TT y las varias funciones que dichas oficinas deben cumplir: incentivar a los investigadores a emprender proyectos con fin comercializable, buscar salida comercial a la investigación que si se hace, vender las capacidades de investigación y desarrollo de la institución, revisar convocatorias públicas, formular proyectos, hacer primeras evaluaciones de libertad de operación y patentabilidad, negociar términos en posibles licencias y spin off, etc. Como se presentó anteriormente los programas de formación específica en gestión de innovación se basan sobretodo en políticas de innovación y se quedan cortos en la oferta de módulos específicos para funciones de transferencia como tal, incluyendo gestión de proyectos de innovación al interior de las instituciones. Específicamente en las universidades, esta carencia de marco regulatorio formal y de oficinas de TT, ha creado una situación en donde la relación de la universidad con la industria para necesidades tecnológicas, es llevada a cabo por fuera de las instituciones y toma la forma de relaciones contractuales entra la industria y profesores directamente. Esta actividad no se considera TT y en general no se reporta, lo que lleva a que el número de operaciones de transferencia (licencias, investigación pagada, etc.) no se pueda capturar adecuadamente como un proxy de la actividad innovadora en el país.

En cuanto al **personal necesario para liderar y realizar las funciones en los centros de prueba de concepto y de apoyo tecnológico a la industria** (dentro y fuera del ámbito universitario), se encuentra que el acceso a personal calificado y con experiencia que pueda servir en las funciones gerenciales de los centros es muy limitado. Como se mencionó anteriormente, este es un problema que sufren todas las instituciones de apoyo a la innovación. Básicamente las personas ocupando los cargos de liderazgo actualmente constituyen la oferta completa de personal con estas calificaciones, si alguno llegara a dejar el sector sería muy difícil reemplazarlo. En relación al personal técnico necesario en estos centros, como se discutió anteriormente, la limitada oferta de ingenieros y técnicos con experiencia profundizada en desarrollo tecnológico generan una situación por la cual si bien estos centros prestan un soporte moderadamente bueno a la base industrial existente, están muy lejos de poder suplir esta función para emprendedores nuevos de alto impacto, especialmente aquellos desarrollando tecnología en las ciencias duras. Incluso en su apoyo a la base industrial existente, los laboratorios de valoración de nuevos productos se quedan cortos; la grande y mediana empresa con los fondos necesarios suplen esta falencia mediante la contratación de consultores técnicos

extranjeros por cortos periodos de tiempo, y el envío de prototipos a laboratorios en el exterior. Claramente estas opciones son prohibitivas para la empresa pequeña y emergente.

Como se discutió en la Sección I de este reporte, la función del **extensionista** que sirve a las universidades y otras instituciones de investigación es la difusión de tecnologías probadas que salen de la institución, o que la misma ha avalado de otros mercados y quiere introducir en una industria específica. Estos pueden ser consultores externos o empleados internos; sin embargo, en el caso de estas instituciones suelen ser internos. La función de **los gestores de innovación** en esta categoría es la de trabajar con los investigadores, los oficiales de transferencia tecnológica, y los extensionistas, en el diseño de programas/procesos innovación por los cuales se crean y se mantienen mecanismos de comunicación con la industria y/o el gobierno para la implementación de proyectos colaborativos conjuntos. A diferencia de los oficiales de TT, los gestores no tienen que ser versados en procesos de patentabilidad y libertad de operación.

De acuerdo a los actores entrevistados a través de todas las instituciones de este motor de innovación, existe una alta carencia de profesionales calificados que cumplan las labores de extensionistas y de gestores de innovación, como se presentó al principio de esta sub-sección, la poca oferta de programas de formación en gestión de innovación, al igual que las falencias de los programas formales de formación de técnicos e ingenieros por el cual se les capacite en materias de extensionismo y relación con la industria, son identificadas como las principales fuentes del problema.

4. Gobierno

En la Sección I de este reporte se presentaron varios perfiles de capital humano requerido por agencias gubernamentales que de uno u otro modo tienen influencia en la promoción de procesos de innovación. Dichos perfiles son los siguientes:

- *Gerentes/directores y personal de soporte de programas de financiamiento*
- *Gerentes/directores de programas de asistencia técnica*
 - o *Para programas de emprendimiento y productividad de la base industrial existente*
 - o *Para programas de comercio internacional y exportaciones*
- *Gestores de Innovación y Extensionistas*
- *Gerentes de programas compra interna gubernamental*
- *Directores y oficiales de agencias de regulación*
- *Legisladores capacitados en el tema de políticas de promoción a la innovación*

En las conversaciones con diferentes agentes en entidades gubernamentales que tienen la función de promover la innovación (Produce, Innovate, CONCYTEC, MEF, CITES) todos coinciden en la apreciación de que existe muy poco personal calificado para el *diseño e implementación de programas de financiamiento y de asistencia técnica para la innovación*.

- A nivel del **personal gerencial**: el personal existente es altamente apeteído por todas las instituciones y salta de una institución a otra, estas personas han adquirido su experiencia en los temas de promoción de innovación básicamente en la marcha y ahora poseen la memoria

institucional que les permite navegar los procesos gubernamentales con mayor facilidad. En este nivel se percibe una alta lealtad al sector (promoción de innovación) por parte de las personas calificadas actualmente activas en el sector, lo que indica que, aunque puede haber una rotación a través de las diferentes agencias, el talento no sale del sector.

- A nivel del **personal de soporte**: el personal puede ser calificado en procesos de administración general de proyectos, pero carece de conocimiento profundo en los temas de promoción de innovación. Se percibe alta movilidad de este personal saliendo del sector completamente, y con esto vacilación por parte del nivel gerencial a invertir en la profundización del conocimiento y experiencia en promoción de innovación en este nivel de personal; lo cual crea un círculo vicioso que deja al sector con una base de personal de apoyo débil.

Existen pocos mecanismos para preparar y entrenar personal tanto al nivel gerencial como a nivel de apoyo. Como se mencionó anteriormente, el conocimiento se adquiere en la marcha y en una forma muy autodidacta; con asistencia a conferencias internacionales, acceso a consultores internacionales e información escrita, e intercambio de experiencia con contrapartes en otras entidades gubernamentales del país y de otros países, como la mayor fuente de capacitación. Sin embargo, restricciones presupuestales y complejos procesos de aprobación, limitan incluso estos insumos. Produce Perú, inicio un esfuerzo para afrontar este problema; la financiación de dos programas de maestría en gerencia de innovación: las maestrías de las universidades Pontificia Universidad Católica y de la Universidad Cayetano Heredia. Dichas maestrías han sido relativamente exitosas en formar personal de soporte, para apoyar las agencias gubernamentales; sin embargo se reporta que después del imputo inicial de las dos primeras promociones, y la salida del financiamiento gubernamental tanto de la universidad implementadora como de los estudiantes ingresados, los programas no encuentran la misma demanda y están decayendo.

Otro tipo de personal de soporte es el capital humano que utilizan las entidades gubernamentales para la evaluación de los proyectos postulantes a concursos públicos. Existe la ansiedad dentro de representantes de empresas y universidades acerca de quienes están evaluando sus propuestas y la idoneidad y real preparación de estos individuos o entes. FINCyT utiliza una entidad estadounidense y representantes de la base industrial y firmas de capital de riesgo. Ya sea por los evaluadores, o por los procesos de evaluación, los resultados no se perciben idóneos. Como se menciona al principio de esta sección, las empresas de mayor tamaño cuestionan dichos evaluadores y temen la filtración de tecnología cuando aplican por el incentivo tributario, mientras que las empresas pequeñas y medianas postulándose para fondos concursales temen la misma filtración de proyecto tecnológico a través de estos procesos. En general se aprecian falencias en la preparación del personal gubernamental y algunos de sus colaboradores externos, en la comprensión real de los criterios que llevan a un proyecto emprendedores de base tecnológica tener un alto potencial de éxito en el mercado.

PromPerú es la agencia a cargo de **promoción de exportaciones y comercio internacional**. Se encontró que el acceso a personal calificado para las funciones de promoción de empresas peruanas en el exterior es más alto que tienen las agencias de promoción a la innovación. Esta agencia es más antigua y estructurada que las agencias de innovación; sin embargo, sí hace falta más formación del personal existente en lo relacionado a la promoción de productos peruanos de base tecnológica, ya que este no ha sido su fuerte ni preocupación en el pasado.

La función del **extensionista** que sirve a agencias del gobierno es la difusión de tecnologías probadas en otros mercados que programas de promoción de incremento de la productividad en la base industrial existente quiere introducir en una industria específica. Estos pueden ser consultores externos o empleados internos; sin embargo, en el caso de estas instituciones suelen ser internos. La función de *los Gestores de Innovación* en esta categoría es la de trabajar con los líderes de las agencias de promoción de la innovación en el diseño de programas/procesos innovación por los cuales se crean y se mantienen mecanismos de comunicación con la industria y las universidades para la implementación de proyectos colaborativos conjuntos. Como en el caso de los extensionistas y gestores de innovación que sirven a las universidades e instituciones de investigación y apoyo, la percepción general es que existe una gran carencia de profesionales que pudieran cumplir estas funciones.

No se pudo encontrar en las entrevistas realizadas y subsecuentes investigaciones, información acerca de programas por los cuales el gobierno compra tecnologías saliendo del sistema de innovación abierto para su uso interno.

En cuanto a los **directores y oficiales en agencias de regulación**, como se discutió anteriormente, los diferentes actores de sistema de innovación no perciben un alto nivel de sofisticación en los estándares y regulación de introducción y uso de productos en el mercado. Como se menciona en el estudio de la consultora Advansis acerca de los Institutos Públicos de Investigación y Desarrollo, dada la falta de la existencia explícita de agencias de estándares y regulación, son estos institutos los que cumplen la función de tratar de regular los mercados con sus ponencias de normativas y estándares^{xc}. El acceso a personal calificado para estas funciones es bajo y dichos institutos están sufriendo un envejecimiento y salida de su personal más calificado.

5. Industria

Antes de empezar la presentación de esta sección se debe recordar que, por industria, se entiende las empresas grandes, medianas y pequeñas establecidas que constituyen la base industrial existente en el Perú; se excluyen aquí los emprendimientos nacientes y no establecidos (los cuales se discutieron en la sub-sección 1). A continuación, se presentan los hallazgos en cuando a las percepciones de la calidad y facilidad de acceso a los perfiles profesionales propuestos para esta categoría por parte de los representantes de industria entrevistados.

Una percepción generalizada es que se requiere primeramente que la industria a nivel gerencial tome la innovación en serio. No existen departamentos de gestión de innovación y la mentalidad prevalente es la de “Para que invertir en creación de innovación si es más fácil comprarla”, con el problema agravante de que dichas compras de tecnología por lo general no están apoyadas por capacitación y entrenamiento necesario para su buen uso. Incluso procesos de re-ingeniería que en muchas ocasiones llevan a creación de tecnologías nuevas, no son considerados de valor agregado así que no hay departamento de I+D que se dediquen a mirar cómo funcionan las tecnologías nuevas adquiridas para de allí crear nuevos productos.

La innovación saliente de la industria es más incremental y de proceso que de nuevo producto, especialmente en lo tecnológico. La industria tiene una gran oportunidad de generar procesos de innovación a través de la cadena de proveedores, mediante la instalación seria de estándares altos

de calidad que obliguen a la innovación; se reporta que actualmente la industria Peruana no es disciplinada en el mantenimiento de estándares de calidad, especialmente aquellos requeridos de sus proveedores. Representantes de la gran industria coinciden en que la capacidad de I+D al interior de las empresas en Perú es bajo en comparación a las empresas extranjeras. Según la Encuesta Nacional de Innovación en la Industria Manufacturera en Perú, 2012, sólo el 16.3% de las compañías 7,603 empresas participantes en la encuesta, tienen alguna actividad de I+D interno^{xci}.

No hay todavía muchos procesos de innovación abierta mediante los cuales las compañías busquen identificar emprendimientos externos que puedan proporcionar soluciones a retos tecnológicos al interior de las compañías e incorporarlos mediante procesos de licencia, compra directa de la tecnología, o proyectos de investigación y desarrollo colaborativos. El único ejemplo existente es el de Wayra, el brazo de Corporate Venturing de Telefónica Internacional. La razón para que los procesos de innovación abierta no sean prevalentes en el país es fundamentalmente la falta de interés, y conocimiento de los mismos por parte de las compañías. De otro lado los representantes de las compañías que están comenzando a explorar estos procesos reportan que les es muy difícil encontrar información de calidad acerca de las capacidades que tienen los emprendedores existentes y si estos pueden en verdad aportar a la solución de los retos tecnológicos.

Como se mencionó anteriormente, la relación histórica entre industria y las universidades y otras instituciones de investigación y apoyo tecnológico es difícil, las empresas encuentra difícil la comunicación y velocidad de respuesta de este tipo de instituciones, y estas últimas no saben cómo vender sus capacidades a la industria y están regidas por limitantes internos que limitan su capacidad de reacción.

En cuanto al personal requerido al interior de las empresas de la base industrial existente, los perfiles propuestos en la Sección I de este documento son:

- *Gestores de Innovación*
- *Rastreadores de Tecnología (Technology Scouts)*
- *Executivos de Inversión Corporativa de alto Riesgo Externa (Corporate Venturing)*
- *Expertos en Licencias y Adquisiciones*
- *Gerentes de I+D*
- *Investigadores, Ingenieros, Técnicos*
- *Extensionistas*

Como se discutió en la Sección I, la función de los **gestores de innovación** al interior de las empresas es el de diseñar y coordinar procesos de innovación a través de toda la compañía, desde la construcción de departamentos y capacidades de I+D internos, hasta el desarrollo de procesos de innovación abierta, y de adquisición directa de tecnologías de punta. Los **technology scouts** y los **ejecutivos de Corporate Venturing** se encargan de hacer las actividades requeridas en procesos de innovación abierta diseñados por el gestor; están más afuera que adentro de la empresa entablando las relaciones con universidades y otros centros de investigación, con la base emprendedora de base tecnológica y evaluando proyectos. Los expertos en licencias y adquisiciones, son quienes cierran el negocio, cuando Corporate Venturing dictamina que una tecnología naciente de un emprendimiento externo debe ser incorporada en la empresa. Dado que los procesos de innovación abierta son casi inexistentes en las empresas en Perú, la demanda por estos perfiles profesionales no está presente y

por ende no hay una oferta palpable. Las empresas que reportan estar interesadas en explorar dichos procesos reconocen que van a hacer falta profesionales con estas capacidades.

Los gerentes de I+D, investigadores, ingenieros, técnicos y extensionistas, sirven funciones relacionadas al desarrollo y comercialización de las tecnologías o productos de base tecnológica que las empresas desarrollan internamente. En empresas con procesos de I+D sofisticados, estos tipos de perfiles requieren formación a nivel de postgrado. Según la Encuesta Nacional de Innovación en la Industria Manufacturera en Perú, 2012, y como se muestra en la **Figura 8**, sólo el 1.7% del personal ocupado por aquellas empresas que se consideran innovativas (65.5% de las empresas encuestadas) cuenta con formación a nivel de postgrado^{xci}. Esta estadística confirma la percepción de que las actividades de I+D son rezagadas. Las empresas admiten que no hay un enfoque en la innovación interna, pero también reportan que es muy difícil encontrar el personal calificado que pueda establecer, dirigir y mantener departamentos serios de I+D internos; de hecho, varios de las empresas que sí tienen dichos departamentos reportan que tienen que recurrir a la importación de talento para mantener una calidad mínima en sus procesos.

Figure 8: Nivel estudios personal ocupado industria manufacturera innovativa, Perú 2011

Último Nivel de Estudios Alcanzados	Personas ocupadas	
	Total	%
Total	442 126	100,0
Postgrado	7 485	1,7
Superior Universitaria	66 684	15,1
Superior No Universitaria	85 800	19,4
Secundaria	247 392	56,0
Primaria	21 555	4,9
Otros	13 210	3,0

Fuente: Instituto Nacional de Estadística e Informática – ENIIM 2012

6. Organizaciones & Personas de Apoyo

En esta sección se entiende por organizaciones de apoyo a la actividad emprendedora solo aquellas entidades aportando soporte para el desarrollo del negocio en su parte gerencial, no en la parte técnica: centros de apoyo empresarial, incubadoras, y aceleradoras específicamente. Las organizaciones que prestan apoyo técnico fueron discutidas en la parte 3 de esta sección: universidades, institutos de investigación, y centros de apoyo técnico.

Organizaciones de nivel mundial de asistencia al emprendedor de base tecnológica, como SEBRAE en Brasil, la red de Unidades de Vinculación Tecnológica (UVT) en Argentina, y Larta Institute en EE. UU, no existen aún en Perú. Aunque se reporta la existencia de varios entes privados consultores que se autocalifican como centros de apoyo al emprendedor, la percepción general es que las únicas organizaciones serias, especialmente cuando se trata de incubadoras, son aquellas que se encuentran al interior de las universidades. Perú Incuba, la asociación de incubadoras del país

reporta 11 miembros, todos pertenecientes a entidades de formación académica^{xciii}. En el caso de aceleradoras, los esfuerzos más importantes son los de StartUp Perú, Wayra Perú y Endeavour Perú.

Un caso especial es el de StartUp Academy, que no es ni incubadora ni aceleradora, pero que ofrece mentoría uno-a-uno a un grupo selecto de emprendedores postulantes para la construcción de su negocio.

En general la gran falencia de todos los programas ofrecidos por las incubadoras, es que no proveen mentoría uno-a-uno especializada; el entrenamiento que se ofrece al emprendedor es muy básico y teórico; esto en virtud de la naturaleza académica misma del personal que usualmente dirige dichas entidades.

Los perfiles identificados para este motor de innovación en la Sección I son:

- *Personal interno, y personas externas, en centros de apoyo al emprendedor, incubadoras y aceleradoras*
 - o *Directores ejecutivos*
 - o *Directores de comercialización*
 - o *Directores de desarrollo de negocio*
 - o *Mentores y modelos de rol*
 - o *Personal de soporte*
- *Facilitadores de networking*

A nivel de **personal gerencial**, estas organizaciones sufren los mismos problemas de los que sufren las entidades de apoyo al interior del gobierno: la oferta de personal muy limitada y de hecho estas organizaciones compiten con el gobierno por talento. Esta falencia se ha tratado de suplir usando académicos para la dirección de organizaciones (incubadoras), lo cual no ha funcionado. Se encuentra también que el personal de soporte al interior de las organizaciones es muy joven y sin experiencia, con pasantes pasado a posiciones de tiempo completo en cuanto se gradúan; lo cual genera que el personal de las incubadoras no hable el idioma empresarial y que haya un alto grado de movilidad en el personal.

Al igual que en los programas de gobierno, las aceleradoras con recursos para proveer fondos concursables sufren del problema de capital humano que utilizan para la evaluación de los proyectos postulantes a concursos públicos. Existe la ansiedad dentro de representantes de empresas y universidades acerca de quienes están evaluando sus propuestas y la idoneidad y real preparación de estos individuos o entes.

En relación a los **mentores**, se percibe una tendencia a limitar la definición de mentor a aquel emprendedor serial en el área digital, cuando las experiencias de empresarios exitosos ya sea en la industria tradicional o en emprendimientos de otro corte tecnológico diferente al digital, son transferibles y podrían ser de gran utilidad. También cabe observar que la mentoría no se debe hacer sólo en el proceso general de emprendimiento sino también en funciones específicas, como finanzas, mercadeo, creación de equipo gerencial, desarrollo de juntas de asesores, procesos regulatorios, etc. Incluso en el mejor ejemplo de una red de mentores en el Perú, el de StartUp Academy, la mayoría de los mentores tienen capacidades y experiencia a nivel gerencial, pero la red carece de expertos en las áreas más operativas del negocio anteriormente nombradas. Muchas de

las organizaciones comentan el error de solicitar repetidamente los servicios de estos mentores a forma gratuita, lo cual no es sostenible en el largo plazo.

En cuanto a la búsqueda de **modelos de rol**, los pocos emprendedores seriales en el área digital son inundados con peticiones para charlas a futuros emprendedores; de nuevo se encuentra el problema de enfocar la búsqueda de mentores en emprendedores seriales de las TICs.

Un tipo de perfil casi inexistente en el Perú es el de **facilitadores de networking especializados**. Las iniciativas son desconectadas y se identifica sólo una entidad (persona) tratando de suplir esta función mediante la creación de “Meetup Perú Incuba”. Claramente hacen falta profesionales dedicados al networking tanto en entidades dedicadas exclusivamente a dicho esfuerzo como al interior de las otras entidades de apoyo. Series de eventos de networking periódicos y predecibles que conecten informalmente a los actores del sistema de innovación son fundamentales para la maduración del mismo, así que la falta de iniciativas y personas dedicadas a esta es una falencia importante en el sistema.

7. Prestadores de Servicios

En la Sección I de este reporte se presentaron varios perfiles de prestadores de servicios independientes que son requeridos por empresas estabilidad y emprendedores de base tecnológica. Dichos perfiles son los siguientes:

- *Gestores de Innovación*
- *Extensionistas*
- *Expertos Legales en Propiedad Intelectual*
- *Expertos en procesos domésticos e internacionales de regulación y certificación*
- *Expertos en comercialización*
- *Expertos en diseño estratégico, mercadeo y manejo de marco*
- *Expertos en Investigación de mercado y planeación de negocios*
- *Expertos en finanzas y contabilidad*
- *Formuladores de proyectos (grant writers)*

Los emprendedores, al igual que las empresas de la base industrial existente, requieren de varios servicios para la identificación, formulación y gestión de los proyectos de innovación. Funciones puntuales como *finanzas, contabilidad, mercadeo, diseño estratégico, regulación, abogados de protección de IP*, etc. son esenciales para el proceso innovador. En el Perú se encuentra una alta deficiencia en la oferta de profesionales de estas ramas con conocimiento y experiencia en proyectos de innovación y las características especiales que los mismos requieren. Las capacidades que pueden ser exitosas para prestar servicios a compañías con proyectos de producción tradicionales, nos son completamente transferibles al apoyo de emprendedores y compañías establecidas haciendo innovación de base tecnológica. Por ejemplo, un profesional de finanzas verso en los modelos financieros de compañías tradicionales se queda corto cuando es presentado con instrumentos de financiación compartida tan innatos a los emprendimientos de base tecnológica (notas convertibles de deuda, inversión dilutiva por patrimonio, y en general la negociación de términos de negocios de venture capital). Las firmas que tienen la capacidad contratan consultores internacionales a corto plazo para cumplir este tipo de funciones. Sin embargo, el problema es obvio

para firmas pequeñas y emprendimientos nacientes, ya que los costos están por lo general fuera de su alcance.

Existen sólo tres firmas de abogados con las capacidades para valorar patentabilidad de proyectos, proponer mecanismos de protección de la propiedad intelectual, y de hacer redacción de patentes para tecnologías nuevas domésticas; la oferta es mejor para el trabajo de patentar tecnologías internacionales en el país. Indecopy, el ente regulador de propiedad intelectual en el Perú, quiere crear una especie de bolsa de consultores que puedan suplir esta falencia, pero el capital humano para ello es escaso.

Más allá de los prestadores de servicios para las funciones operativas puntuales, el sistema requiere de intermediarios que faciliten la comunicación entre los diferentes agentes particularmente entre gobierno y empresas, entre universidad e industria, y entre gobierno y universidades. Los gestores de innovación y los formuladores de proyecto. El mercado **de gestores de innovación** es muy nuevo, con pocos consultores calificados y con experiencia, y es un mercado no regulado.

El mercado de **formuladores de proyectos** se encuentra más desarrollado en términos del número de consultores disponibles, pero se reporta la preocupación en cuanto a la idoneidad y real experiencia de dichos individuos ya que la oferta de los mismos creció como resultado de la aparentemente ola de proyectos que el gobierno puso en el mercado que requería que las compañías postularan por financiamiento. La expectativa es que el mercado mismo depure la calidad.

IV. Recomendaciones para el Desarrollo y Fortalecimiento del Capital Humano para la Innovación en Perú

Para el desarrollo y/o fortalecimiento del talento necesario en el sector de innovación existen básicamente 2 tipos de estrategias que se pueden implementar de varias formas de acuerdo a las condiciones y los recursos de la nación implementando las estrategias:

1. **Desarrollar/fortalecer el capital humano doméstico:** Esta estrategia implica la identificación, cultivo, retención y continuo refrescamiento de conocimientos y capacidades de talento al interior del país. Esta estrategia es aplicable cuando existe algún nivel de oferta del perfil requerido o una fuente de posible oferta de corto y/ mediano plazo. Algunas de las tácticas de implementación de esta estrategia son las siguientes:
 - a. Importar capital humano a corto plazo para que entrene a locales con potencial y que ya se encuentran cumpliendo la función.
 - b. Crear programas de capacitación formal locales en el país. Estos pueden ser de corto plazo, diseñados a la medida de las necesidades específicas, o de largo plazo en carreras formales más generales.
 - c. La creación de eventos o conferencias informativas y de creación de redes de contacto dentro del país con invitados de dentro y fuera del mismo.
 - d. Enviar personas fuera del país a que se entrenen en el exterior ya sea vía de pasantías prácticas, capacitación más tradicional (cursos cortos o largos), misiones tecnológicas, comerciales, o de intercambio de experiencia peer-to-peer.
 - e. Proveer a oportunidad de participación en eventos o conferencias informativas y de formación de redes de contacto en el exterior.

2. **Importar el capital humano a largo plazo:** Esta estrategia implica la conclusión previa de que no existe en el país ninguna fuente razonable de oferta de corto y/o mediano plazo para los perfiles identificados y el desarrollo de dicha oferta local tomaría demasiado tiempo y crearía una disrupción en el funcionamiento del sistema de innovación. Debe dejarse claro que esta estrategia no elimina el uso de estrategias de desarrollo del capital humano local al largo plazo; solo suple deficiencias de corto y mediano plazo.

Los programas que se utilicen para la implementación de estas estrategias dependen en presupuestos, facilidades logísticas, apoyo político, etc. La delineación específica de estos programas están más allá del alcance de este documento, sin embargo a continuación se presentan, para cada uno de los motores de innovación y sus perfiles identificados, la aplicabilidad de alguna de las estrategias notadas arriba y acompañadas de observaciones e ideas preliminares acerca de posibles tácticas de implementación.

La **Tabla 3** en las siguientes páginas presenta un resumen de las recomendaciones por perfil; sin embargo esta es solo una ayuda visual al lector y no se debe interpretar por si sola sin la revisión completa de la narrativa de esta sección. Aunque la misma estrategia se pueda recomendar para diferentes motores y perfiles, las tácticas de implementación pueden cambiar significativamente y pueden incluir otras tácticas de no se presentan en la tabla como tal por ser muy específicas a un perfil; dichas variaciones son presentadas en la narrativa. Ejemplos de estos matices son: a) la estrategia

presente en la tabla es citada como “pasantías”, pero la forma de dichas pasantías puede variar, algunas son in-situ, otras virtuales, otras un modelo híbrido; b) la estrategia de incluir profesionales del sector real con alta experiencia como profesores adjuntos no está presente en la tabla, pero es discutida en la narrativa; c) la creación de una red de contactos de la diáspora de emprendedores peruanos tampoco se ven en la tabla pero se discute en la narrativa; d) la creación de cursos y revisión de currícula por convenio con instituciones internacionales.; y así otros detalles de implementación que solo se discuten en la narrativa.

Tabla 3: Resumen de Posibles Estrategias para el Desarrollo y/o Fortalecimiento de los perfiles claves para la innovación en el Perú

Estrategias de Desarrollo/ Fortalecimiento											
Motor de Innovación	Perfiles de Capital Humano Claves	Crear programas locales de capacitación				Enviar talento local a programas internacionales de capacitación				Importar talento de corto plazo	Importar talento de largo plazo
		Cortos	Largos	Eventos de información y networking	Pasantías	Cortos	Largos	Eventos de información y networking	Pasantías		
Talento Emprendedor	<ul style="list-style-type: none"> - Emprendedores Novatos - Gerentes de Negocio Experimentados - Emprendedores Experimentados 	●		●		●		●			
Capital Privado	<ul style="list-style-type: none"> - Oficiales de crédito comercial (especializados en emprendimiento de base tecnológica) - Gerentes de programas de “grants” a nivel de fundación privada - Inversionistas Ángeles - Venture Capitalists (socios/analistas) - Gerentes de programas de inversión de riesgo corporativa (Corporate Venturing) 					●		●			●
Universidades, Institutos de Investigación y Centros de Apoyo Técnico	<ul style="list-style-type: none"> - Profesores de cátedra calificados en ciencia y tecnología - Profesores de cátedra en gestión de innovación - Profesores de cátedra en herramientas de emprendimiento - Profesores investigadores de planta y estudiantes investigadores - Oficiales de transferencia tecnológica - Gerentes y personal técnico en centros de prueba de 	●					●	●		●	●

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	concepto									
	- Gestores de Innovación	●	●	●						
	- Extensionistas	●	●	●						
Gobierno	- Gerentes/directores y personal de soporte de programas de financiamiento	●		●						
	- Gerentes/directores de programas de asistencia técnica para programas de emprendimiento y productividad de la base industrial existente	●		●			●	●		
	- Gerentes directores de programas de asistencia técnica Para programas de comercio internacional y exportaciones	●					●			
	- Gestores de Innovación y Extensionistas	●	●				●			
	- Gerentes de programas gubernamentales de adquisición interna de tecnología	●								
	- Directores y oficiales de agencias de regulación	●					●			
	- Legisladores capacitados en el tema de políticas de promoción a la innovación	●					●			
Industria	- Gestores de Innovación	●		●			●			
	- Rastreadores de Tecnología (Technology Scouts)						●		●	
	- Ejecutivos de Inversión Corporativa de alto Riesgo Externa (Corporate Venturing)			●			●			●
	- Expertos en Licencias y Adquisiciones	●					●			

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	<ul style="list-style-type: none"> - Gerentes de I+D - Investigadores, Ingenieros, Técnicos - Extensionistas 	<ul style="list-style-type: none"> • • • 	<ul style="list-style-type: none"> • • 								<ul style="list-style-type: none"> •
Organizaciones y Personas de Apoyo	<ul style="list-style-type: none"> - Directores ejecutivos - Directores de comercialización - Directores de desarrollo de negocio - Mentores y modelos de role - Personal de apoyo - Facilitadores de networking 	<ul style="list-style-type: none"> • • • • • • 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • 				<ul style="list-style-type: none"> • • • 		
Prestadores de Servicios	<ul style="list-style-type: none"> - Gestores de Innovación - Extensionistas - Expertos Legales en Propiedad Intelectual - Expertos en procesos domésticos e internacionales de regulación y certificación - Expertos en comercialización - Expertos en diseño estratégico, mercadeo y manejo de marca - Expertos en Investigación de mercado y planeación de negocios - Expertos en finanzas y contabilidad - Formuladores de proyectos (grant writers) 	<ul style="list-style-type: none"> • • • • • • • • • 	<ul style="list-style-type: none"> • • 	<ul style="list-style-type: none"> • • • • • • 							

Source: Pachon, 2015

1. Talento Emprendedor

Motor de Innovación	Perfiles de Capital Humano Claves	Disponibilidad en el Perú	
		Volumen	Calidad
Talento Emprendedor	- Emprendedores Novatos	Alto	Baja
	- Gerentes de Negocio Experimentados	Medio	Alta
	- Emprendedores Experimentados	Bajo	Alta

Dado que existe un alto volumen de **emprendedores novatos**, pero con capacidades gerenciales e ideas de negocio de baja calidad, la estrategia recomendada es el fortalecimiento del capital humano doméstico. Dicho fortalecimiento se podría hacer mediante una combinación de las tres vías de operacionalización, y siempre teniendo en cuenta que este tipo de programas no están diseñados para ser ofrecido a todos aquellos que se auto-clasifiquen como emprendedores. Procesos de filtración de aquellos con real potencial tendrían que ser implementados en un principio para cualquier programa recomendado y programas piloto de no más de 20 participantes escogidos por ronda y no más de dos rondas al año serian adecuados.

- Importar capital humano de corto plazo para que entrene a locales: este entrenamiento no es teórico o inspiracional; es de práctica, así que aquí no se está contemplado la invitación de conferencistas internacionales a eventos especiales, aquí lo que se requiere es la creación de convenios con programas locales e internacionales que lleven al emprendedor novato a través de los procesos de creación de empresa. El ejemplo más claro de dichos programas son los convenios con las escuelas de negocios a nivel post-grado que asignan a grupos de estudiantes y docentes de negocios experimentados con emprendedores novatos para la estructuración y desarrollo de las primeras etapas críticas de la validación de una idea de negocio. También se tiene que tener en cuenta que se deben escoger escuelas de negocio de alta reputación y programas cuyos estudiantes no sean así mismos novatos. Ejemplos de dichos programas son MIT Start-Up Exchange^{xciiv}, and UCLA Anderson Global Access Program (GAP)^{xciiv}. El uso de las escuelas de negocio locales dependerá de las capacidades y experiencia colectivas de los docentes y estudiantes; la idea de estos programas es que el grupo de estudiantes asignado y los docentes aporten claramente a la formación de capacidades gerenciales en el emprendedor novato al cual asisten, no que todos aprendan en la marcha. Por ende el énfasis de que los convenios sean hechos con programas de negocio de postgrado, lo cual asume que los estudiantes admitidos tienen años de experiencia.
- Crear programas de capacitación formal locales: Como se mencione, existen en el Perú programas de apoyo y formación de emprendimiento, pero se encuentra por lo general muy generales, inspiracionales y no de práctica. La recomendación aquí es por el fortalecimiento de los programas serios existentes ofrecidos por las universidades y las organizaciones de apoyo de alto calibre. Dicho fortalecimiento se puede obtener mediante convenios de revisión de contenidos con instituciones internacionales reconocidas en su formación emprendedora práctica, y el establecimiento de programas que son de corte “workshop”, más que de teoría; es decir que los conceptos se van a aplicar directamente sobre la idea de negocio que traiga el participante mediante ejercicios específicos y seguimiento. Startup Academy Perú, es un buen

ejemplo de un programa de formación local que lleva este tipo de lineamientos; la extensión de este modelo es una alternativa presente.

- Enviar personas fuera del país a que se entrenen en el exterior. Centros clúster exitosos alrededor tienen programas de empoderamiento de emprendedores de base tecnológica de corto plazo (1-3 semanas) por los cuales proyectos de alto potencial son invitados a programas intensos de fortalecimiento de la idea y exposición a potenciales inversionistas; los recursos a los que tienen acceso compañías que participan son de muy alta calidad. Ejemplos de dichos programas son IBM SmartCamp^{xcvi}, y Blackbox Connect^{xcvii} para proyectos en TICS; Ag Innovation Showcase^{xcviii} para tecnologías en el sector agrícola; y Lean Launch Pad^{xcix} para las ciencias de la vida. Para todos estos tipos de programas, los proyectos primero deben ser aceptados por estas terceras partes como participantes, lo cual implica que el emprendedor puede trabajar con organizaciones de apoyo para aplicar y si son escogidos podrían aplicar para fondos especiales del gobierno que ayuden a subsidiar la participación; esta inversión de fondos del estado puede representar un retorno más alto ya que la calidad de los proyectos ya ha sido vetada internacionalmente.
- Otro tipo de estrategia es un híbrido entre formación local y experiencia internacional por medio de programas con componentes virtuales. Este tipo de programas implican la rigurosa identificación y selección de proyectos locales que participan en programas de aceleramiento con entidades internacionales que incluyen componentes en el país, componentes de seguimiento con mentores especializados virtualmente, y componentes de experiencia de visita y exposición a mercados y socios e inversionistas internacionales. Un ejemplo de este tipo de programa es el Global Bridge^c de Larta Institute en EE.UU.

Como se mencionó en la sección anterior, el hecho de que la oferta de **gerentes de negocio experimentados y emprendedores experimentados** no sea alta, no representa un problema mayor dado el flujo de proyectos de innovación en el Perú; como también se mencionó las capacidades gerenciales y de operación de estas personas es alta, el reto aquí es la identificación de estas personas y los mecanismos de incentivo para que emprendan en negocios de base tecnológica que pueden ser nuevas áreas para ellos. En ambos casos los agentes promotores de innovación no saben cómo localizar este grupo de la población efectivamente, especialmente si estos se encuentran actuando en sectores no tecnológicos. De otro lado, tanto para los gerentes de negocio experimentados, actualmente trabajando en posiciones estables, como para los empresarios experimentados no en el área tecnológica, la decisión de dejar su zona de comodidad y dar el salto a emprender por primera vez (en el caso de los primeros), o emprender en un nuevo sector (en el caso de los segundos) no es nada fácil. Incentivar este tipo de salto en este sector de la población puede pagar muy altos dividendos ya que las empresas iniciadas por estas personas tienen un chance mucho más alto de supervivencia que las empresas iniciadas por emprendedores novatos, como lo muestra la data internacional.

- Una estrategia para identificar este sector de la población y involucrarlo en el sector de emprendimiento de base tecnológica, es mediante las asociaciones profesionales, y las cámaras de comercio. Estas personas pueden empezar como mentores en programas de apoyo a emprendedores novatos y así obtener una primera exposición al sector y los proyectos a los que pueden suscribirse de una manera más activa. Las colaboraciones en donde un gerente

experimentado decide tomar las riendas de la formación y crecimiento de una empresa en base a una idea de un emprendedor novato, son generalmente muy exitosas.

- Otra estrategia para identificar y envolver a estos grupos, es la identificación y selección de algunas compañías grandes que se le apunten a procesos de “intrapreneurship”. Estos procesos son definidos como la promoción de desarrollo de nuevas líneas de negocio adyacentes a las líneas primarias de la empresa madre y que pudieran separarse como emprendimientos independientes. Ejemplos exitosos de estos procesos en la región se encuentran en Colombia, varios conglomerados económicos promueven a sus empleados a la generación de ideas a las que se les pueda hacer “spin-off”, la corporación Corona (porcelana y accesorios de baño y cocina) ha separado compañías adyacentes a partir del desarrollo interno de materiales que no son de línea primaria pero que son en sí buena opción de negocio. La instauración de esta cultura requiere de incentivos por parte de gobiernos al principio para la empresa madre y para la empresa naciente. Claramente, esta opción requiere una mente abierta por parte de las empresas ya que implícitamente supone la potencial salida de personal experimentado de la empresa madre para el liderazgo de la empresa naciente.

2. Capital Privado

Motor de Innovación	Perfiles de Capital Humano Claves	Disponibilidad en el Perú	
		Volumen	Calidad
Capital Privado	- Para financiación no dilutiva:		
	- Oficiales de crédito comercial (especializados en emprendimiento de base tecnológica)	Nulo	N/A
	- Gerentes de programas de “grants” a nivel de fundación privada	Bajo	Baja
	- Para financiación dilutiva:		
	- Inversionistas ángeles	Medio	Baja
	- Venture capitalists (socios/analistas)	Bajo	Media
	- Gerentes de programas de inversión de riesgo corporativa (Corporate Venturing)	Casi nulo	Alta

En área de financiación no dilutiva, la escasez de personal con experiencia en operaciones especializadas para emprendedores de alto riesgo viene directamente de la falta de interés de las instituciones de crédito tradicionales en crear instrumentos, áreas de práctica, especializadas para este sector. Mientras las entidades no empiecen a crear dichas prácticas, la demanda por este perfil de capital humano no jalará la oferta. En las etapas tempranas de creación de estas prácticas especializadas, la estrategia recomendada para que las entidades puedan tener los primeros **oficiales de crédito especializado para emprendimientos de alto riesgo** es:

- Desarrollar el capital humano doméstico por medio del envío de personas fuera del país a que se entrenen en el exterior. Esta estrategia es viable dados los recursos que las entidades financieras poseen y el hecho de que son pocas las personas que deberían entrenar, una o dos máximo por entidad. Entidades como Silicon Valley Bank, Square One Bank, Bridge Bank, y 4

Square Bank en EE.UU. tienen programas especiales de entrenamiento de corto plazo para profesionales de banca comercial tradicional que necesitan aprender más acerca de la valoración de riesgo en emprendimientos de base tecnológica; las entidades locales en Perú pueden crear convenios no sólo para entrenar a su gente en estos programas, sino también para aprender a montar instrumentos para el sector.

En cuanto a **gerentes de programas de “grants” a nivel de fundación privada**, como la oferta de este tipo de instituciones relacionadas con emprendimiento de alto riesgo no está presente, el tipo de capacidades que se deben desarrollar son aquellas por las cuales personal de las organizaciones de apoyo adquieren el conocimiento de cómo identificar programas de grants, típicamente “grand challenges”, en fundaciones internacionales los cuales sean aplicables para proyectos locales; igualmente instruirse en los procesos de aplicación y criterios de éxito.

- Este tipo de conocimiento puede ser adquirido en una forma auto-didacta por medio de investigación en la internet y asistencia a algunos de los eventos de lanzamiento que dichos “grand challenges” suelen tener; allí se crean las redes de contactos y se aprende sobre los criterios de éxito de primera mano.

En el área de financiación dilutiva, las estrategias recomendadas para desarrollar el talento necesario son:

- Para la formación redes de **inversionistas ángeles** continuos y fortalecidos, dado que no existen todavía en el Perú, pero ya que, si existen las personas interesadas en el sector y con la capacidad financiera necesaria, se recomienda construir sobre los esfuerzos que ya se hicieron por parte de BID. Si bien una de las conclusiones de dichas primeras intervenciones del BID en este sentido es que las redes no se pueden armar sin la existencia de un flujo adecuado de proyectos interesantes, también se identificó las deficiencias de las personas a cargo de armar y mantener la red como una barrera y el poco conocimiento del sector por parte de los inversionistas potenciales. El flujo de proyectos está aumentando en el Perú y se irá refinando poco a poco, las redes de ángeles deben ir preparándose a través del desarrollo del capital humano doméstico por medio de: 1. Para el personal a cargo de la construcción y mantenimiento de las redes: dos o tres personas seleccionadas muy rigurosamente pueden enviarse a cursos de capacitación especializados en el exterior y ser comprometidos con determinados años de servicio al sector en reciprocidad. Convenios con organizaciones como el Angel Capital Association^{ci} de EE.UU. pueden ser una buena alternativa dado que dicha organización tienen programas de entrenamiento específico para la formación y mantenimiento de redes de ángeles y además tienen un network sólido al que sería muy útil tener acceso. Igualmente este tipo de organizaciones pueden ser muy valiosas para desarrollar una mentalidad más propicia en los ángeles potenciales; se podrían traer ángeles conferencistas especializados que trabajaran con los ángeles potenciales en el Perú; y también hacer disponibles recursos de información en línea para la investigación auto-didacta.
- El caso del **personal de Venture Capital**, la recomendación es similar a lo presentado para el caso de los ángeles; con la diferencia centrándose en las organizaciones a las que se puede acudir para apoyo, entrenamiento y redes de contacto. La National Venture Capital Association (NVCA)^{cii} de EE.UU. y la Latin América Private Equity and Venture Capital Association (LAVCA)^{ciii}

son las organizaciones con recursos más pertinentes al desarrollo de capacidades en una red de Venture Capital.

- Para el desarrollo de modelos y capacidades de **Corporate Venturing** primero se debe invertir en la educación de ejecutivos con poder de decisión en las grandes empresas con recursos para la formación de estas iniciativas de innovación abierta al interior de sus compañías. Este tipo de educación es parte del desarrollo de las capacidades locales y se podría empezar por la creación de un evento central al que se inviten al país representantes de las diez firmas más exitosas en corporate venturing en el mundo^{civ} (véase lista en el link de la referencia), y representantes de firmas con prácticas exitosas en Latino América para que compartan sus experiencias con los ejecutivos de las grandes (e incluso medianas) empresas en el Perú, tanto completamente locales, como sucursales de multinacionales. En cuanto dichas empresas tengan la disposición de armar estas prácticas, requerirán de personal que las lideren. Dado que estas funciones requieren de conocimiento y acceso detallado a los retos tecnológicos de las compañías; es preferible que el talento venga del interior de las compañías; en empresas multinacionales, estas pueden importar talento con más conocimiento de estos temas de algunas de sus otras subsidiarias, incluso la única firma en el Perú que tiene este tipo de práctica –Wayra- tuvo que importar el talento para su ejecución. Para el caso de las empresas nacionales que nunca se han visto expuestas a estas prácticas, la selección de personal al interior de la compañía que pudiera empezar a explorar este tipo de procesos y la participación de estos en eventos de capacitación como el descrito anteriormente (peer-to-peer) serán la base de un aprendizaje en la marcha. Las compañías también pueden importar el talento; reclutando ejecutivos de Corporate Venturing que han servido los mismos tipos de industrias en mercados extranjeros. Igualmente en principio podrían las compañías contratar consultores externos que cumplan estas funciones; el problema es que este mercado no está desarrollado todavía en el Perú.

3. Universidades, Institutos de Investigación, y Centros de Apoyo Técnico

Motor de Innovación	Perfiles de Capital Humano Claves	Disponibilidad en el Perú	
		Volumen	Calidad
Universidades, Institutos de Investigación, y Centros de Apoyo Técnico	- En la categoría de entrenamiento de la fuerza laboral:		
	- Profesores de cátedra calificados en ciencia y tecnología	Bajo	Baja
	- Profesores de cátedra en gestión de innovación	Bajo	Baja
	- Profesores de cátedra en herramientas de emprendimiento	Bajo	Media
	- En la categoría de creación y transferencia de tecnología.		
	- Profesores investigadores de planta y estudiantes investigadores	Bajo	Media
	- Oficiales de transferencia tecnológica	Casi Nulo	Baja
- Gerentes y personal técnico en centros de	Medio	Media	

	prueba de concepto		
	- Gestores de Innovación	Bajo	Baja
	- Extensionistas	Bajo	Baja

En cuanto a las deficiencias en el **personal a cargo de la formación de una fuerza laboral** adecuada, primero que todo hay que trabajar en el fortalecimiento de la curricula al través de las diferentes disciplinas; claramente esta tarea está más allá del alcance de este reporte, pero en general, la estrategia más convencional para dicho fortalecimiento es la realización de convenios con entidades internacionales reconocidas por sus buenos programas (de acuerdo a rankings internacionales aceptados) para la revisión conjunta de la curricula y el desarrollo de programas más actualizados. El fortalecimiento de la base docente se puede recomendar varias estrategias de desarrollo del capital humano local:

- Enviar a docentes destacados en sabáticos cortos de intercambio en universidades internacionales, o incluso universidades locales de mayor rango. Estos intercambios serán de 4 o 6 meses de acuerdo al sistema que siga la universidad anfitriona (de semestres o de cuartos) y se establecen mediante acuerdos por medio de los cuales el docente visitante asiste al docente anfitrión en todos los aspectos de la clases elegidas a un nivel sénior.
- Incorporar profesores adjuntos que vengan del sector productivo real; esta estrategia es especialmente válida para el desarrollo de talento para cátedras de emprendimiento e innovación. Estas personas inyectan matices de realidad diaria que los docentes de planta pueden perder.

Las deficiencias identificadas en el **personal a cargo de creación de tecnologías** ya se ha discutido que el desarrollo del capital humano local de investigación de alto nivel –doctores e ingenieros- está más allá del alcance de este reporte y que el gobierno Peruano ya está implementando instrumentos de largo plazo en este respecto. Sin embargo, hay algunas estrategias de corto y mediano plazo que se pueden nombrar:

- La importación de investigadores reconocidos internacionalmente por periodos de por lo menos tres años, para que instituyan centros de investigación de nivel mundial, incluyendo procesos de identificación e inclusión de estudiantes interesados en la investigación en ciencia y tecnología. Esta estrategia es costosa ya que no sólo incluye el paquete de compensación atractivo para el investigador internacional, pero también incluye inversión en las instalaciones y logística que este requiera; sin embargo, la experiencia internacional ha probado esta estrategia exitosa. Singapur y Saudí Arabia son reconocidos por su uso de esta estrategia.
- La creación de convenios con universidades internacionales mediante los cuales se instalan sucursales locales de los centros de investigación. Estos convenios incluyen la rotación de personal especializado de la entidad madre en la entidad sucursal local. Chile ha implementado este tipo de convenios con el programa de investigación agropecuaria de la Universidad de California Davis^{cv} y con el instituto Fraunhofer^{cvi}. A través América latina se encuentra ejemplos de institución de clase mundial de investigación así que los convenios pueden ser con instituciones en la región.

Estas estrategias, aunque empiezan con la importación de talento y capacidades, siempre miran al desarrollo de talento y capacidades locales en el largo plazo.

En cuanto a las deficiencias en el **personal a cargo de la transferencia de tecnologías** existen varias estrategias específicas que son relevantes para Perú:

- La formación de **oficiales de transferencia tecnológica** puede hacerse mediante el desarrollo de talento local mediante convenios con organizaciones como AUTM^{cvii} para el entrenamiento de personal identificado en el país. Programas mediante los cuales varias universidades invitadas que tengan compromiso serio con la transferencia tecnológica, seleccionan el personal que desean entrenar y todos en conjunto participan del curso local de entrenamiento.
- El fortalecimiento de formación de **gestores de innovación y extensionistas** empieza con el fortalecimiento de los programas de postgrado especializados en gestión de innovación. Dicho fortalecimiento se puede hacer mediante convenios con universidades de la región que tienen programas reconocidos de formación de gestores de innovación para la revisión conjunta de currículas que terminen con programas que habrán las posibilidades del graduado para trabajo de gestión para el gobierno, las organizaciones de apoyo y la industria; no sólo para el gobierno como se reporta actualmente. Este fortalecimiento también puede darse mediante la inclusión de módulos electivos de gestión de innovación en las carreras de pregrado y programas de postgrado en administración de empresas. Los extensionistas requieren por lo general una formación técnica previa, así que la estrategia a seguir es la inclusión de módulos de gestión de innovación en programas de ingeniería y carreras técnicas. Igualmente las instituciones de formación pueden crear programas específicos para diferentes industrias y ofrecerlos, o crearlos en conjunto con, la industria. Más allá del fortalecimiento de los programas, también se deben crear campañas de promoción que presenten no sólo el mérito del programa como tal pero también las oportunidades de colocación después de la finalización de estudios para que los programas tengan la demanda adecuada. Es importante considerar que estos programas tengan opciones para trabajadores de tiempo completo, tanto en industria, universidades y gobierno, para que puedan acceder a la formación sin interrupción de sus labores.

4. Gobierno

Motor de Innovación	Perfiles de Capital Humano Claves	Disponibilidad en el Perú	
		Volumen	Calidad
Gobierno	- Gerentes/directores y personal de soporte de programas de financiamiento	Bajo	Alta
	- Gerentes/directores de programas de asistencia técnica		
	o Para programas de emprendimiento y productividad de la base industrial existente	Bajo	Media
	o Para programas de comercio internacional y exportaciones	Bajo	Baja
	- Gestores de Innovación y Extensionistas	Bajo	Medio
	- Gerentes de programas gubernamentales de adquisición interna de tecnología	Nulo	N/A
	- Directores y oficiales de agencias de regulación	Bajo	N/A
	- Legisladores capacitados en el tema de políticas de	Bajo	Media

promoción a la innovación

El gran problema de la oferta de **personal a cargo de programas de financiamiento y de asistencia técnica, gestores de innovación y extensionistas**, de este personal, es el escaso volumen de empleados públicos que se han especializado en el sector. Las estrategias de promoción de este sector como una vía a carrera pública viable deben enfocarse a la retención y afinación de capacidades de dichas personas de nivel sénior, y a la promoción de personal de apoyo junior. Las siguientes son las estrategias recomendadas:

- Como se discutió en la sección anterior, se debe continuar el fortalecimiento de los programas de formación en gestión de innovación y la inclusión de módulos de gestión de innovación en los programas de administración de empresas y en las carreras más técnicas. El gobierno puede ser parte de este proceso de fortalecimiento y debe continuar considerando el envío de su propio personal a este tipo de programas de capacitación.
- Desarrollo de cursos cortos de capacitación para afinación de conocimientos adquiridos en la marcha y refrescamiento de prácticas usadas internacionalmente. Estos programas pueden ser desarrollados con universidades y entidades de formación en temas de innovación internacionales y serían series intensivas de una o dos semanas con la asistencia de personal del exterior a los seminarios y talleres en Perú. Los contenidos serían desarrollados en base a las necesidades específicas expresadas por aquellos miembros del sector que se identifiquen como posibles participantes.
- El continuado apoyo al personal a nivel gerencial para que participen de conferencias o eventos en donde puedan compartir experiencias con colegas al mismo nivel en países con sistemas de innovación más desarrollados.
- Inversión fuerte en la promoción de personal de apoyo de rango medio que haya demostrado lealtad al sector y que tenga algunos años de servicio. La institución de programas de pasantía práctica de corto plazo (dos semanas a 3 meses). Estas pasantías permitirían a personal selecto la participación en momentos claves de la ejecución de programas de promoción en países con sistemas de innovación más desarrollados. Esta puede ser una alternativa poco viable dados los gastos y interrupción en funciones laborales diarias; sin embargo, no es una estrategia a descartar ya que las pasantías no tienen que ser in-situ, pueden ser virtuales mediante procesos de “shadowing” o acompañamiento intensivo. Las pasantías virtuales presumen la elaboración de convenios por los cuales personal de una organización puede participar virtualmente en reuniones de planeación, discusión y ejecución de programas ya sea tomando lugar en otros países, o en programas contratados por las agencias nacionales pero ejecutados por contratistas internacionales. Un ejemplo ilustrador sería el siguiente: Innóvate Perú utiliza una organización internacional para la evaluación de los proyectos postulantes a fondos concursables; una pasantía virtual se establecería mediante la inclusión de componentes de fortalecimiento de capacidad local en dicho acuerdo por los cuales los oficiales locales no sólo reciben los resultados, pero participan virtualmente (incluso sí sólo como observadores) en las reuniones de revisión que la entidad internacional tiene.

- Inclusión de componentes de fortalecimiento de las capacidades locales en cualquier contrato de servicios con instituciones internacionales que se vinculen en los programas de promoción de las entidades locales. Por los cuales las compañías consultoras no sólo presentan un servicio puntual al sistema de innovación peruano: creación de un programa de formación a emprendedores, evaluación de propuestas a fondos concursables, creación de misiones tecnológicas internacionales, creación de programas de apoyo a la comercialización doméstica e internación, etc.; sino que también transfieren conocimientos y herramientas a las contrapartes locales.

El desarrollo del capital humanos en las áreas de *programas gubernamentales de adquisición interna de tecnología, agencias de regulación, y legislación para la innovación*, esta fuera del alcance de este reporte dado que las falencias empiezan por la no existencia o debilidad de las instituciones a cargo de estas funciones, lo cual conlleva un proceso político de formación de entidades y de mentalidad de apoyo a la innovación a los más altos niveles del gobierno. Sin embargo, la recomendación general es precisamente la exploración de instrumentos para el fortalecimiento de dichas entidades, mecanismos, y actores.

5. Industria

Motor de Innovación	Perfiles de Capital Humano Claves	Disponibilidad en el Perú	
		Volumen	Calidad
Industria	- Gestores de Innovación	Bajo	Baja
	- Rastreadores de Tecnología (Technology Scouts)	Casi Nulo	N/A
	- Ejecutivos de Inversión Corporativa de alto Riesgo Externa (Corporate Venturing)	Casi Nulo	N/A
	- Expertos en Licencias y Adquisiciones	Bajo	Media
	- Gerentes de I+D	Bajo	Baja
	- Investigadores, Ingenieros, Técnicos	Bajo	Medio
	- Extensionistas	Bajo	Bajo

Los perfiles de **gestores de innovación y extensionistas** que sirven a la industria se pueden fortalecer mediante el desarrollo del talento local.

- Como se discutió en la sección de universidades e instituciones de investigación, el fortalecimiento de los programas de formación en gestión de innovación y la inclusión de módulos de gestión de innovación en los programas de administración de empresas y en las carreras más técnicas (para la formación de extensionistas) constituyen la primera línea de estrategias.
- En el caso particular de la industria, la creación de programas de formación a corto y mediano plazo creados a la talla de las necesidades de la industria (formación corporativa) pueden ser una vía más efectiva para el rápido desarrollo de estas capacidades en el sector. Esta estrategia ya está siendo utilizada por la industria en Perú; un ejemplo claro es el uso de la Institución

TECSUP para el desarrollo de cursos de extensión específicamente encargados por diferentes actores de la industria para la formación de sus empleados. Este ejemplo se puede aplicar en el caso de las necesidades de gestión de innovación y extensionismo.

En desarrollo de los perfiles de **ejecutivos de corporate venturing** se presentó en la sección anterior de capital privado; las estrategias y retos presentados allí son las mismas para el desarrollo de **technology scouts**; refiérase a dicha sección para la presentación detallada, aquí se presenta un resumen para facilidad del lector:

- Se requiere invertir en eventos de concientización de ejecutivos con poder de decisión en las grandes empresas de la necesidad y conveniencia de la creación de iniciativas de innovación abierta al interior de sus compañías. CADE-Ejecutivos^{cvi}, la conferencia que reúne a los principales ejecutivos industriales del Perú, puede ser un vehículo para este tipo de campaña de concientización.
- Importar talento de otros países. Ejecutivos que han servido en estas funciones para el mismo tipo de industria en otros mercados.
- Desarrollar el talento desde adentro de la compañía: en empresas multinacionales, estas pueden importar talento con más conocimiento de estos temas de algunas de sus otras subsidiarias. En el caso de las empresas locales que nunca se han visto expuestas a estas prácticas, la selección de personal al interior de la compañía que pudiera empezar a explorar este tipo de procesos y la participación de estos en eventos de capacitación peer-to-peer serán la base de un aprendizaje en la marcha. La conferencia anual de Corporate Venturing and Innovation Partnering^{cix} es un muy buen recurso para utilizar.
- Las compañías también pueden en principio contratar consultores externos que cumplan estas funciones; el problema es que este mercado no está desarrollado todavía en el Perú.

Los **expertos en licencias y adquisiciones de tecnología**, pueden desarrollarse desde el interior de la compañía o por medio de la contratación de consultores externos.

- Sea cual sea la figura que se utilice, las personas dedicadas a estas funciones pueden formarse en estos temas mediante cursos cortos de capacitación y el intercambio de experiencias con colegas a cargo de las mismas funciones en industrias similares en otros mercados. La participación en el Licencing Executives Society Internacional (ELSI)^{cx} es una buena alternativa para acceder a entrenamiento, redes de contacto y en general la clase de exposición que las personas a cargo de estas funciones deben tener.

El fortalecimiento de los profesionales a cargo del desarrollo de nuevas tecnologías y de implementación de tecnologías ya probadas al interior de las empresas, **directores de I+D, científicos, ingenieros, técnicos**, está fuertemente ligado a la mejora de la formación de dichos perfiles desde el ámbito de las entidades educativas discutido en la sección tres de universidades e instituciones de investigación. Sin embargo las empresas que deseen implementar procesos serios de innovación pueden emplear estrategias de corto y mediano plazo, en cuanto la oferta local de talento mejora:

- Importación de talento del exterior. Investigadores no universitarios, si no profesionales ejerciendo roles de I+D en industrias relacionadas en otros países. La importación de este tipo de personal es menos difícil y costosa que la importación de talento investigador por parte de las universidades.
- Enviar personal destacado a cursos cortos de entrenamiento en nuevas tecnologías que pueden ser incorporadas en los procesos existentes de producción.

6. Organizaciones y Personas de Apoyo

Motor de Innovación	Perfiles de Capital Humano Claves	Disponibilidad en el Perú	
		Volumen	Calidad
Organizaciones y Personas de Apoyo	- Personal interno, y personas externas, en centros de apoyo al emprendedor, incubadoras y aceleradoras		
	o Directores ejecutivos	Bajo	Media
	o Directores de comercialización	Casi Nulo	N/A
	o Directores de desarrollo de negocio	Bajo	Media
	o Mentores y modelos de role	Medio	Alta
	o Personal de apoyo	Bajo	Baja
	- Facilitadores de networking	Casi Nulo	N/A

Como se discutió anteriormente, **la oferta de personal de liderazgo y de ejecución al interior de las organizaciones de apoyo no gubernamentales** sufre de los mismos problemas que la oferta para las organizaciones del gobierno; básicamente la oferta total para todo este tipo de entidades es la misma y es muy reducida. En el caso de las organizaciones no gubernamentales, que en su mayoría residen al interior de las universidades, uno de los grandes problemas identificados es el uso de académicos en estas funciones. Dadas estas condiciones las estrategias recomendadas son:

- La búsqueda de personal capacitado con experiencia específica de industria y de emprendimiento más allá del ámbito académico para las posiciones de liderazgo. Dicho perfil es escaso en el Perú, por lo que la importación de personas calificadas de organizaciones de apoyo exitosas en países de la región puede ser una buena alternativa.
- Inversión en la preparación y retención del personal de apoyo, mediante talleres de entrenamiento cortos desarrollados con instituciones de apoyo en otros países. Estos cursos o talleres no se recomiendan ser desarrollados por universidades ya que lo que se requiere es transferencia de experiencias del día a día en el diseño y manejo de programas de promoción; por ende convenios de colaboración con organizaciones que ya lleven años prestando este tipo de asistencia pueden ser más efectivos.

Existen en el Perú personas que podrían ser **mentores y modelos de rol**, el problema es identificarlos y atraerlos al servicio del sector de innovación. Los que se han identificado son los pocos relacionados con el sector TICS, pero hay otros sectores tecnológicos que también se pueden explorar.

- Las asociaciones gremiales y profesionales, incluyendo asociaciones de exalumnos de las universidades, deben ser envueltas activamente en los procesos de promoción de innovación; estas pueden ayudar a identificar modelos de rol y mentores para sectores diferentes al sector TIC.
- En el caso de los mentores es importante que las organizaciones de apoyo desarrollen modelos de compensación, ya que el uso repetido de mentores sobre una base gratuita no es sostenible.
- La creación de bases de datos de la diáspora peruana de emprendedores es una tarea que se debe realizar liderada por alguna de las organizaciones de apoyo, pero con el soporte de todas. El mantenimiento de esta red de contactos y su atracción al servicio del sistema de innovación nacional como modelos de rol y como punto de acceso a otros mercados puede ser una buena alternativa.

7. Prestadores de Servicios

Motor de Innovación	Perfiles de Capital Humano Claves	Disponibilidad en el Perú	
		Volumen	Calidad
Prestadores de Servicios	- Gestores de Innovación	Bajo	Baja
	- Extensionistas	Bajo	Baja
	- Expertos Legales en Propiedad Intelectual	Bajo	Alta
	- Expertos en procesos domésticos e internacionales de regulación y certificación	Bajo	Media
	- Expertos en comercialización	Bajo	Media
	- Expertos en diseño estratégico, mercadeo y manejo de marca	Bajo	Alta
	- Expertos en Investigación de mercado y planeación de negocios	Bajo	Media
	- Expertos en finanzas y contabilidad	Bajo	Media
	- Formuladores de proyectos (grant writers)	Bajo	Media

La discusión acerca del desarrollo de **gestores de innovación y extensionistas** ya se presentó en las secciones de universidades, de gobierno y de industria; refiérase a estas secciones para mayor información. Lo único diferente a mencionar en esta sección es que en el caso de los prestadores de servicios; las personas que quieran iniciar una práctica de consultor independiente ya sea al servicio de programas de gobierno, o al interior de universidades o industria; deberán invertir en la formación de conocimiento y experiencia por sí mismos ya que en los otros motores es muy factible que las entidades mismas subsidien la preparación de su personal en estos temas. El mercado de consultores en estas ramas se depura por sí mismo.

El desarrollo de prestadores de servicios especializados en trabajo con emprendedores de base tecnológica en las áreas legales, de mercadeo, de finanzas y contabilidad y otras áreas puntuales del manejo de empresa es un proceso que se irá cristalizando a medida que se las firmas que ya prestan estos servicios vean el potencial de negociaciones en el trabajo con emprendimientos. Sin embargo, se

pueden emplear estrategias para difundir información y acelerar el acercamiento de dichas firmas a los emprendimientos:

- Hacer campañas de información mediante la invitación de representantes de las firmas existentes a eventos de emprendimiento en donde se hagan evidentes las necesidades que estos tienen.
- Crear partidas dentro de los instrumentos de financiación de emprendimiento que permitan gastos en servicios profesionales idóneos.
- Crear eventos en donde se inviten a firmas en otros países de la región que ya estén especializadas en estos servicios para que pueda haber intercambio de experiencias y capacidades peer-to-peer.

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