Design of a Best-Practice Start-Up Accelerator for the Granada Health Technology Park

by

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Submitted to the MIT Sloan School of Management in Partial Fulfillment of the Requirements for the Degree of

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Abstract

Accelerators are ecosystem catalyzers introduced in 2005 by Y-Combinator. They are time-bounded programs to facilitate core resources for entrepreneurs (mentors, capital, training), with the goal of making the trial-and-error innovation process faster and more efficient. Accelerators are schools of entrepreneurship and, often, a certificate of quality. The province of Granada generates more than 3.46% of Spain's scientific production; however, it contributes with only 1.4% to the domestic GDP (year 2011). A well-designed startup accelerator can help close the gap between the innovation capacity and the economic impact on the region by fostering a vibrant ecosystem of innovation-driven entrepreneurs. Our research examines the idiosyncratic needs of the entrepreneurial ecosystem in Granada, because this understanding is crucial to address the local limitations. In parallel, we studied a diverse typology of accelerators (e.g., selected Health based accelerators in the US and Spanish accelerators) and created an exhaustive benchmark analysis across them. Finally, we proposed a "best-practice" accelerator for the PTS Granada, including choices such as the value proposition, the intake process, the program duration, the amount of seed capital, the role of mentors, and the nature of sponsors. We determined that an accelerator may be non sufficient for emergent entrepreneurial ecosystems. For those cases, we offer additional recommendations to improve the pre- and post-acceleration phases.

Thesis Supervisor: Fiona Murray
Title: Dean of Innovation
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Acknowledgements

This thesis is more than a grade fulfillment report. It is a project to make the Granada Health Technology Park a reference hub in healthcare entrepreneurship; a project with the ambition to be a reality and to have an impact on the society.

I would like to thank Lourdes Nuñez, Director of Technology Transfer at the Granada Health Technology Park for her constant support during these months. We have been working together to understand what kind of accelerator can bring the highest value to the park. We interviewed a variety of stakeholders, ranging from investors to entrepreneurs, university professors and healthcare professionals, to understand what is missing to boost healthcare innovation in the region. We are both keen to make the accelerator a reality.

Mercedes Delgado has offered very helpful guidance to develop and implement the research methodology used in the thesis. Her expertise in entrepreneurship, industry clusters, and regional competitiveness has been valuable to shape the content of the thesis.

I would like to thank Fiona Murray for her inspiration and guidance for the thesis. She has a tremendous experience advising regions to facilitate entrepreneurship and innovation. She has a vast knowledge in the field. It has been an honor to have her supervision for this ambitious project.

I would like to thank Christian Catalini for sharing with me his experience at Creative Destruction Labs, and his research on crowdfunding. I also would like to thank Daniel Fehder for sharing his article about Accelerator Design, and his knowledge about what is working in different accelerators across America.

Without these people, and many others who contributed by answering emails, calls, or having twenty minutes to sit with me, the conclusions and the results of the thesis would not be as sounded and rounded as they are.

Thank you all for your time. Thank you all for your trust.

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Acronyms

eCap: Entrepreneurial Capacity

F&F: Family and Friends, in the context of seed capital

GDP: Gross Domestic Product

IBE: Innovation-Based Enterprises

iCap: Innovation Capacity

PTS Granada: Granada Health Technology Park from its initials in Spanish, Parque Tecnológico de la Salud

SAS: Andalusian Healthcare Public Service, Servicio Andaluz de Salud

SME: Small and Medium Enterprises

Chapter 1 – Introduction

1. Introduction

The purpose of this report is to offer specific design recommendations for a best-practice startup accelerator for the Granada Health Technology Park (PTS Granada).

Accelerators are programs aiming at closing the gap between entrepreneurs and resources (being capital, training, mentors, customers, etc.). We conducted a benchmark analysis to understand what are the best practices worldwide and which have proven to be more effective in a diversity of contexts (US, Latin America, Canada and Spain).

We found that one-size does not fit all the ecosystems, and before launching an accelerator, its founders need to understand the specific dynamics and needs of the particular ecosystem.

With that purpose, we launch a survey and held interviews with the main stakeholders of the ecosystem: entrepreneurs, corporations, universities and venture capitalists, where we identified the main challenges and the strongest needs.

After our primary and secondary research, we came out with specific recommendations for the PTS Granada Accelerator, and added a chapter of pre- and post-acceleration recommendations, to reinforce the effectiveness of the acceleration program in promoting innovation-driven entrepreneurship.

1.1. Scope

The industry scope is that of the Healthcare Information Services industry including, but not limited to, "wellness", "medical devices", "IT systems" and "health delivery". Listed below are the fields[1] within digital health -defined as the convergence of IT and healthcare- that will be included in our research as potential focus areas for the accelerator:

- Analytics / Big Data
- Electronic Health Record (EHR) platforms

[1] Source: Rock Health accelerator areas of specialization

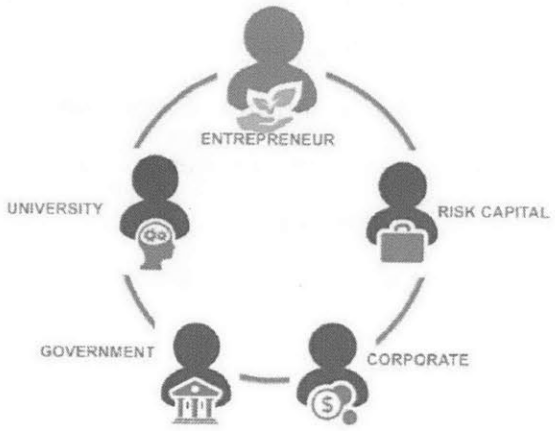
- Healthcare administration tools
- Sensors (including devices and wearables)
- Specialist discovery services, scheduling services
- Remote patient monitoring
- Telemedicine or alternative site care delivery
- Wellness services
- Digital therapy
- Digital diagnostic
- Adherence control

In terms of location, accelerator activities will be concentrated in Granada, although the accelerator will target an international audience and the global market in the spirit of PTS Granada to become an international reference model of technology transfer in healthcare.

1.2. Entrepreneurship Ecosystem Stakeholders Framework

Our analysis is supported by the MIT Entrepreneurship Acceleration Framework, where five main stakeholders contribute to a successful entrepreneurial ecosystem formation and sustainability. Entrepreneurs, Risk Capital, Universities, Government and Corporations are essential pieces of the entrepreneurial system, and their contribution is fundamental to create and sustain productive entrepreneurial communities.

Figure 1. MIT Entrepreneurship Ecosystem Stakeholders Framework[2]



Universities provide skillful talent to society. They also produce scientific knowledge and technology that can be used to generate economic value through patents and companies. Universities are becoming more and more relevant to the entrepreneurial ecosystem since they are building their own incubators and accelerators to help their scientific and student community a vehicle to have economic impact beyond education.

Venture Capitalists generate value in several ways. They select the best startups to move forward in their growth cycle, they give advice and provide connections, and they provide capital. Venture capital business is risky and skewed, 63% of the ventures lose money and only 4.3% of the ventures generate 61.7% of the value (Roberts and Sahlman 2012). Finding the future "unicorns" is the job of VCs. Start-ups without the ambition to become "unicorns" are better off looking other sources of capital, like family and friends, public funding or debt.

Corporations contribute to the entrepreneurial ecosystem by becoming strategic investors. They are interested in start-ups working on solutions within their industrial sector. Those start-ups can later become acquired by the corporation or become a strategic provider of new technology.

Governments have a tremendous impact on the entrepreneurial ecosystem. A poorly

[2] Source: Fiona Murray, MIT Regional Entrepreneurship Acceleration Lab, 2013

designed regulation can have negative effects on the entrepreneurial ecosystem. For example, bankruptcy regulation should encourage entrepreneurs to take risks by helping them with costs, timing and debt relief (Lee, et al. 2011), as in the Silicon Valley motto "fail fast, fail cheap, and move on". Often regulation reflects deep beliefs of the local culture, such as negative attitude toward failure. However, bankruptcy regulation is very important, because the majority of start-ups fail. Beyond regulation, governments are financing agents, providing grants or cheap loans in many countries.

Finally, entrepreneurs are the executors, the engine at the heart of any entrepreneurial ecosystem. They become passionate about their venture, and work long hours to make a vision tangible.

Small and Medium Enterprises versus Innovation Based Entrepreneurship

Before moving forward, it is useful to make a distinction between two very different kinds of entrepreneurship: the small and medium enterprises (SME) and the innovation-based enterprises (IBE) (Aulet and Murray 2013). The radical difference between these two approaches to entrepreneurship is the level of innovation they bring to the table. SME are created to serve local markets with traditional, well-understood business models and limited competitive advantage. On the other hand, IBE's are based on a radical innovation in the way they are applying technology, proposing a business model or running the operations of the company. For IBE's, the local market is a test market. Their ultimate goal is to reach the global market with a sustained competitive advantage. Table 1 summarizes the main differences between SME and IBE.

Table 1. Differences between SME and IBE

Aspect	SME	IBE
Market	Local	Global
Risk	Moderate	High
Human capital	Basic	Skilled
Wages	Below average	Above average
Impact (job creation)	Reduced	Substantial
Visible results	Short term	Long term

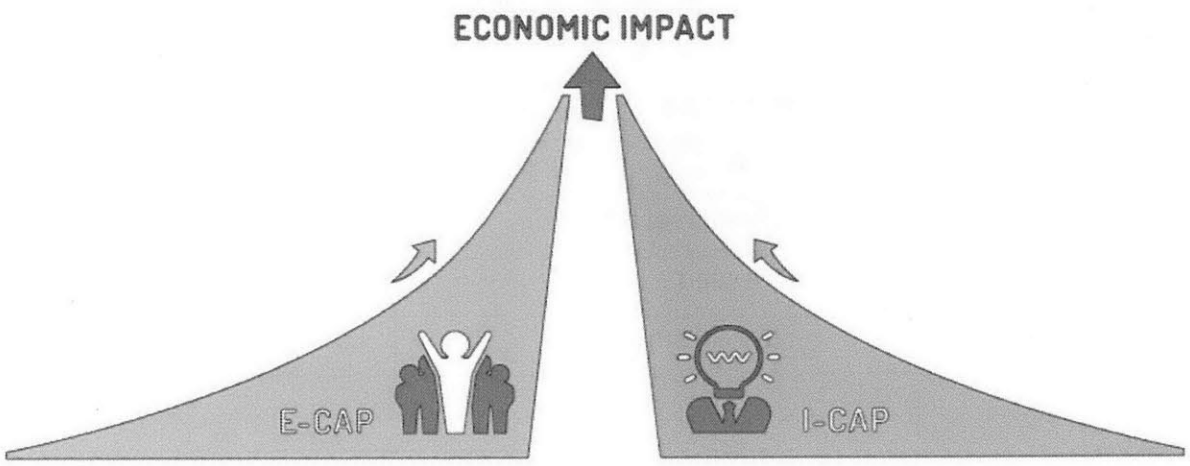
Although both kinds of entrepreneurships are vital to the economies, to be competitive in the future with major capital cities and their surroundings, regions must invest in knowledge-based economic activity. Prosperous regions will be those that become innovation hubs through the promotion of innovation-based entrepreneurship (IBE) (Aulet and Murray 2013).

Innovation Capacity and Entrepreneurial Capacity

To generate a successful innovation-driven entrepreneurial ecosystem, both Innovation Capacity (iCap) and Entrepreneurial Capacity (eCap) should co-exist and feed each other. Innovation Capacity is the ability to develop new-to-the-world innovations from inception through to the market. Entrepreneurial Capacity is the ability to start and build new-to-the-world businesses from inception to maturity.[3] Innovation capacity without entrepreneurial capacity generates a surplus of research that hardly reaches society, leaving the research effort unexploited. Similarly, entrepreneurial capacity without a real innovation will never create Innovation-Driven Enterprises that are responsible for the growth of the economy.

[3] Source: Fiona Murray, MIT Regional Entrepreneurship Acceleration Lab, 2013

Figure 2. eCap and iCap as drivers of economic impact



Source: Fiona Murray, MIT Regional Entrepreneurship Acceleration Lab, 2013

1.3. Relevance of the report

1.4. Why the Granada Health Technology Park?

The Granada Health Technology Park is an exceptional environment that combines research, business and institutional presence. It is expanding into a dynamic biomedical quarter with state-of-the art research institutes and facilities.

The activities of PTS Granada focus in four main areas: (1) Business Development and Innovation, (2) Research, (3) Healthcare and (4) Education (see Appendix A for more detail). It is financially supported by the international pharmaceutical companies Pfizer, Abbott, Merck Sharp & Dohme, innovation-driven enterprises, and government-driven programs. The players installed in the park embody four of the five stakeholders of the MIT entrepreneurship ecosystem framework:

- University of Granada: one of the largest universities in Europe with 85,000 students, 10,000 foreign students (2,000 of them European students through the Erasmus program). The University of Granada is the top one Spanish university in

the Shanghai ranking for the computer sciences domain[4].

- Hospital Universitario: a cutting edge hospital that is expected to be open in the second half of 2014.
- Big corporations: Telefonica, Merck Sharp & Dohme, Abbot, Rovi and Pfizer.
- Successful local entrepreneurs: Era7 (bioinformatics), NeuronBio (biotechnology), Caton (data centers and cloud solutions), IIDF Cabrera (pharmaceuticals), Vircell (diagnostics) and Master Diagnostica (diagnostics).
- Government: PTS Granada is managed by regional and local government through the foundation.

PTS Granada Governance

A variety of organizations are members of the governance board of PTS Granada through a public-private partnership:

- Spanish Council for Scientific Research (CSIC)
- University of Granada
- Autonomous Government of Andalusia, via:
    - Ministry of Innovation, Science and Business
    - Ministry of Health
    - Ministry of Public Works and Transport
- Provincial Council of Granada and the City Councils of Granada, Armilla and Ogíjares
- Local financial institutions: Caja Granada and Caja Rural
- Granada Chamber of Commerce
- Granada Confederation of Entrepreneurs (CGE)

In addition to the board, PTS Granada keeps strong links with prestigious institutions operating in the biotechnology and health sectors at different geographic level:

- **International**
    - Association of University Research Parks (AURP), http://www.aurp.net/

[4] Source: http://www.shanghairanking.com/SubjectCS2013.html, accessed on April 2014

- International Association of Science Parks (IASP), http://www.iasp.ws/

- **National**
  - Association of Science and Technology Parks of Spain (APTE), http://www.apte.org/en/index.cfm
  - Spanish Association of Bio Enterprises (ASEBIO), http://www.asebio.com/en/index.cfm
- **Regional (Andalusia)**
  - Andalusian Network of Technology Sites (RETA), http://www.reta.es/index.php/component/content/article/9713
  - Andalusian Technological Corporation (CTA), http://www.corporaciontecnologica.com/en/index.html
- **Local**
  - Andalusian School of Public Health (EASP), http://www.easp.es/
  - Scientific Instrumentation Center (CIC), University of Granada, http://cic.ugr.es/
  - Biosanitary Research Foundation in Eastern Andalusia 'Alejandro Otero' (FIBAO), http://www.fibao.es/?lang=en
  - Parque de las Ciencias, http://www.parqueciencias.com
  - University of Granada, http://www.ugr.es/en/

Because of this privileged environment, the province of Granada generates more than 3.46% of Spain's scientific production; however, it contributes with only 1.4% to the domestic GDP (year 2011)[5]. This discrepancy between strong iCap and weak economic impact leads us to think that iCap is not being matched by a corresponding eCap in the ecosystem. An accelerator can help to eliminate this gap.

[5] Source: 2011 GDP data from Instituto Nacional de Estadística, www.ine.es, accessed on April 2014

1.5. Why Healthcare?

Healthcare spending is a widespread issue for developed nations mainly driven by the aging of the population. However, the development of IT and mobile technologies has opened the door to improvements in the healthcare system, ranging from prevention (for example, wellness mobile apps) to connected devices for remote chronic patients.

Healthcare is the flagship service of the regional government in Andalusia[6]. In 2014, 7.5€ billion[7] were allocated to provision full healthcare services to a population of more than 8 million people[8]. The regional government of Andalusia spends more than 5% of Andalusia GDP in the public healthcare service (Servicio Andaluz de Salud), or in other words, 25% of its overall regional budget. Thanks to the centralization of the service and the bargaining power of the administration towards the healthcare providers, this system is very efficient when compared to the healthcare spending in countries like the USA, where the public healthcare spending reached 8.3% of the GDP in 2011[9]. However, current pressures in the public overall budget, and demographic factors like the aging of the population, demand further improvements in prevention, early treatment and efficiency.

The evolution of the aging index (also referred to as the elder-child ratio, and defined as the number of people aged 65 and over per 100 youths under age 15), as presented in Figure 3, shows this relentless trend in Andalusia's population. An older population usually requires more frequent and intense healthcare as a result of a higher prevalence of chronic and general diseases.

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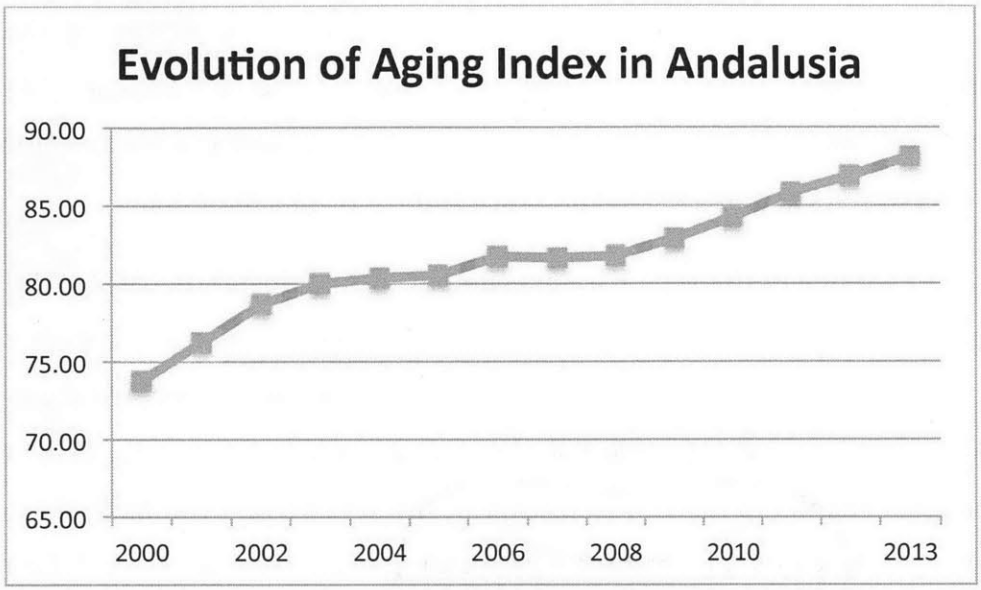
[6] Note from the author: In Spain, the healthcare public service is managed at a regional level. In the case of Granada, the public institution in charge of healthcare is the Andalusian Healthcare Service (Servicio Andaluz de Salud, or SAS) that covers eight provinces, Granada one of them.

[7] Source: Junta de Andalucía Annual Budget web site, http://www.juntadeandalucia.es/economiayhacienda/planif_presup/presupuesto2014/estado/servicios/servicios-a.pdf, accessed on March, 2014

[8] Source: Instituto Nacional de Estadística, www.ine.es, accessed on April, 2014

[9] An additional 8.7% of the GDP was spent in the private sector in the US. Source: OECD

Figure 3. Aging Index in Andalusia (2000 - 2013)



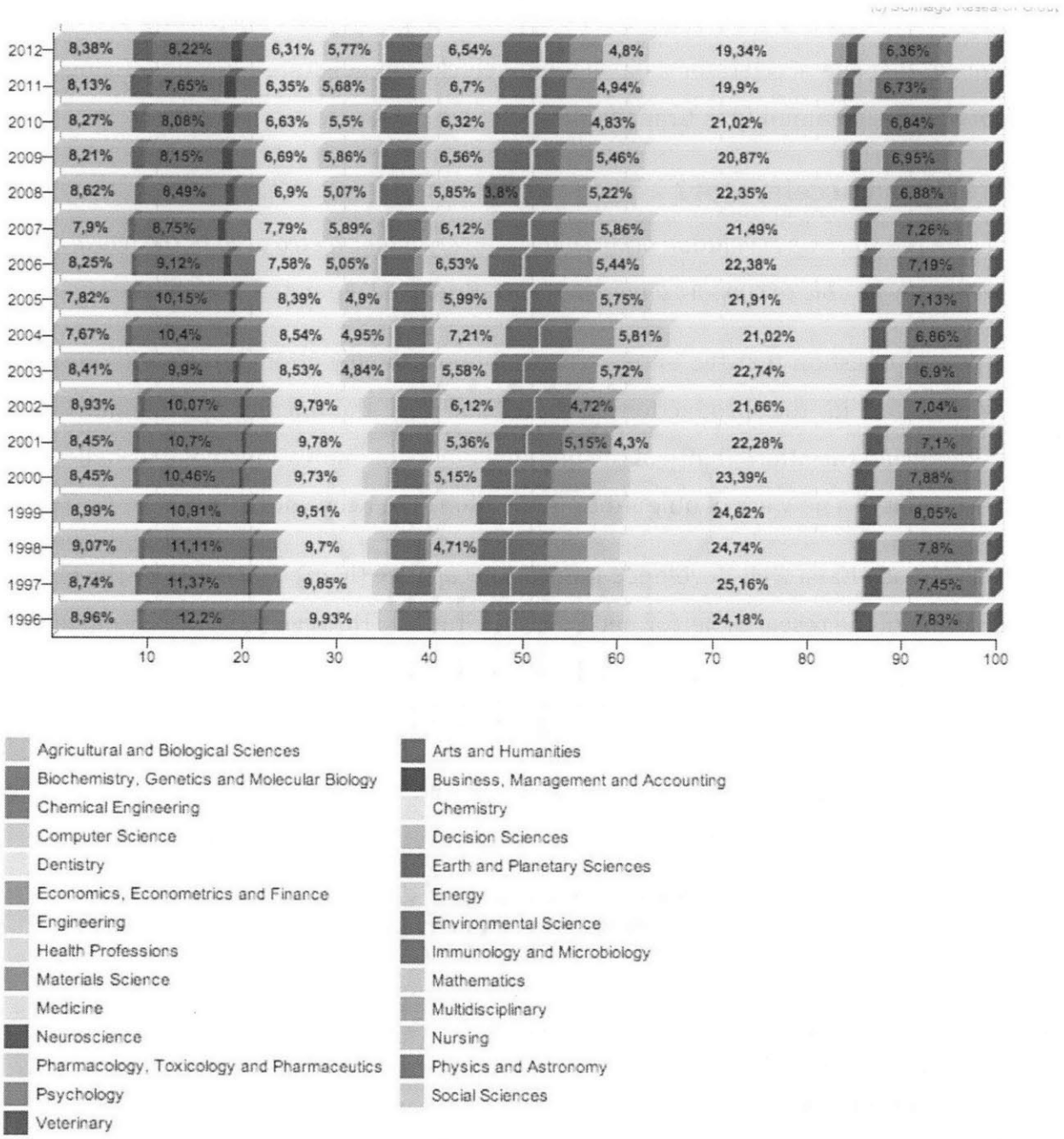
Given the aging of the population, investing in a more efficient and effective healthcare system, together with a better lifestyle, can substantially impact the overall public spending in the region.

Another reason to focus on healthcare is the rich innovation capacity in the field that, with the proper vehicles, can be translated into entrepreneurial capacity to bring cutting edge technology to society and wealth.

Figure 4 shows the distribution of the research production in Spain along the last fifteen years. Medicine, Biochemistry, Genetics, Agriculture and Biological Sciences, Molecular Biology, Immunology, Microbiology and Health Professions account for more than 40% of the overall research production[10].

[10] Source: SCImago, http://www.scimagojr.com/countrysearch.php?country=ES, accessed on April 2014

Figure 4. Distribution of research production in Spain



Finally, the motivation to focus on digital health as opposed to a broader healthcare field is based on a constraint and an opportunity. Biotech projects usually require far more time than the usual 5-month-acceleration program to test their fundamental assumptions. On the other hand, there is an opportunity to incorporate the excellence of the University of Granada in Computer Science (top 100 in the Shanghai rank) in the intersection between

healthcare and IT. The presence of some (emergent) clusters of related industries and firms in Health and IT could facilitate entrepreneurship (Delgado, Porter and Stern 2010). We believe that the accelerator as a shaping vehicle can generate a prolific dialogue and entrepreneurial community in Granada.

1.6. Why an accelerator?

> *"There is a start-up revolution occurring [...]. Every major metro area in the world will eventually be able to support an accelerator"*, Brad Feld, Founder, Techstars.

Some people question that the entrepreneurial boom is only a temporary fade. However, strong changes in the production process, such as the increasing modularity, the accessibility and the affordability of the building blocks of innovation, make us believe that we are in front of a new era of ubiquitous innovation (The Economist 2014).

Granada already has a well-developed innovation capacity (iCap) supported by the quality and quantity of the research performed by its institutions. However, the entrepreneurial capacity is still weak. An accelerator could help Granada to adopt entrepreneurial culture and create stronger links between the existing stakeholders.

Table 2 lists some of the eCap dimensions that an accelerator can improve.

Table 2. How accelerators stimulate entrepreneurial capacity[11]

Dimension	Effect
RESOURCE – People	Attracting capable people Developing capable people
RESOURCES – Funding	Attracting capital
RESOURCES – Infrastructure	Providing specialized co-located space
POLICIES AND PROGRAMS	Involve government and policy makers
NETWORKS	Creating network connections among entrepreneurs and risk capital
NORMS & CULTURE	Building culture and social recognition

Table 3 summarizes how accelerators help entrepreneurs overcome certain challenges.

[11] Source: Fiona Murray, MIT Regional Entrepreneurship Acceleration Lab, 2013

Table 3. How an accelerator can help entrepreneurs

Challenge	Action
Lack of interaction between IT and Healthcare professionals	Creation of multidisciplinar Hackathons aiming at solving some of the existing problems with awards to the best solutions proposed. This way seed entrepreneurial spirit can be created
Capital	The accelerator can provide a seed capital to start with. On top of that, an accelerator investment index can be offer to micro-investors as a financial vehicle to diversify investment in high risk, high potential enterprises
Culture	Accelerators and hackathons celebrate the entrepreneurial culture by rewarding the effort and the success of its participants
Business Training	Accelerators incorporate a training programs adapted to their target market
Community Support	Mentors are one of the most effective resources offered by accelerators to share experience, best practices, contacts and, some times, investors and/or customers
Commercialization	Access to mentors, investors and business training can significantly reduce the current challenges in commercialization
Relationship with Big Corporations	There are many and significant examples of corporations collaborating with accelerators, offering sponsorship and direct channels for further collaboration

Incubators vs. Accelerators

As a clarifying note, we would like to briefly talk about incubators. Sometimes, incubators and accelerators are indistinctly used in the literature. To avoid a misinterpretation of what we are proposing with this thesis, we would like to make a distinction between these two

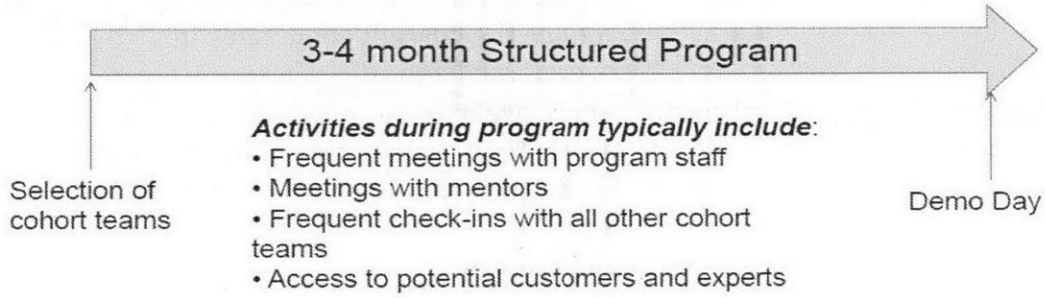
terms emphasizing their differences.

Incubators offer space, services, guidance, and sometimes equity investment. They are mainly a real state service enhanced with specific services to entrepreneurs. Their service is not bounded in time and entrepreneurs can stay in the facilities as long as they pay the rental or they comply with the specific incubator requirements.

However, startup accelerators, according to Daniel Fehder and Fiona Murray from MIT (Fehder and Murray 2013), are:

> (...) cohort-based, time-bounded early stage funding programs. The most notable of these new types of programs are Y Combinator and Techstars. Yearly, these two accelerators launch more than 100 new startups while other accelerators in our sample are responsible for almost 1,700 more startups yearly, providing a structured and formalized process for starting new firms. Successful firms like AirBnB and Dropbox combined with the small price tag of investment have created a recent spike in the interest for this relatively new form of investment among entrepreneurs, venture capitalists and policy makers. Startup Accelerators recombine existing elements of a region's entrepreneurial ecosystem (startup firms, mentors, seed capital) in a new way (cohort-based, time-limited).

Figure 5. Accelerator Time Line[12]



Since PTS Granada already offers incubator services, we will concentrate our effort in the design of an accelerator. But, do accelerators deliver value? According to (Wu 2011),

[12] Source: Fiona Murray, MIT Regional Entrepreneurship Acceleration Lab, 2013

accelerators do:

- Create value to the human capital through education and training
- Give signal of credibility of a particular project and ecosystem
- Reduce search cost by concentrating network interactions and filtering candidates
- Optimize the cost of capital

Accelerators such as Rock Health or Y-Combinator have proven to be successful in providing resources to overcome the above-mentioned challenges.

2. Research Approach

This research has been conducted in three differentiated phases:

1. Literature review

A literature review has been helpful to incorporate the state of the art, the scientific community thinking and the practitioners approach to promote entrepreneurship in a region.

A variety of resources including research papers, economic journals, case studies and MIT lectures has been fundamental to get a base knowledge of the state of the art and understanding the formation of innovation and entrepreneurship clusters.

2. Case studies and benchmark

A selection of case studies is provided in this thesis to illustrate best practices and common issues when putting in practice a startup accelerator in a variety of contexts. A benchmark summary has been created for the convenience of the reader.

3. Survey and in-depth Interviews

To better understand the local challenges, an on-line survey was created with the collaboration of the Granada Director of Knowledge Transfer at the Granada Health Technology Park, Dr. Lourdes Nuñez. With her help, we distributed the survey to more than twenty-five experienced stakeholders who provided helpful insights and valuable comments.

Additional in-person interviews covered healthcare entrepreneurs, accelerator participants, accelerator designers, MIT faculty and venture capitalist. They all helped provide a well-rounded picture of the challenges and best practices they observe.

3. Thesis Organization

This thesis is organized in five main chapters. Chapter one gives an introduction to the problem, and presents the main framework and concepts used in the development of the thesis. Chapter two focused on the research findings: first the selection of case studies, then the benchmark and finally the survey results.

Chapter three proposes a structure for the Granada PTS Accelerator commenting on the trade-offs at every design decision. It also provides a table summarizing the design recommendation. Chapter four gives recommendations for the pre- and the post-acceleration stages, required for less-mature ecosystems. Finally, chapter five outlines the topics for future research.

Chapter 2 – Research Findings

The three main pieces of research are:

1. Case studies selection of start-up accelerator programs
2. Benchmark analysis in three categories:
    - Digital health accelerators in the United States
    - Community accelerators in America
    - Spanish accelerators
3. Survey results

These three sections complement each other bringing local and global perspective, generic and specific, long-term and short-term programs, to understand what makes an accelerator successful in diverse settings with different goals.

1. Case studies

1.1. StartUp Health

Founded in 2011 by health tech entrepreneurs Steven Krein and Unity Stoakes, StartUp Health has the substantial goal of multiplying by ten the equity value of 1,000 healthcare startups in ten years by supporting entrepreneurs in creating sustainable transformational businesses. They are devoted to reduce healthcare costs while improving the service.

StartUp Health concentrates in providing entrepreneurs with "inspiration, education and access to customers, capital, and other critical resources so that startups can innovate more quickly"[13]. They do not offer seed capital. Instead they provide access to pilots, customers, fundraising and partnerships with healthcare providers, pharmacies, labs, payers, etc. since the access to stakeholders is more aligned with what they find challenging in the healthcare innovation: regulation, resistance to change and long sales cycles.

At StartUp Health, they believe now is an "epic" moment of technology and business model disruption based in the combination of three factors: the aging population and increase in

[13] http://www.startuphealth.com/about-us/our-mission/

chronic diseases, the golden age of entrepreneurship, and the digital and mobile technologies that can be applied to health and wellness.

They have put a tremendous effort to generate network effects within their initiative. This is a snapshot of what they did to create their network:

> "The first phase of StartUp Health was focused on hosting a series of community-based programs around the country, (...):
>
> - More than 8,000 people have taken the StartUp Health Pledge.
> - Hundreds of startups have demoed their companies at StartUp Health (...)
> - Thousands of people have attended StartUp Health Roundtables either in person or online.
> - Hundreds of scholarships have been made available (...).
> - Over 900 companies have applied to the StartUp Health Academy.
> - We've held Office Hours with hundreds of companies (...).
> - Partners including GE, AARP, StartUp America Partnership, US Department of HHS, Foundation for the National Institute of Health, AT&T, Amazon, California HealthCare Foundation, TEDMED, Gerson Lehrman Group, Morgan Lewis, and Health 2.0 have collaborated and continue to contribute amazing resources to help support the ecosystem and the Healthcare Transformers enrolled in StartUp Health Academy.
> - Dozens of the world's top subject matter experts in healthcare have committed to being StartUp Health Coaches (...)"[14]

The acceleration program duration is unique to StartUp Health: 36 months, covering the four stages a startup needs to become a growth sustainable business. Figure 6 illustrates the stages from idea conception to exponential speedup stage.

[14] Source: StartUp Health site, http://www.startuphealth.com/about-us/our-mission/, accessed on May, 2014

Figure 6. StartUp Health Program[15]

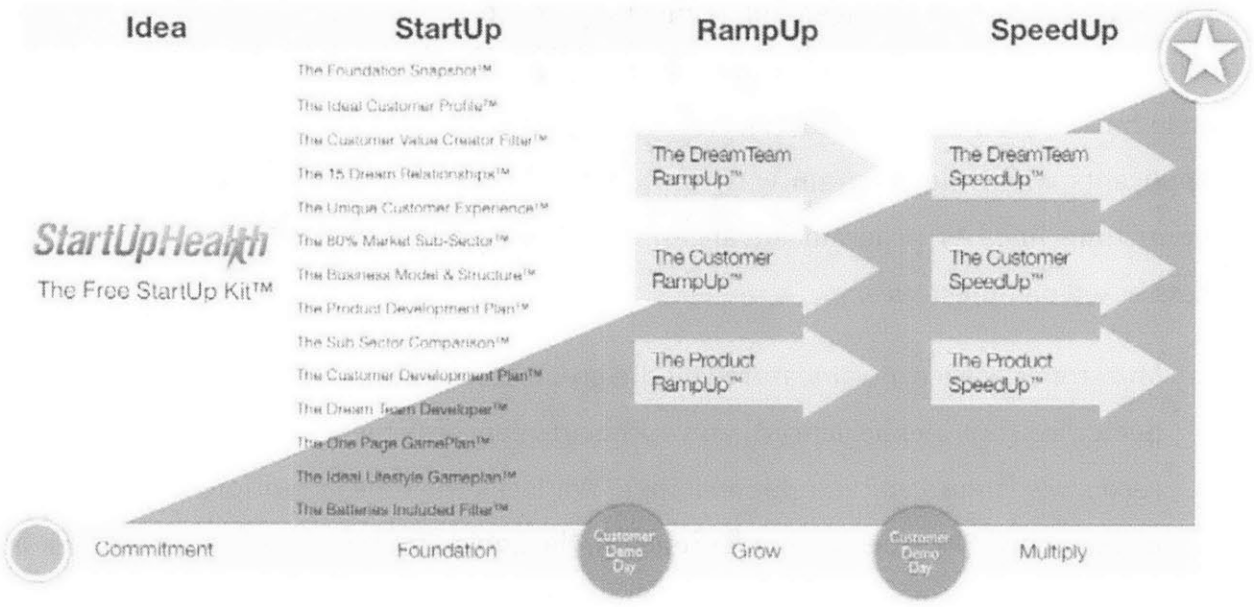


Table 4 summarizes the StartUp Health accelerator best practices.

Table 4. StartUp Health Best Practices

Area	Best Practice Description
Value to entrepreneurs	They understand the complexity of the sector and give resources to address the specific challenges in healthcare
Intake process	Accept ventures at any stage, being flexible in the conditions and consistent in their goal of increasing the equity value 10x after 3 years
Network	They emphasize the value of the network and collaborate with other accelerators in taking companies to the next stage
Location	Companies do not need to relocate to participate in the program

[15] Source: http://www.startuphealth.com/about-us/our-mission/, accessed on May, 2014

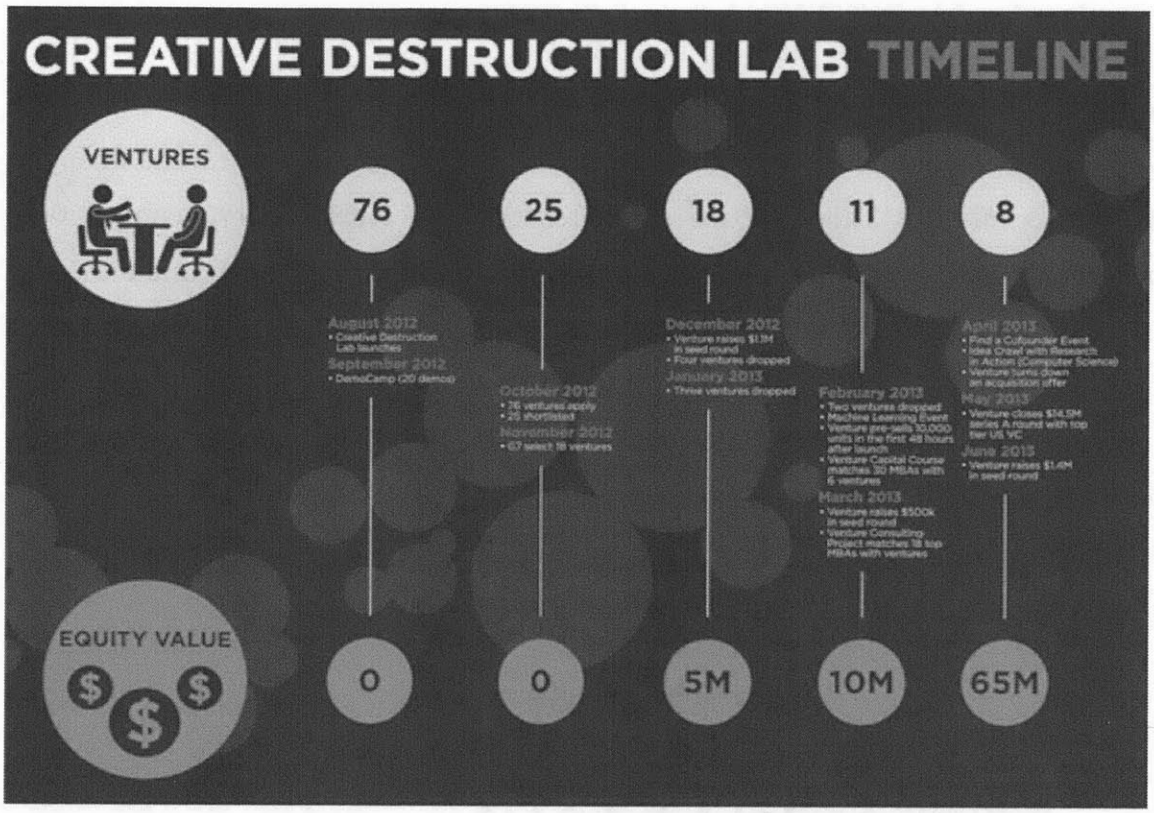
1.2. Creative Destruction Lab

The Rotman School of Management (University of Toronto) runs an accelerator called Creative Destruction Lab. It is an eight-month program with the focus in building strong, scalable businesses from its affiliates. Cohorts are extensive, up to 18 teams from a pool of 64 applicants when the program was run for the first time in 2013. ***Figure 7*** shows the program time line. As program advances, teams are narrowed down in a competitive process based on milestones:

> Milestones are a central feature (...) the greatest weakness of smart, passionate, and dedicated (but inexperienced) entrepreneurs concerns the allocation of their scarce resources (time, capital, relationships). We focus the time, attention, and judgment of seven highly successful entrepreneurs, the Lab's Group of Seven Fellows (G7), on working with founders to set specific milestones to guide the allocation of their resources. Milestones are of two types: business and technical. The careful selection of milestones is conducted to most efficiently reduce risk associated with the venture and maximize equity value as quickly as possible.[16]

[16] Source: CDL web site, http://www.creativedestructionlab.com/content/how-it-works, accessed on April, 2014

Figure 7. Creative Destruction Lab Timeline[17]



CDL value proposition includes mentorship, access to investors, networking opportunities - with customers, partners, recruits and investors-, workshops, free legal advice, accounting and marketing services, and office space. The accelerator is not targeting to create a radically different value proposition, but an excellent execution in Toronto to offer a local best-in-class accelerator to the local community.

CDL has impressive success stories at the start-up valuation stage. For example, Thalmic Labs got a series A valuation of $14.5 million from investors such as Sparks Capital, Intel Capital and First Round Capital, all top-tier venture capital firms.

[17] Source: CDL web site, Source: http://www.creativedestructionlab.com/, accessed on May, 2014

Best practices from CDL

Creative Destruction Labs has incorporated innovative twists to the usual accelerator structure. Here is a selection of CDL's best practices:

- A demanding milestone program where the lowest performing venture is dropped every two months. This practice simulates the real world severe competition, incentivizes hard work, and reallocates scarce resources into the best candidates.
- Startups are matched with MBA students who incorporate business insights at the same time the learn entrepreneurship. For the technical needs, CDL organizes cross-campus networking events for students and alumni of University of Toronto, where business and technical students can meet.
- Successful interactions with investors, not only local, but also international such as Spark Capital, First Round Capital and Intel Capital.

Table 5. CDL Best Practices

Area	Best Practice Description
Accountability	Milestones that give inexperienced entrepreneurs discipline and criteria to decide on trade-offs
Intake process	Broad. Start with a big class -18- and filter out teams along the process to end up with half.
Network & Community	StartUps are matched with MBA students to incorporate business insights. In campus events help at matching with technical students. They also managed to attract top-tier investors.

1.3. Start-Up Chile

Start-Up Chile is a government-driven acceleration program sponsored by the Chilean government. It was launched in 2012 to attract early-stage, high-potential international entrepreneurs with the purpose of creating a prolific entrepreneurial community in Chile. The goal of the program is to make Chile a reference entrepreneurial hub in Latin America.

Chile has the underlying goal of increasing its overall GDP growth rate to become a developed country in the next ten years. In particular, Chile should grow at a 6% rate, as opposed to the average 4% YoY GDP growth in the decade previous to 2010 (Applegate, et al. 2012). Start-Up Chile founders believe that more active entrepreneurial activity is the way to reach this long-term growth.

The program offers $40,000 of grant funding (no equity is taken) that entrepreneurs should match (at least 10%) with their own money. Entrepreneurs also receive a one-year visa, social security, a bank account, and office space. In addition to that, the program facilitates the access to Chilean business networks, both in the corporate and in the entrepreneurial community. To measure how the granted entrepreneurs give back to the Chilean entrepreneurial community, a system of "points" has been created. Points can be earned by participating in local events, presentations, workshops and university classes (Applegate, et al. 2012). This system, called "return value agenda", not only is useful to encourage giving back to the community, but also to keep track of the impact of the initiative in terms of number of talks, meet-ups, interactions with multinational corporations and mentorships to Chilean entrepreneurs.

Best practices from Start-Up Chile

Start-Up Chile is probably the most successful accelerator in generating buzz and media attention. It has been featured in major publications, including The Economist, BBC News, TechCrunch, ABC News, Forbes and Business Week[18]; and top business schools, such as MIT and Harvard, include the Start-Up Chile case study in their analysis and discussions.

[18] Source: author's research and Wikipedia http://en.wikipedia.org/wiki/Start-Up_Chile, accessed on May, 2014

The return value agenda (the points system), although criticized by entrepreneurs as distracting, is a good way to track entrepreneurs' contribution. This is especially useful to guarantee that international entrepreneurs interact with the local communities.

Replicability of Start-Up Chile

Chile is a cash-rich country that can afford the luxury of experimenting with different initiatives to achieve its GDP growth goals. While Chile can afford experimentation, this is not always applicable to other regions given their economic constraints.

A question with the program is its impact on the local economy. We believe that from the branding perspective, the program has being a phenomenal success. However, what is the impact on the real economy? How many start-ups stayed in Chile? How sticky and sustainable this entrepreneurial vibe will be after the cash injection?

Similar to other non-US accelerators, Start-Up Chile is still looking for a big success story to tell to the world and the entrepreneurial community. With 3 waves of experience, Start-Up Chile should now be able to attract quality start-ups and to design more effective incentives to make entrepreneurs more disciplined (i.e. to avoid the vacation-in-Chile attitude).

A challenge with Start-Up Chile is the difficulty for many startups to actually find a beachhead market in Chile. The local business community is still conservative and barely open to the innovations proposed by the accelerated startups.

Table 6. StartUp Chile Best Practices

Area	Best Practice Description
Marketing	Presence in major media as a case study. How a country positions itself as an entrepreneurial hub in Latin America for the world
Community	The return value agenda (the points system) is a good way to track entrepreneurs' contribution by securing that international entrepreneurs interact with the local communities.

1.4. Lanzadera

Lanzadera is a private accelerator launched in 2013 by Juan Roig, a successful Spanish businessman, owner of Mercadona. It is a non-profit initiative, which has invested 4 million euro in injecting cash to 20 teams in 2014.

Lanzadera is one of the most successful accelerators measured in number of applications received (4000 for 15 spots). One of the main reasons for its power of attraction in the entrepreneurial community is their remarkable capital offer, up to 200,000€ in venture debt per start-up, in contrast with the average 15,000€ per start-up in exchange of equity offered by other accelerators.

Lanzadera pushes clear and strong values in the participants, based on hard work and commitment to quality standards through the Total Quality Model, a model that Juan Roig has used to make Mercadona the success it is today.

The kind of people Lanzadera is looking for are those with strong leadership skills, capable of motivating a team and spotting opportunities where others cannot see any. Candidates should be willing to take risks by challenging assumptions, and be committed with the project and the team. The projects should provide different solutions to existing problems, be scalable and have the potential to survive in the long term.

Lanzadera accepts 15 teams at different levels of maturity in their projects as far as they comply with Lanzadera's philosophy and criteria.

The program hosts the teams for 6 months at the Lanzadera offices in Valencia. Milestones are agreed between the entrepreneurs and their mentors, and money is injected progressively once the milestones are met. Personalized training and mentorship is offered to the teams, as well as financing support after the program.

Lanzadera makes the entrepreneur's life easier by providing administrative help to keep entrepreneurs focused on their projects. They also provide personalized training, a staff member devoted to the team, relevant mentors to the field of work, and networking opportunities.

Best practices from Lanzadera

Lanzadera equips the teams with a set of values (leadership, effort, example, reciprocity, courage, concern and training) and a model to operate the company: Total Quality Model, as part of Juan Roig mission to improve the Spanish business landscape.

It incorporates accountability in a progressive release of cash. This process help teams to acquire a sense of urgency and discipline.

Table 7. Lanzadera Best Practices

Area	Best Practice Description
Finance accountability	Progressive debt financing conditional to achieve agreed milestones
Values	Lanzadera shares a clear list of values that includes leadership, commitment and effort. Values are important to entrepreneurs to make decisions and execute trade-offs.
Operations	Total Quality Model

2. Benchmarks

2.1. Healthcare Accelerators in the US

United States has a powerful entrepreneurial culture. Many of the richest man in the country are self-made entrepreneurs. The ecosystem is mature; entrepreneurs have access to mentors, business angels go beyond family and friends, venture capital is tiered and covers different stages, etc.

Because of the level of specialization, let us concentrate in a selection of accelerators present in the healthcare space[19].

[19] The list is not exhaustive and we invite the reader to explore other healthcare accelerators

Table 8. Benchmark Healthcare US Accelerators

	Rock Health	BluePrint Health	StartUp Health
Focus	Digital Healthcare	Healthcare	Digital Health
Number of Teams per Class	14	9	25 in 2012; 75 in 2013
Location	San Francisco	New York	Agnostic
Sponsors	Medical institutions, venture capital firms, and corporate partners: Mayo Clinic, Nike, GE, Quest Diagnostics, and leading VC firms.	A wide range of sponsors who are mainly contributing as mentors, from Humana to Pfizer and Google	Investors and strategic partners such as GE, Robert Wood Johnson Foundation, AARP, California Healthcare Foundation, AT&T, Morgan Lewis, WCG, Merck, Pfizer, Humana
Purpose	Non for-profit Transformation of health through technology	Finding passionate and coachable founders who are working to solve a problem for a customer that has demonstrated a willingness to pay for the solution	Non for-profit Healthcare transformation
Program Length	5 months	3 months	36 months
Acceptance Rate	3%	1.8%	10%
Network	N/A	Charter member of the Global Accelerator Network	They accept teams from other accelerators They believe in the network effect per principle
Education	To early stage start-ups	It helps find customers and capital in 3 months	Long-term coaching program and community designed to help digital health startups scale and 10x their equity value
Seed Capital	$100,000 (+$30,000 in perks)	$20,000 (+$50,000 in perks)	None (usually they take more mature projects)
Equity Stake Required	6%	6%	From 2% to 10%
Advertised Success	$900,000 average capital raised per start up	Largest network of mentors 1000 startups applied in 2012	Goal of helping 1000 startups in 10 years and create 100,000 jobs

Additionally, we observe that accelerators do not have fixed structure in all cases. They evolve along time to better reach their goal. For example, Rock Health has increased the seed capital from $20K to $100K to increase the potential of their companies. Startup Health is opening up to 75 teams in 2013 from 25 in the previous year.

2.2. Community Focused American Accelerators

Community accelerators are those who were born with the purpose of energizing the entrepreneurial local community. Some of them have grown beyond that, like MassChallenge, who has recently incorporated collaborations with UK and Israel. Others, like StartUp Chile, started addressing the international community, and are open now to the local entrepreneurs once the reputation has been established.

Table 9. Benchmark Community Focused American Accelerators

	Creative Destruction Lab	MassChallenge	StartUp Chile
Focus	Toronto University	Catalyze entrepreneurship to create new value	Local entrepreneurship
Number of Teams per Class	From 18 (start) to 8 (end)	128	105
Location	Toronto	Boston	Santiago de Chile
Sponsors	University of Toronto	Commonwealth of Massachusetts, Microsoft, Verizon, IBM, University of Boston, RBS (UK), EMC2 (Israel), etc.	Government
Purpose	Education, build scalable businesses, offer value to University of Toronto affiliates	Non for-profit Attract entrepreneurs to Boston area	Non for-profit Attract entrepreneurs to Chile
Program Length	8 months	4 months	6 months
Acceptance Rate	N/A	10%	15%
Network	Canadian	Massachusetts	Chile
Education	Mentorship and milestones driven	Early stage start-ups. The accelerator curriculum is flexible and not required. Entrepreneurs choose sessions that will help them most.	Two-ways education: entrepreneurs are supposed to give workshops and talks
Seed Capital	None	$50K -$100K	$40,000
Equity Stake Required	No equity	No equity	No equity, but participation in Chilean events
Advertised Success	Valuation of the participants (1st cohort) reached $65 million	3,000 job created $1M average capital raised Biggest accelerator	Number of applicants Number of companies created

They are usually non-for-profit and broad in the number of teams accepted. The length of the program varies and the main sponsors vary from local to national government to universities. Other main observation is that accelerators are organically evolving along time to adapt to the demand, their sponsors or their success.

2.3. Spanish Accelerators

Acceleration programs are starting to be popular in Spain. Some of them have a long history behind them, such as Tetuan Valley that started back in 2009. Others, like Lanzadera, are taking the second mover advantage and offering compelling value propositions to entrepreneurs. Table 10 compares four of them.

Table 10. Benchmark Spanish Accelerators

	Wayra	Lanzadera	Tetuan Valley	Yuzz
Focus	IT and Telecom (Strategic)	Spanish entrepreneurs, Total Quality Model, IBE	Pre-acceleration training	Spanish young entrepreneurs (Corporate Responsibility)
Number of Teams per Class	10 teams X 14 cities	15 (2013), 20 (2014)	10	500 young pre-entrepreneurs
Location	Madrid, Barcelona & other international locations	Valencia	Madrid & Barcelona	26 centers in different locations in Spain
Language	English and Spanish	Spanish (and English, not at the same level)	English	Spanish
Sponsors	Telecom corporation: Telefonica	Retail corporation: Mercadona	The European Commission and other private sponsors like Google	Bank: Santander and other partners like Intel, Indra and local governments
For profit?	For profit	Non-for-profit	Non-for profit	Non-for profit
Program Length	5 months	Up to 11 months	1.5 months (6 week program)	7 months
Acceptance Rate	N/A	15 teams out of 4209 applications	10 teams	N/A
Key Intangible Value	Network, follow up funding, access to Telefonica VC fund	Values and Total Quality Model	Pre-acceleration	Support young entrepreneurship
Seed Capital	$30,000 to $50,000	€200,000 zero-interest debt	None	1st – 30,000€ 2nd – 20,000€ 3rd – 10,000€
Equity Stake Required	2%	No equity	No equity	No equity
Main Success Metric	1.5 million average raised capital	Number of applicants	History of editions	Capillarity in the national territory

Spain is experiencing a plethora of acceleration programs, led by those funded by big corporations such as Telefonica (Wayra) and Mercadona (Lanzadera). Vertical projects, specific to one knowledge area or geography can be the right strategy to succeed in this crowded space.

3. Survey findings

The survey had two main goals: to understand the pitfalls in the current ecosystem and to gather preliminary ideas on the best way to solve them.

Twenty-seven seasoned professionals answered the on-line survey. Out of them 42% were entrepreneurs, 23% were financial professionals, and the rest include stakeholders affiliated to universities, corporations and healthcare. Roughly one third of the respondents belong to healthcare, other third belongs to IT and the remaining third belongs to consulting, financial, legal, among other sectors.

3.1. Quantitative findings

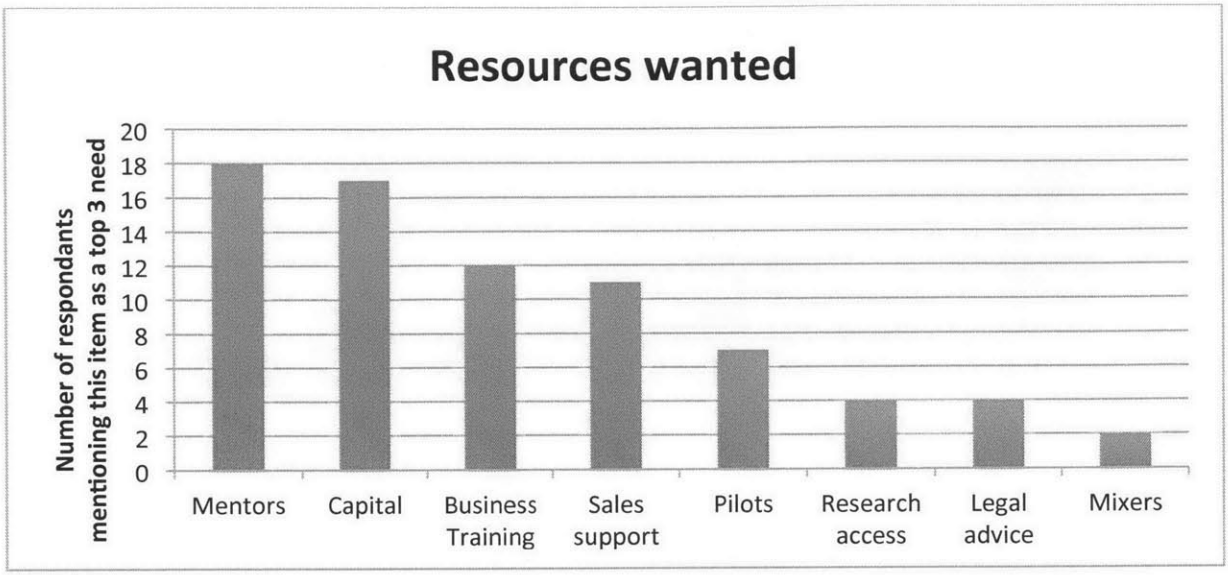
Question: Choose the top three resources a Digital Health accelerator should provide?

The main needs for the early stage projects are mentors, capital and business training. Entrepreneurs do not have access to mentors, reference models, people who have already been in their shoes. Providing access to mentors can be a straightforward value of an accelerator program.

Capital is the second most wanted resource. Facilitating the access to capital is a clear need of the start-ups. Accelerators can be a good certificate of quality and a meeting point with investors, through events like the Demo Day.

Business training is typically covered in the accelerator program. It can be customized for each team or cohort wide sessions.

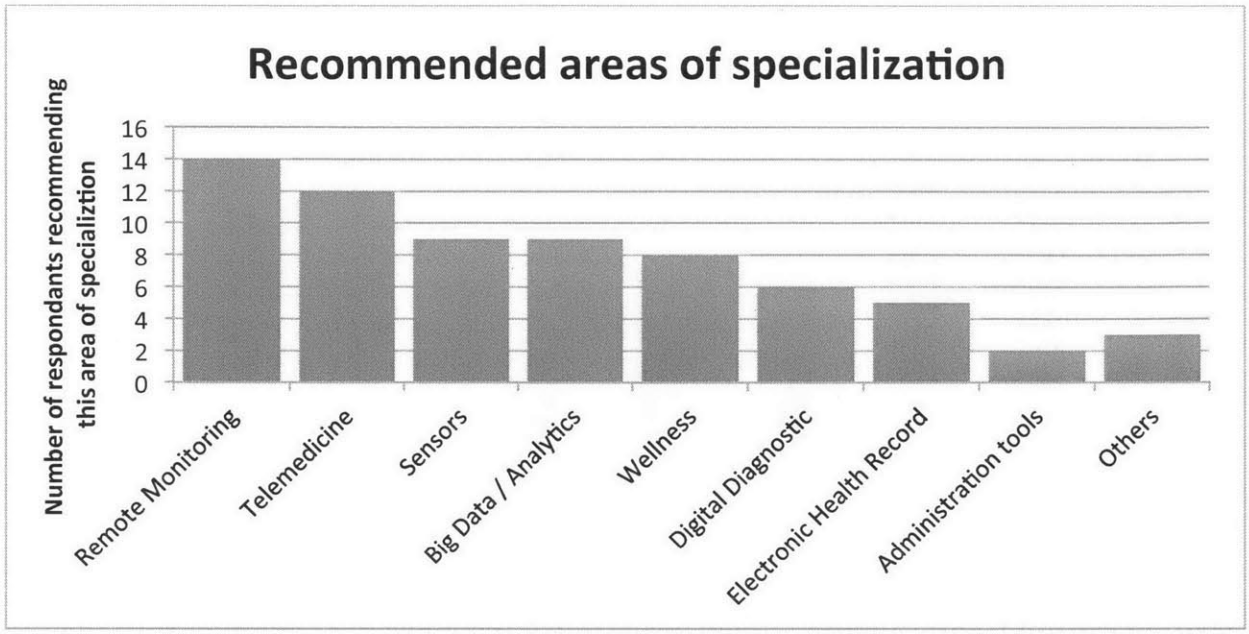
Figure 8. Resources wanted by survey respondents



Question: Within Digital Health, which areas will have more projection within the Granada Technology Park?

Being Digital Health a broad area, we asked which fields have more potential to succeed in this particular entrepreneurial ecosystem. Remote monitoring and telemedice are the most popular areas in the context of PTS Granada. We believe that a potential access to SAS with its eight million patients can be an extraordinary field for big data and analytics.

Figure 9. Recommended areas of specialization for the accelerator



3.2. Qualitative findings

Qualitative questions gave the opportunity to respondents to provide open answers related to their experience with healthcare entrepreneurship. They were asked about the challenges they experienced or observed in healthcare entrepreneurship. The second open questions tried to dig further in the implementation side, what kind of barriers they foresee to implement a successful program.

In both questions we observed concerns for the access to capital and for the entrepreneurial culture. Concrete issues in the Spanish legislation (expensive to hire and fire) and commercialization at a global level, are also pointed out.

Challenges for entrepreneurship in Spain

The survey reveals the following **challenges** in the entrepreneurial ecosystem:

- Silos: lack of knowledge exchange between IT and Healthcare professionals, who usually work and interact in their silos without exchanging information about their pain points or the latest technologies that could help to solve those pain points.

- Capital:
    - Debt: further restrictions in the banking system are making more difficult to get debt, which is the main source of capital for Spanish entrepreneurs.
    - Private capital:
        - Private capital prefers other asset classes.
        - Due diligence: investors do not have access to a good risk vs. profit analysis to feel confident about these investments.
    - Public capital:
        - The main source of capital today is family and friends and public capital supporting the development of disadvantaged regions in Europe.
- Lack of fertile collaboration programs with big corporations and multinationals
- Legal Problems:
    - Incompatible regime of doctors who cannot create their own company.
    - Labor market legislation: it is too expensive to hire and fire collaborators.
- Commercialization:
    - Lack of experience, capital or knowledge to commercialize globally.
    - There are also commercialization challenges when it comes to introduce a new solution in the healthcare system, however this challenge is not specific of Granada.
    - Reaching global markets is also challenging due to the lack of track record in the area. "Made is in Spain" is not *per se* a recognized brand in the healthcare or biotech domain.
- Culture lacks entrepreneurial mindset. Further on, many entrepreneurs lack business perspective when designing their products. The education system and the society itself do not put too much emphasis on linking together product design and development with business applications.
- Business basic concepts should be taught to the entrepreneurial community, both IT and healthcare professionals so they can understand what are the basic principles to think of when evaluating an idea.

- Since the biotech sector is not mature, the community has it difficult to find the right mentors, the right investors, effective commercialization channels and trusting customers.

Obstacles to implement a successful program to accelerate entrepreneurship

The respondents of the survey identify the following **obstacles** to the implementation of the startup accelerator at PTS Granada:

- Put in place a strong governance board aligned and committed with the project. The board should believe in the project and have deep enough pockets to guarantee at least a 5-year support before starting seeing results.
- Getting government interest and support is also a challenge, although creating it in the context of PTS Granada can use the strong connections already in place.
- Define the acceleration financial model: equity based, convertible debt, regular debt, other financial vehicles, ... This model should be attractive enough to entrepreneurs at the same time that it should satisfy sponsors and board expectations.
- Generate an early track record of successes to attract not only brilliant people but also money hungry of quality projects. The entrepreneurship accelerator program should attract the right projects to build up its reputation.
- These projects should be easily broke down into proof-of-concept milestones and should start by solving a problem.
- Create a program of business training, covering business plan creation, financial aspects, marketing and sales guidance.
- Find the right mentors, committed with the project and the community, willing to periodically meet their teams in a periodic basis.
- Choose projects that address actual problems in the market, and that are able to create the right value proposition for their customers. Building a company that cannot generate cash eventually can be a waste of effort and resources (unless it is a non-profit businesses).

- Make sure to offer a follow up approach to the companies created. The first five years are difficult to survive when there is no incoming revenue stream and the cost structure is growing.
- The last challenge is probably the cultural limitations, given the lack of a dynamic entrepreneurship culture. On the other hand, the pressing economical challenges will attract people that usually would have opted for more comfortable professional options.

Chapter 3 – Accelerator Design

Now that we understand the state of the art in accelerators design, we are ready to propose a design for the PTS Granada Accelerator. The methodology of this research is the following:

1. **Objective:** What is the goal of the accelerator? What are the problems it will try to solve?
2. **Local attributes and constraints:** What are the particular local needs and constraints? What are the local strengths?
3. **Accelerator outline**: What are the overall dimensions that will characterize the accelerator such as value proposition, timing, number of teams, sources of mentoring, and sources of capital?

1. Accelerator Goal

The objective of the accelerator is to close the gap between the existing innovation resources in Granada measured by the amount of scientific production (3.4% of the Spanish production) and its modest contribution to the national GPD (just 1.4%). GPD growth and skilled jobs creation are the fundamental goals behind this initiative. To achieve them, we believe that an improved entrepreneurial capacity can be instrumental to effectively transfer knowledge and wealth to the local economy.

2. Local attributes and constraints

Accelerators should be specifically designed to serve the community they are intended for. A good way to understand the role of the accelerators is to compare them with that of the universities. Although there are universities aiming at being number one worldwide, many of them are present in the local communities to provide and create knowledge in every corner of the world. Similarly, accelerators will pop-up in every major urban area to supply their local communities with hands-on entrepreneurial knowledge.

Granada has the advantage of PTS Granada: research centers, a hospital, big corporations, entrepreneurs and the University of Granada share a cutting-edge real state complex devoted to innovation, door-to-door. The presence of this variety of stakeholders in the

same space facilitates the dialog and the exchange of knowledge between high skilled professionals. It also facilitates the creation of a reinforcing ecosystem. The university can provide cutting-edge technology and ideas, the hospital can provide access to patients or to doctors who can enhance the products and services with their feedback, big corporations and the hospital can be the beachhead market for the solutions designed in the accelerator, etc.

Although unfortunate, the current cost of opportunity of entrepreneurship has declined substantially, if we use the unemployment figure in the region (36% in 2013 from 14% in 2007[20]) as an indicator. This means that now more people than when corporate careers were abundant would be open to consider entrepreneurship as a way to make a living. This economic shock is an opportunity to incentivize a movement "from latent to active entrepreneurship" (Feldman and Francis 2004).

On the constraints side, Granada should be aware of the particular obstacles that its entrepreneurs face. In our survey, many of them mentioned the difficulties of financing their ventures. The lack of a high-speed connection with Madrid or Barcelona, where most of the venture capital firms reside, complicates the access to capital -although the revolution in the crowd-founding financing can help to alleviate this disadvantage-. An additional weakness is the lack of entrepreneurial culture in the region: not many success stories that inspire new entrepreneurs to work hard on their projects, no easily accessible mentors that can offer guidance and support, no culture of giving back to the community by angel investing, etc.

The design of any entrepreneurial program should to take into account these strengths and limitations to be effective. In the case of Granada, we will incorporate the strengths in the design of the accelerator and will address the needs in supporting programs for the pre- and post-acceleration stages.

[20] Encuesta de Población Activa, www.ine.es, accessed on April 2014

3. Accelerator Outline

This section outlines the initial conclusions about the shape of the accelerator: unique value proposition, sources of capital, number of teams, selection process, program, mentors and metrics. We will discuss the specific tradeoffs implied, to help the final decision makers with their decision process.

Value Proposition

PTS Granada should take advantage of its strengths when promoting the accelerator to the entrepreneurs. Some of the identified unique values are:

- Beachhead market: Access to patients and healthcare providers through mentors from the hospital, the pharmaceutical companies and Telefonica. The hospital can be a door to access the Andalusian Healthcare Service (SAS), covering eight million patients.
- Talent: Access to developers and designers from the University of Granada. In our interviews we discovered that one of the most precious resources for the entrepreneurs is the access to developers. University of Granada, being a top university in Computer Science, can be an excellent source of qualified employees.
- Space: Excellent buildings and co-working space with access to cutting-edge research, physicians and patients.
- Living costs: Granada is far less expensive than other cities in Spain or Europe, and the weather is nice (why do you think people moved to California in the early days?). Cheap living and labor can be very appealing for entrepreneurs who are usually struggling to keep their reserves of cash.

Teams and selections process

Incorporating what we learnt from the Lanzadera and CDL case studies, we recommend accepting a generous number of teams and investing in them only as they are delivering in their milestones.

To avoid penalizing the acceptance rate metric, we recommend establishing a mid-program milestone that only the best performing teams can reach, as CDL does with its progressive elimination process (see Figure 7. Creative Destruction Labs Timeline).

An alternative recommendation is to start with a number of teams that seems manageable given the existing resources (budget, mentors, space and support personnel) and fine-tune this number in subsequent rounds based on the teams' performance. For example, Lanzadera started with fifteen teams but will select twenty teams for the next intake.

Program Duration

The duration of the program depends on the maturity of the teams selected and on the gap the accelerator aims to cover. The accelerator purpose is to train the teams and to intensify interactions to test the team, the idea and the business model. A business angel should feel confortable investing in a start-up after the program. Given the complexity and regulations of healthcare, and the developing local ecosystem, we recommend a "long" program rather than a "short" program within the benchmark. A nine-month program could be a sweet spot to provide enough time for entrepreneurs to understand the fundamentals of their business, and the key connections in their way forward a sustainable growth business.

Intake

We recommend accepting projects at any maturity stage that have not yet received VC capital. We think that the example set by Lanzadera is applicable to PTS Granada. A poor pool of applicants can damage the accelerator from the "input" side of the process. The advantage of accepting different maturity levels is to broaden the pool of projects qualified to apply. The disadvantage is the additional personalization that the program must offer to the different stages. This additional customization can be covered with a better use of networked resources and mentors.

Seed capital

According to our research, the seed capital that comes with the program is not as important as providing pilots, customers, fundraising and partnership. Seed capital should be enough to cover the basic needs of the entrepreneurs, and to attract quality entrepreneurs in competition with other programs, but should not be the primary focus of the program.

Mentors

Mentors are a fundamental piece of the accelerator program. They are the ones with the experience, the expertise, the contacts and, sometimes, the ones with capital to invest in the start-up. However, mentoring requires a relevant expertise and, at the same time, a connection at the personal level. For this reason, we recommend nurturing a significant pool of mentors to guarantee a fruitful match between entrepreneurs and mentors.

The benefits of mentoring are manifold and the accelerator board should be able to articulate and enhance the advantages of being a mentor if it wants to attract mentors without paying an elevated fee:

- Privileged access to entrepreneurs in a safe environment where they can test the maturity of the ideas, the team and the projects before becoming angel investors
- Opportunity to influence the team and get their ideas executed
- Public recognition of their labor in the accelerator annual report and web site
- The opportunity to give back to society in a vibrant and effective way

Based on the practices found in the Global Accelerator Network site, we recommend an extensive list from 20 to 40 mentors that can embrace the diversity of the teams selected.

Sources of Capital

The accelerator should be designed as a viable economic unit. It can be a for-profit enterprise, supported on the return on the equity invested in the startups. Or it can be a non-for profit, supported by corporations or public funding.

In both cases, additional revenue streams should be explored to compensate for the uncertain nature of the equity revenues. For example, cash injections from sponsors who

may be interested in participating for corporate responsibility purposes, to have access to the development of new technologies, or from risk investors, who want to have early access to the start-ups. Other revenue streams may come from headhunters and human resources departments looking for tested talent.

So far, PTS Granada has been successful in attracting capital (600 M€ in investments by 2014[21]), mainly for infrastructure. They estimate additional 150 M€ investment over the next two years. The accelerator could run for five years with just 3% of the incoming money[22]. It may be an excellent opportunity to invest in human infrastructure instead of buildings.

When thinking of specific initiatives, Open Future, the recent partnership between Telefónica (present in the park) and the Regional Government (Junta de Andalucía, member of the PTS board) with the particular purpose of fostering entrepreneurship, can be an opportunity to finance the accelerator in a private-public partnership.

Language

Language should not be a barrier to participate in the accelerator. For this reason, we recommend to use both Spanish and English at least in the main documentation and site, as both Wayra and Lanzadera do.

[21] Source: PTS Granada site, http://en.ptsgranada.com/pts_granada/noticias/detalle_noticas/?tx_ttnews%5Btt_news%5D=229&cHash=09c48962bde6a97f76ff5f0ce20cd1a2, accessed on May, 2014

[22] Based on preliminary financial estimations by the author.

Metrics

Metrics are important to measure the impact of a program and to improve results over time. Although the full impact on the local GDP is difficult to measure, the accelerator should track its performance through indicators such as:

- Input metrics
    - Acceptance rate
    - Number of applications received
    - Number of pre-accelerator activities: hackathons, workshops, etc.
- Process metrics
    - Patents used or applied
    - Number of mentors committed
    - Team satisfaction
    - Sponsor satisfaction
    - Presence in media
    - Number of investors who attend Demo Day
- Output metrics
    - Capital raised
    - Equity valuation
    - Number of companies created
    - Venture survival rate after one, two and five years
    - Employment generated
    - Number of hospitals or healthcare corporations using a PTS Granada Accelerator company product

The metrics presented above combine short-term and long-term parameters. The board of the accelerator should be aware that some of them are observable immediately, like the number of applications received, whereas others require some time to understand the quality of the program, for example, the survival rate of the companies created.

Table 11. Summary of the recommendations for the PTS Granada Accelerator

	Recommendation
Focus	Healthcare Innovation / Transformation
Location	PTS Granada
Language	Spanish and English
Sponsors[23]	Telefonica Open Future and public funding, among others
For profit?	Not-for-profit (but sustainable attracting sponsors who get value for their money)
Program Length	9 months (reaching agreed milestones every 2-3 months to stay in the program)
Acceptance Rate	Aim at less than 25%, to pick quality projects
Key Intangible Value	Access to pilots with patients, access to customers, partnerships with corporations, help in fundraising
Seed Capital	At least 10,000 euro to make sure start-ups have cash
Equity Stake Required	0% to avoid legal and monitoring costs OR 2% -10% depending on the maturity of the project
Main Success Metric	Metrics should cover input, program, and output. Metrics should reflect the value generated to the stakeholders (i.e. entrepreneurs, sponsors, mentors, VCs, etc.)

[23] Proposed (not confirmed) sponsors based on the alignment between the accelerator's goals and the sponsors mission

Chapter 4 – Pre and Post Acceleration

One of the main findings of this research is to understand that one size does not fit all when referring to start-up accelerators. Accelerators are catalysts that should be shaped to the community they are serving or to the purpose they are targeting. For example, an accelerator in a mature ecosystem, from the entrepreneurship point of view, tends to be more concentrated on the input metrics, i.e. how to attract the best teams from all over the world; whereas an accelerator aiming at boosting the local economy is more concentrated on the process and on the output aspects, like the financial viability.

In the case of PTS Granada, the main challenge is the lack of a strong entrepreneurial culture. The interactions between the stakeholders in our initial framework (entrepreneurs, universities, corporations, venture capital and government) are weak, as perceived by our survey respondents.

The PTS Granada Accelerator would need to work on creating these links in the stages before and after the acceleration process (in addition to during the acceleration).

4. Pre-acceleration

A vibrant local entrepreneurial culture will be essential to ensure a healthy pool of applicants. PTS Granada should put some effort into nurturing the entrepreneurial culture on the campus and the dialogue among its diverse community. Some actionable initiatives are:

- Multidisciplinary hackathons: with the purpose of bringing together healthcare professionals presenting their challenges, healthcare students and IT students, professionals looking for solutions, and people with business intuition and training to bring the market perspective.

  These workshops can have a three-day structure, where the first day people pitch problems and teams are formed around those problems to find a solution. The second day teams work together on defining their proposition, doing market

research and studying solution viability. On the third day team presents and awards are given.

- Undergraduate entrepreneurship and innovation workshops: these programs can be concentrated in 4 weeks or extended over a semester. The idea is to select a cohort of interdisciplinary students from the University of Granada to follow a special program in innovation, prototyping, and how to generate a business model. The students in the end will be able to identify problems, apply innovative ideas to its solution, create a prototype and write a business plan (including pitching).
- Celebrate entrepreneurship: organize events throughout the year to train entrepreneurial skills (pitching, patents applications, entrepreneurial finance, grants, etc.) celebrate entrepreneurship (prizes), talk about the challenges, and tell the success stories of PTS entrepreneurs. For example, in Conference Format or TEDx talks of entrepreneurial experiences.
- Inbound marketing: Be a reference content creator of digital health entrepreneurship material in Europe, as Rock Health is doing in the U.S. It can be used as a training material and as an attraction material for future applicants and investors.

Overall, PTS Granada should be a forum where concrete problems are identified and shared within a multidisciplinary community.

Table 12. Pre-acceleration actions

Dimension	Action
Culture	Media presence (interviews in mass media, such as radio and TV) Undergraduate entrepreneurship Public recognition (prizes) Inbound (content) marketing
Dialogue (problems identification)	Hackathons Workshops Events

5. **Post-acceleration**

Financing

One of fundamental challenges entrepreneurs face is surviving their cash-burning rate after the acceleration, as the interviewees in our research have recognized both in multiple choice and in open questions. In Spain, due to the existing culture, business angels are scarce. In entrepreneurial economies, angel investors cover the *Death Valley* between F&F seed capital and venture capital. This uncovered gap is a capital problem in the Spanish entrepreneurial ecosystem.

One way European countries are reacting to this cultural issue is by offering a variety of public funding programs to support innovation. These programs are available at different levels of administrations and accelerators should include information about them in their programs.

Crowdfunding

A more innovative way to overcome finance barriers, although still under regulation discussions, is crowdfunding. Crowdfunding has many advantages, such as making it possible to gather money from many investors or getting a measure of the market demand for one's product. However, its efficacy as a financing vehicle is still unproven. For example, (Agrawal, Catalini and Goldfarb 2011) shows that you usually need a local investor to signal quality in the projects. Regulation, still under discussion in many countries including Spain (a draft law has been presented in February, 2014), is undefined regarding the quantities that non-accredited investors are allowed to invest, as well as in the otherwise confidential information the company would need to share to be able to advertise their equity in a crowdfunding platform. The crowdfunding draft bill presented in Spain in February 2014 proposed a limit of 3,000 euro per transaction and 6,000 euro per investor and year[24] that is considered insufficient by the industry.

[24]Government of Spain web site, http://www.lamoncloa.gob.es/ConsejodeMinistros/Enlaces/280214-informeanteproyectos.htm, accessed on April 2014

Community

The second issue after the acceleration period is less tangible, but more pervasive: the support of the community as entrepreneur. Spain still needs to work on developing a culture of celebrating entrepreneurship and the learnings that come with failure. Attractive opportunities offered to entrepreneurs who fail in one project can be an appealing incentive for young professionals who do not want to jeopardize their professional careers. In that sense, specific programs, such as the support of corporations in employing "failed" entrepreneurs, can be very powerful.

Table 13 summarizes the suggested actions in the post-acceleration phase.

Table 13. Post-acceleration actions

Dimension	Action
Financing	Investors - Public development programs - Corporate strategic investors - Venture debt from partner institutions - Crowdfunding Online due-diligence tools
Community building	Talent pool (promote exchange of employees, interns, etc.) Promote giving back to the community Mentorship Events and incentives to share and exchange Interact with other accelerators (GAN or more mature state)

Chapter 5 – Future Work

1. Metrics

The job of an accelerator is to catalyze the interactions between the stakeholders of the entrepreneurial ecosystem. In order words, to facilitate interactions between entrepreneurs, investors, universities, corporations and government, at the same time as it offers training to entrepreneurs and safer investment opportunities to VCs.

The ultimate goal is to revitalize entrepreneurship and help quality teams to scale up and become successful ventures. This process requires time, and is difficult to measure. How can we answer the question of whether the accelerator was actually a key ingredient in the success of a venture? How much more wealth has been created thanks to the accelerator?

Further research is needed to identify the right input, output and process metrics to measure the intrinsic impact of an accelerator on an ecosystem.

2. Recommendations to Policy Makers

Government is a powerful stakeholder, not only as a source of financing but also as a shaping agent of the economic conditions in a location. What are the best policy recommendations for legislation (e.g., bankruptcy and intellectual property protection), taxation and infrastructure to support entrepreneurship?

Some work (Lee, et al. 2011) relates the bankruptcy legislation and culture with the entrepreneurial activity in a country. Further research on policy makers' impact could help in defining a friendlier business environment to promote innovation-driven entrepreneurship.

3. Healthcare and Entrepreneurship: How to Make it Modular

The reason for the explosion of entrepreneurship in IT and computer sciences is the modularity achieved in these domains. One can use pieces of code from other software developers, call a web service remotely, or build a platform on top of other technologies.

Modularity detonates innovation to make it possible to play with countless combinations and to make smaller the minimum piece of work that introduces value in the chain.

Pharmaceutical companies are struggling with how to incorporate outside innovation into their R&D processes[25].

How can we help healthcare innovation become more modular in the future, in a way that patients or hospitals can plug-and-play different modules to receive their dreamt of service? A study on how to translate the accessibility of IT to healthcare, incorporating higher quality standards, is an important area of future research.

[25] From conversations with a Pfizer R&D executive

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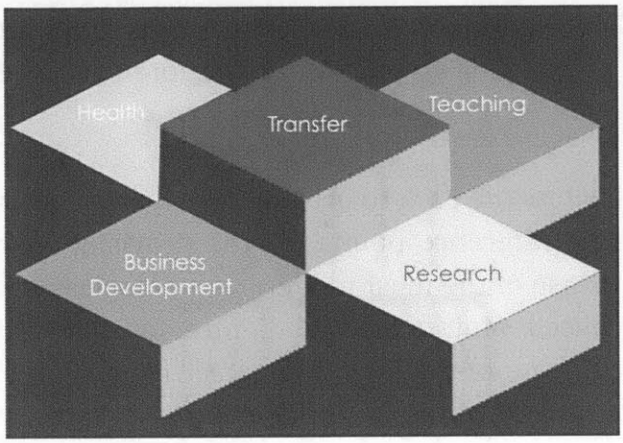
Appendix A – PTS Granada Focus Areas

The activities of PTS Granada focus in four main areas: (1) Business Development and Innovation, (2) Research, (3) Healthcare and (4) Education.



In the Business Development and Innovation area of PTS Granada some companies have their own buildings: Rovi, Telefónica, International Institute of Flebology, Master Diagnostic, Medina, NeuronBP, Servilens, Vircell, Inves Biofarm, Ibermutuamur and Pfizer. In addition to that, the European Business Innovation Centre (BIC Granada) is currently hosting 65 companies employing more than 500 people and a new Business Center promotes the creation of technology-based companies, with a particular focus on life and health sciences, bioinformatics and biohealth.

The Pharmaceutical Development Centre has the goal of research and development of medicines, studying new ways in which to use drugs, manufacturing essential medicines and/or "orphan" medicines, supporting public institutions in the manufacture of batches for clinical tests and carrying out studies into bioavailability, bioequivalence, pharmacokinetics and quality control. In the field of Nutrition and Food Technologies, research is centered on the design and application of biotechnology solutions which meet the new demands of the market, such as functional foods, dietary supplements, enriched foods and diets for special groups of patients. Also, CIDAF aims to generate new scientific knowledge transferable and oriented applications useful in the design, production and characterization of Functional Food and Nutraceuticals, safe and healthy, addressing all stages of R & D and transferring the results to the productive sector to add value. Provides with scientific support and equipment (pilot production plant) to the companies operating in the sector of Functional Foods and Nutraceuticals located in the PTS Granada, and more specifically in the business incubator of the BIC.

In the research area, PTS Granada promotes initiatives to foster basic clinical research in the field of health and biomedicine using its prestigious, advanced research centers, placing

Granada at the forefront of biotechnology and health research. The López Neyra Parasitology and Biomedicine Institute (IPBLN), which is part of the Spanish Council for Scientific Research (CSIC), is a reference point in biomedical research both nationally and internationally, especially in the fields of Immunology, Molecular and Cellular Biology and Infectious Diseases. The Biomedical Research Centre, which incorporates and coordinates the Andalusia Tumor Bank Network and the DNA bank, employs groups of highly qualified researchers and aims at bringing Andalusia at the forefront of biomedical research in Europe.

The healthcare area will allow the park to provide high quality health care for the people of Granada, and will become reference points for the provision of health care throughout Andalusia thanks to their use of the most modern technologies available in the health care sector today. The Advanced Multifunctional Centre for Simulation and Technological Innovation (CMAT) has state-of-the-art automated robots, virtual reality simulators, advanced multimedia and retransmission equipment and highly realistic training areas. The University Hospital will cover an area of 110,000 m^2 over its nine floors, and will have 700 beds and 132 consulting rooms in its in-patient area, as well as spacious waiting areas and administrative offices for medical and nursing staff. The surgical block will include 26 operating theatres divided between the General Surgery, Major Outpatient Surgery, Casualty and Obstetrics departments.

In the education area, the faculties of Medicine, Dentistry and Pharmacy, as well as the University School of Life Sciences, which complement the existing Advanced Multifunctional Centre for Simulation and Technological Innovation (CMAT), highlights the emphasis that the people behind this ambitious project place on a complete educational background which serves to guarantee excellent results both in healthcare services as well as in the ever-changing field of biomedical and pharmaceutical research. The university teaching area, along with the shared facilities of the Central Library, the Main Hall and the General Services Building, will occupy around 25 percent of the total service area of the Granada Health Technology Park, boosting the activity and dynamism of the healthcare park.

Appendix B – Survey

More than forty interviews were conducted to collect the opinions of the different stakeholders about this research. Interviewees include MIT professors, venture capitalist, healthcare professionals and entrepreneurs.

1. Online Survey Questions

Survey questions transcript:

The Granada Health Technology Park, in collaboration with the Martin Trust Center for MIT Entrepreneurship, is working on the creation of a Digital Health Accelerator (a program to develop startups in the intersection between Information Technologies and Healthcare).
We would love to know your point of view to make informed decisions when designing the accelerator for this particular ecosystem.

Which of the following collectives do you belong to? *(Required)*

- Entrepreneurs
- Universities
- Financial Sector
- Corporations
- Healthcare professionals
- Government
- Other

What is your sector?

- IT
- Healthcare
- Other

What is the main challenge for Digital Health entrepreneurs in Granada / Andalusia /Spain? *(Open question)*

Choose the top three resources a Digital Health accelerator should provide *(Required)*

- Seed capital
- Business administration training
- Mentors with experience in Digital Health
- Prestige
- Access to Venture Capital

- Pilots with patients or in hospitals
- Legal advice
- Access to cutting edge research
- Mixers with other collectives
- Healthcare specific training
- Sales and marketing guidance

What are the implementation problems the accelerator should overcome?
(Open question)

What is the main success metric for this accelerator? *(Required)*

- Number of companies created out of the program
- Raised capital
- Jobs created
- Applications received
- Number of patents (created or incorporated in projects) / Technology transfer
- Financial impact on the healthcare system
- Improvement of the healthcare system (more patients covered, more patient satisfaction, time saved, etc.)
- Other

Within Digital Health, which areas will have more projection at Granada Technology Park? *(Required)*

- Analytics / Big Data
- Electronic Health Record platforms
- Healthcare administration tools
- Sensors (including devices and wearables)
- Specialist discovery services, scheduling services
- Remote patient monitoring
- Telemedicine or alternative site care delivery
- Wellness services
- Digital therapy
- Digital diagnostic
- Adherence control
- Other

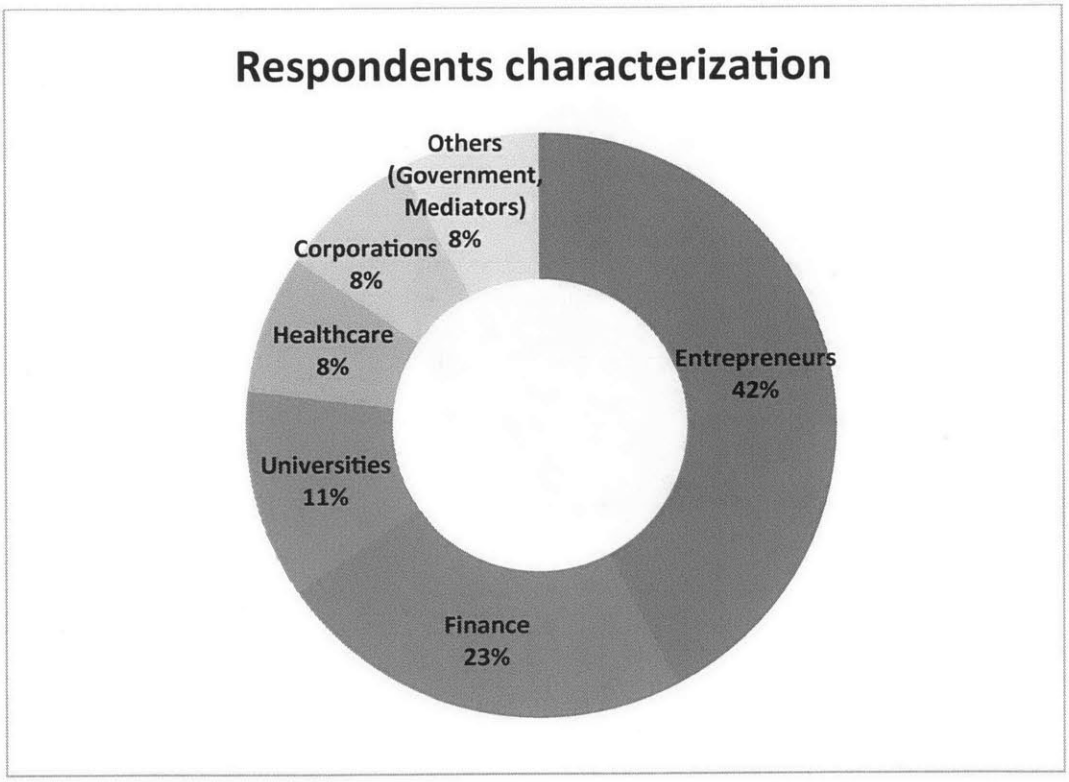
What else would you like to add?
(Open question)

2. Respondents Characterization

Question: Which of the following collectives do you belong to?

The on-line survey was answered by 27 professionals, out of them 42% were entrepreneurs, 23% were financial professionals, and the rest include stakeholders affiliated to universities, corporations and healthcare.

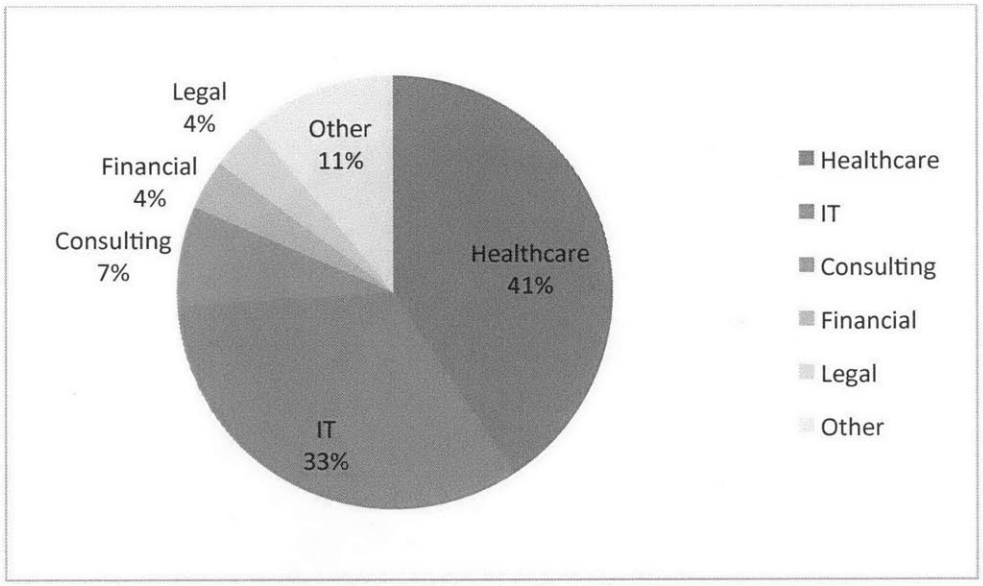
Figure 10. Survey respondents professional field



Question: Which is your sector?

When asked about their sector, roughly one third of the respondents belong to healthcare, other third belongs to IT and the remaining third belongs to consulting, financial, legal, or other sectors.

Figure 11. Survey respondents professional areas



Appendix C –Mentors

PTS Granada has a access to a strong network of professionals, from recognized physicians to successful entrepreneurs in healthcare. This a list of people we contacted and that showed interest in collaborating as mentors (in alphabetical order):

- **Ernesto Almansa:** Head of Granada Center at PDI - Telefónica Digital.
- **Luis del Arbol:** Product Manager of Granada Center at PDI - Telefónica Digital.
- **Juan Cabrera:** inventor of Varithena™ (polidocanol injectable foam) for the treatment of patients with incompetent veins and visible varicosities of the great saphenous vein, recently approved by the US Food and Drug Administration (FDA).
- **Mercedes Delgado**: Assistant Professor in the Department of Strategic Management at the Fox School of Business. She serves as a Senior Institute Associate at the Institute for Strategy and Competitiveness (ISC) at the Harvard Business School. Before joining Temple University, she completed postdoctoral fellowships at the ISC and at the NBER's Innovation Policy and the Economy Group.
- **Roberto Gili**: Promoter of the Master in Business Innovation (MBI) at the Polytechnic University of Barcelona; business angel at CrowdCube Spain and Galgo Medical; member of the board of the Blood and Tissue Center of Catalonia.
- **Daniel Giménez:** serial entrepreneur, Trovis Founder, mentor at Wayra.
- **Hugh Ilyine**: CEO at DestiNA Genomics.
- **Robert Istepanian**: professor of Data Communications for Healthcare delivery at Kingston Universty, London.
- **Paloma Lillo**: Corner Stone co-founder. Motivational speaker at IE Business School. Impact Weekend mentor. Head of Pangea Official Ecosystem. Social entrepreneur. Startup advisor.
- **Paul Lizardi**: PhD in Molecular Biology and Entrepreneur, Paul has more than 15 years professional experience as R&D professional in the USA. He has created more than 10 patents that have been commercially used, has a wide knowledge of Intellectual Property development and has worked as consultant for top biotech companies. He will be working for 6 months at Genyo, at PTS Granada.

- **Juan Martínez Barea**: MIT Sloan MBA, healthcare entrepreneur and business school professor.
- **Lourdes Nuñez**: Director of Knowledge Transfer at PTS Granada, PhD in Microbiology and MBA at IESE. Lourdes has more than 10 years experience in the healthcare industry. MIT REAP Team.
- **Ignacio Ochoa Mendoza**: Director of Government and Businesses for the South Region at Telefónica España. MIT REAP Team.
- **Lluis Pareras**: President of the Official Medical Association of Barcelona (COMB) and Executive MBA at IESE. He recently published the book "Innovation and Entrepreneurship in the Healthcare sector" (2007).
- **Carlos Reines**: RubiconMD co-founder and MBA by Harvard Business School.
- **Juan Santanella**: patent examiner at the Spanish Patent and Trademarks Office, and Associate Professor at the Charles III University of Madrid.
- **David Whitcombe**: founder of DXs. He worked at Astra-Zeneca prior to launching DXs.

Appendix D – iCap and eCap Figures

METRIC	DESCRIPTION	2012 (or most recent year)	Region/ Country	SOURCE
Population	Population in country	46,217,961	Spain	WDI
	Population in region	8,286,382	Andalusia	OECD
	Human Development Index	0.89	Spain	Human Development Reports
	Gini Coefficient	0.34	Spain	OECD
Wealth	GDP/capita ($)	24,087	Andalusia	OECD
Innovation Capacity	**METRIC DESCRIPTION**	**2012 (or most recent year)**	**Region/ Country**	**SOURCE**
iCap Performance	Number of Patents Filed/ year	179	Andalusia	OECD
iCap People	Number of STEM graduates/ year	45,728	Spain	OECD
iCap People	Number of Doctorate Graduates	8,747	Spain	OECD
iCap Funding	Gross R&D Expenditure/ GDP	1.21	Andalusia	OECD
iCapacity Infrastructure	Top 3 research institutions	University of Granada, University of Sevilla, University of Malaga	Andalusia	
iCapacity Policy	Intellectual Property Protection Ranking (1-7)	3.89	Spain	GCI
iCapacity Incentives	Celebrated Regional Innovation	International Institute of Phlebology IIDF, FDA approval (MIT TR35 award)		PTS Granada
iCapacity Demand	GDP/capita	24,087	Andalusia	OECD
Entrepreneurial Capacity				
eCap Funding	Total Venture Capital Investment (M€)	158.8	Spain	ASCRI
eCap Funding	Total Venture Capital Investment (M€)	16.2	Andalusia	ASCRI
eCap Funding	Seed Investment (M€)	12.5	Spain	ASCRI
eCap Funding	Start-Up Investment (M€)	90.5	Spain	ASCRI
eCap Funding	Other Early-Stage Investment (M€)	55.9	Spain	ASCRI
eCap Funding	Domestic Entity (M€)	133.4	Spain	ASCRI
eCap Funding	International Entity (M€)	25.4	Spain	ASCRI
eCap Funding	Public funds (CDTI / Enisa) (M€)	60.9	Spain	ASCRI
eCap Funding	Accelerators & Business Angels (M€)	10.9	Spain	ASCRI
eCapacity Performance	Number of S & C corps incorporated/year	81,027	Spain	World Bank
eCapacity People*	Total Early Stage Entrepreneurship	5.8	Spain	GEM
eCapacity Infrastructure	Top 3 business parks, innovation hubs or accelerators	PTS Granada, PTA, Cartuja 93		
eCapacity Policy	Number of days to start a business	23	Spain	World Bank
eCapacity Incentives	Celebrated Regional Entrepreneurs	Iactive, Axesor, Rovi, NeuronBio, Era7	Granada	PTS Granada
Clusters	Top 3 industry clusters	Health PTS Granada Cluster, ICT Innovative Cluster, Andalusian Aerospace Cluster	Andalusia	PTS Granada