

# The role of social capital for university start-up incubation: A multi-level compari- son of USA and Europe

Endbericht zum Jubiläumsfondsprojekt Nr. 15500 der Österreichischen  
Nationalbank

Georg Furlinger  
Karl-Heinz Leitner



The role of social capital for university start-up incubation: A multi-level comparison of USA and Europe

Endbericht

Georg Furlinger<sup>1</sup>  
Karl-Heinz Leitner<sup>1</sup>

Endbericht zum Jubiläumsfondsprojekt Nr. 15500 der Österreichischen  
Nationalbank

AIT-IS-Report  
Vol. 123, März 2016

<sup>1</sup> AIT Austrian Institute of Technology GmbH  
Business Unit Research, Technology & Innovation Policy



# Contents

---

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Theoretical background</b>	<b>2</b>
2.1	Network approach to business incubation	2
2.2	Academic entrepreneurship as a multilevel phenomenon	2
2.3	University spin-offs and start-ups	3
2.4	Model to assess university startup development	3
2.4.1	Universities as incubators	4
2.4.2	Actors in the ecosystem	4
2.4.3	Spin-off development domains	7
<b>3</b>	<b>Research questions and hypotheses</b>	<b>8</b>
<b>4</b>	<b>Methodology and data</b>	<b>9</b>
4.1	Survey	10
4.2	Sample and data description	11
<b>5</b>	<b>Results</b>	<b>13</b>
5.1	Research and non-research actors supporting university startup development	13
5.2	Social capital of university startups in the USA and Europe	16
5.2.1	Continent level comparison	17
5.2.2	Country level comparison	17
5.2.3	City region level comparison	18
5.2.4	The role of Startup Support Organizations	19
5.2.5	Sources of funding for university startups in the USA and Europe	20
<b>6</b>	<b>Conclusion and implications</b>	<b>22</b>
	<b>References</b>	<b>23</b>
	<b>Appendix: Questionnaire</b>	<b>26</b>

---



# 1 Introduction

The transfer of scientific knowledge to the market through the creation of science-based start-up companies (sometime called “spin-offs”) has raised great attention in the last years for good reasons: First, USOs are found to develop more innovative products than their technology counterparts without academic origin (Blair and Hitchens 1998). As high innovative inventions come with high uncertainty, they are unattractive for larger establishment - therefore, commercializing academic research through USOs brings technologies to the market, that otherwise would be left undeveloped (Etzkowitz 2003). Second, this results in the creation of jobs that require highly educated personnel (Shane 2004), which offers opportunities to local talents and thus can help curbing brain drain (McDevitt et al. 2014). Third, these jobs can be interpreted as more secure than others in another new venture when comparing their survival rates: Taking ETH Zurich, Switzerland, as an example, 90% of the 153 spin-offs that were founded between 1998 and 2008 were still in business after 5 years (Veugelers 2014). At the same time the number of startup support organizations at universities (e.g. tech transfer offices, university incubators and accelerators) is growing every year and there is an ongoing discussion about which kind of support methods are most effective in fostering university startup and spin-off development.

The initial aim of this study was to conduct a comparative analysis of (university) incubators in Europe and the US and to identify factors that make them incubators successful.<sup>1</sup> In the meantime, however, two incidents lead to a slight shift in the focus of this project. First, the Swedish UBI Index program<sup>2</sup> was started and is dedicated to analyze university incubators and accelerators around the world. Hence, starting another research project that focuses as well on benchmarking of the same set of institutions did not make sense. Second, one of the project researchers spent three month working with the accelerator program *StartX* of the Stanford University and interacted with the staff, founders, mentors and other stakeholders involved in the program. Research conducted by the *StartX* management has shown that successful entrepreneurs – compared to those that fail – were able to build a system of people (cp. social network) around themselves that helps them to get their venture off the ground and grow it. Once they have established this system the probability that they will succeed (multiple times) increases dramatically. *StartX* has recognized the importance of interpersonal relationships and – besides offering other services and resources - leverages the exchange among the founders within the program to learn from, motivate, and support one another (cp. community). Furthermore there program provides committed and engaged mentorship from hundreds of Silicon Valley veterans who support the entrepreneurs with know-how, feedback and contacts in the ecosystem (Fürlinger & Leitner 2015). The main learning from *StartX* and Silicon Valley is that the most crucial contribution a startup support organization (cp. incubator, accelerator, etc.) can provide is access to the most important resource overall – the right people.

These insights from the observational research in Silicon Valley, together with scientific findings in the field (see Theoretical Background chapter) suggested to examine the impact of social capital on university start-up development and performance. Furthermore, the research project switched to a more holistic approach to understand academic entrepreneurship and university start-up creation. On the one hand, the actors and the institutional factors in the surrounding ecosystem were taken into account and, on the other hand, the analysis of the startup support organizations’ role has changed from a property-based approach towards a social networks/capital approach of incubation.

<sup>1</sup> The original title of the research proposal was: „Die Rolle von Hochschulinkubatoren im Start-Up Prozess - Eine Analyse zwischen USA und Europa“.

<sup>2</sup> <http://ubi-global.com/>

## 2 Theoretical background

### 2.1 Network approach to business incubation

Recent theoretical developments suggest that the likelihood of value creation increases when the incubator is structured as a strategic network. So incubation gets defined as the process that enables new businesses to create value by embedding them in a network system that provides extensive powerful business connections (Hansen et al 2000). Hackett and Dilts (2004) define incubation as a strategic, value-adding intervention system within a network context. An incubator network therefore is a generic network available to each incubating firm. Hansen et al. (2000) employ network theory (Nohria and Eccles 1992) to argue that primary value-added feature of networked incubators is the set of institutionalized processes that carefully structure and transfer knowledge throughout the incubator network in order to create conditions that facilitate the development of incubatees and the commercialization of their innovations. The importance of the network design factor is supported by research that concludes that network relationship-building is the most important value-added component of the incubation process (Lichtenstein 1992). Rather than locate the incubation process either inside the incubator or in the local community, network theory asserts that the incubation process includes and transcends the incubator (Hackett and Dilts 2004).

Hence, the emphasis is placed on the network effect the incubator has rather than its physical location. Incubation is a process, not a place. Hence, the perception of an incubator moved from an isolated to a networked entity (Etzkowitz 2002). Through interactions within the network incubating firms generate social capital, which can create substantial value and, ultimately, increase performance (Kambil et al. 2000). By providing meaningful relationships that help to access needed knowledge and resources support institutions for (potential) entrepreneurs, like incubators, reduce the cost of acquiring knowledge by saving considerable time and search costs. Hence, the major advantage that incubation offers are the means to overcome the new ventures' liability of newness (lack of experience and reputation).

### 2.2 Academic entrepreneurship as a multilevel phenomenon

In order to understand what drives individual behavior one has to understand the importance of the social context within which economic action is embedded. That economic action is not solely the function of the self-interest of the individual or other social entity (e.g. organization), rather, economic action is also influenced by the web of social relationships and institutions in which the individual or organization is embedded (Kenney & Goe 2004): In case of a university the individual faculty member is a member of a department, an important organizational sub-unit of the university that has a certain measure of autonomy, and the department is embedded in the larger university. In turn, the university is embedded in an exogenous environment (cp. ecosystem) at the regional, national, and international levels.

Building on these insights, the overall finding is that academic entrepreneurship and spin-off generation is a complex phenomenon that needs to be examined on different levels: The micro level focuses on the entrepreneur and the team behind the new venture. The university (and department) the new companies are spinning-out from and its support infrastructure, like incubators and accelerators, are the second level (meso level). And third, the cultural and institutional environment (cp. ecosystem) in which these startup activities are taking place (macro level).

On the macro level the influence of political, economic and cultural factors on university spin-off generation and development was examined. In order to answer the research question "*How does the surrounding entrepreneurship ecosystem (cp. cultural and institutional environment) influence university spin-off development in the USA and Europe?*" the new research approach of "entrepreneurship ecosystems" led the way. Focusing on the differences between USA and Europe in terms of the surrounding ecosystem several factors were identified that support (academic) entrepreneurship (Fürlinger 2014): Policy, for example, has certain means to create a favorable environment for inno-

vation and entrepreneurship by altering the framework conditions (Fuerlinger et al. 2015). However, culture is the foundation for any entrepreneurial ecosystem and sets the parameters for how people perceive risk and influences them in their decision to start a company or not.

With respect to the university level it became clear that the role of the university in our society is changing towards an “entrepreneurial university”. This concept emphasizes economic development in addition to the more traditional missions of teaching/education and research. Following their counterparts in the USA also higher education institutions in Europe are adopting new policies and starting new initiatives to foster entrepreneurial spirit among their faculty, employees and especially students. In particular support organizations like incubators and accelerators are widely adopted and there is an open discussion about how such support institutions can actually foster spin-off development. In order to answer this question one has to understand the underlying social dynamics between the academic entrepreneur and the actors in the surrounding entrepreneurship ecosystem.

## 2.3 University spin-offs and start-ups

In his seminal work on MIT spin-offs Shane (2004) defined a spin-off as “*a new company founded to exploit a piece of intellectual property created in an academic institution*”. He focused only on spin-offs that disclosed their intellectual property to university administration and protected it by legal means (cp. patents). But he did not take into account the *informal ways* of tech transfer in cases where the inventor chose to circumvent the Tech Transfer Office and the IP or knowledge found its way to the market through different means. The problem is that even though it is prescribed by law many university scientists in the United States do not disclose their inventions to their university (Siegel et al. 2003). University administrators will therefore have an interest to better understand the determinants of informal technology transfer given their objective to create revenues for the university. Whereas formal technology transfer is a mechanism to allocate property rights whereas informal technology transfer is much more about communication among individuals (Grimpe & Fier 2014). Some authors (Siegel et al. 2003) argue that formal and informal technology transfer may go well together. Informal contacts can improve the quality of a formal relationship and formal contracts are usually accompanied by an informal relation of mutual exchange on technology-related aspects. Hence, more general a spin-off can be defined as “*a new venture initiated within a university setting and based on technology derived from university research*” (Rasmussen and Borch 2010).

On the other hand an academic or university startup is a wider term referring to a new company founded by people who were or are working in science or at a university, respectively. In comparison those kind of companies do not necessarily depend on new research findings or new scientific processes/methods/skills developed at the university (Egelin et al. 2007). Hence, university startups are founded by people who recently started to study, were studying at the time of founding or ones that have dropped out of their studies. Furthermore, it could be people who work/ed at a scientific institution (cp. university).

## 2.4 Model to assess university startup development

An entrepreneur is embedded in social networks that influence the development and performance of the spin-off or start-up. These social networks exist within the universities and between the university and its surrounding ecosystem (industry/market). A specific challenge for universities for building competencies in technology transfer is the existence of both internal and external intermediaries. The former support the commercialization of research results, whereas the latter are bridging the academic and commercial context (Wright 2009). Internal intermediaries are defined as the actors within the university (= department colleagues, research colleagues in other departments and tech transfer office (TTO) members). External intermediaries are all other actors outside the university network. Along those lines startup support organizations (like incubators and accelerators) can be defined as intermediary organizations per se since it is their mission to bridge the gap between science/academia and business/market, by providing a support network for their tenant companies.

The probability of a successful innovation is positively correlated with the size of the region to be searched for knowledge with the size of the search-region itself depending on the expansiveness and heterogeneity of the entrepreneur's social network. Hence, the ability of an entrepreneur to access different sources of knowledge is determined by the size and heterogeneity of his/her effective networks (Leyden et al. 2013). The entrepreneur's network effectiveness is assumed to be a positive function of the heterogeneity of the entrepreneur's social ties and past experiences (i.e. the entrepreneur's social network). Therefore policies should be considered that are directed to increasing the heterogeneity of sources of knowledge that the entrepreneur relies on (Leyden et al. 2013).

#### **2.4.1 Universities as incubators**

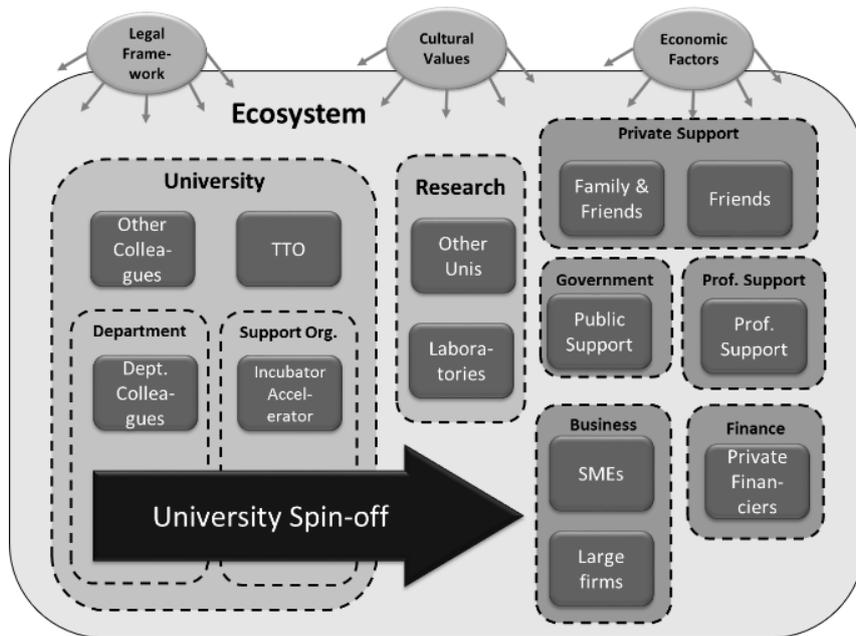
Fetters et al. (2010) describe a university entrepreneurship ecosystem (UEE) as a multidimensional enterprises that support entrepreneurship development through a variety of initiatives related to teaching, research and outreach. The outreach initiatives help to build a meta-ecosystem, linking the university to the regional/local entrepreneurship ecosystem. Hence, an UEE is an "*integrated and comprehensive, connects teaching, research and outreach, and is woven into the fabric of the entire university and its extended community for the purpose of fostering entrepreneurial thought and action throughout the system*" (Fetters et al. 2010, p. 2). Analogous Etzkowitz (2002) describes the university as a natural incubator that sometimes plays an informal entrepreneurial role in the incubation of companies.

The influence of the department from which potential academic entrepreneurship emerges has attracted little attention so far (Murray 2004, Bercovitz and Feldman 2008). Only limited research exists suggesting that the local work environment at the department level can influence the engagement of faculty in academic entrepreneurship (Bercovitz and Feldman 2008, Stuart and Ding 2006). It is easily conceivable that different departments exhibit different cultures either supporting or suppressing academic entrepreneurship.

#### **2.4.2 Actors in the ecosystem**

Industry networks and partners are outside the university are important for spin-off development to establish and grow their ventures because they offer capabilities and resources that academic entrepreneurs lack. Furthermore the connections maintained to partners in the industry could be another differentiator facilitating the tech transfer process or not. A schematic model of the actors within the university and in the surrounding ecosystem is depicted in the figure below.

**Figure 1: Multi-dimensional university spin-off model**



Source: own depiction

Business angels are usually successful founders or experienced managers who generated a considerable fortune, and now are willing to support emerging start-up companies in their endeavor. They invest in the early stages of a new venture and, thus, are closing a gap in the funding landscape, as banks usually do not provide loans to companies in this high-risk early phases. For business angels, next to altruistic reasons, the return rate and the founder or founding team is central to their decision making (Mason & Matthew 2004). They pay attention to the background and experience of the entrepreneurs and trust their personal assessment of whether he or she "has what it takes" to successfully build the company. For reasons of risk diversification experienced business angels therefore usually do not just invest in one young company, but in several at the same time (cp. investment portfolio). In addition, business angels support the founders through advice and feedback and open their personal network to them. Thus, they are not only financiers, but also take on an important role as mentor.

Many young companies, especially in the web and IT sector are encouraged to grow quickly, in order to stay ahead of their competition and not to lose market share. To be able to finance the scaling of the business, many companies need large sums of capital and therefore seek financing from a venture capitalists (or simply VCs). VCs are professional investors who invest large sums of capital from wealthy individuals or financial institutions (e.g. pension funds) in new ventures. The main interest of a VC is to increase the valuation of the new company they are invested in. If these companies are acquired by a large company or go public, the VC receives a share of the profits (usually around 20 percent). Still, investing in new companies is an extremely risky business and a difficult task - even for experienced VCs (Freeman & Engel 2007). But the role of VCs is not just that of the financier - analogous to the business angel a good VC helps a founder to build his company (Senor & Singer 2011). Active venture capitalists provide assistance in strategic decision-making and allow access to a wider network of business contacts (Hellmann and Puri 2002). Moreover, they can help to raise additional finance, recruit key employees and professionalize the company (Dushnitsky 2006). The assumption that increasing the supply of venture capital will automatically imply better support for high-tech small firms is falsified if venture capitalists provide "more money than advice" (Bottazzi & Da Rin 2005).

Governments in ecosystems with less maturity in venture capital funding provide capital to close the financing gap. This public support is essential to jump-start new business and fund especially the

earlier stages of a new venture. But by doing this to excessively the marketplace for venture financing gets distorted and private equity investors eventually move to other markets. To establish a link to the private investment market is important as the market applies the law of natural selection (Isenberg 2010, 2011). Furthermore, developing a functioning ecosystem also requires that public authorities and private companies jointly invest in promising areas and thus co-create the basis for sustainable innovation landscape and a dynamic entrepreneurship ecosystem together.

Building upon the work of Mosey & Wright (2007), Batjargal (2003) and Totterman & Sten (2005) we classified support actors in the non-research network in five categories and six actors groups (see table 1).

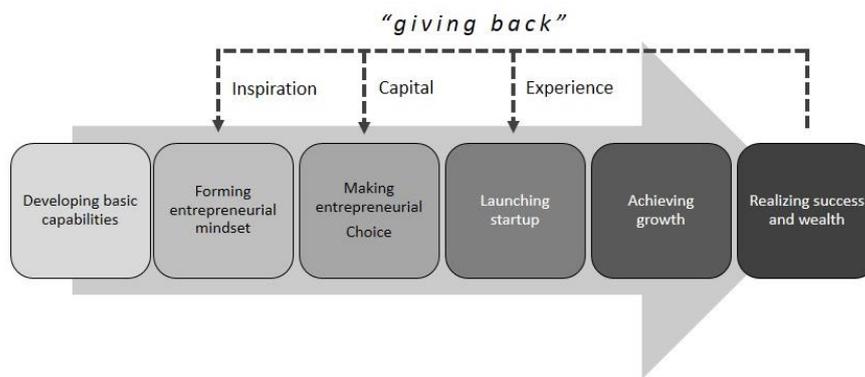
**Table 1: University start-up supporting actors within and outside the research network**

<b>Research Network</b>	<b>Non-Research Network</b>
<b>Inside university</b>	<b>Finance</b>
Department colleagues	Private Financiers (e.g. business angels, venture capital firms)
Other university colleagues	<b>Industry/Business</b>
Tech Transfer Office (TTO) or equivalent	Entrepreneurs & small businesses (SMEs)
<b>Outside university</b>	Large firms
Other universities	<b>Policy</b>
Research laboratories	Public support organizations (e.g. government grant providers, regional development agencies)
<b>Intermediary Organization</b>	<b>Support</b>
Startup Support Organization (e.g. incubators, accelerators)	Professional support actors (e.g. consultants, legal firms, accountants)
	<b>Private</b>
	Private support (e.g. family & friends)

Source: own list building on Mosey & Wright (2007), Batjargal (2003) and Totterman & Sten (2005)

One of the most interesting phenomena in a thriving entrepreneurship ecosystems is the rule of “entrepreneurship reinforcing entrepreneurship”. Many successful entrepreneurs become investors, advisors or board members of new ventures and provide capital, experience and connections to upcoming entrepreneurs. This, maybe most important, principle for a functioning entrepreneurship ecosystem can be referred to as “giving back” (see figure below).

**Figure 2: Successful entrepreneurs „giving back” to the community**



Source: own depiction

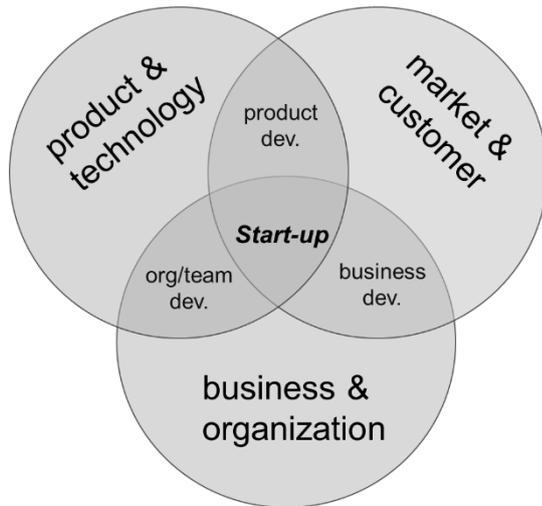
### 2.4.3 Spin-off development domains

The goal of technology-based spin-offs is to bring a new product or technology to the market through the establishment of a new organization (Bhave 1994, Vohora et al. 2004). In the process of creating a product or service around a technology by establishing a new business, spin-offs need to develop different forms of knowledge. A common distinction is made between technological knowledge (or product knowledge) and market knowledge (Burgers et al. 2008; Scillitoe and Chakrabarti 2010, Sullivan and Marvel 2011, Shane 2004). On the economic side the team should possess business, management and market knowledge as well as product development and production knowledge (Shane 2004). Technological knowledge (also called 'product(ion) know-how' - Shane 2004) refers to knowledge associated with technologies, products or processes and includes product design, manufacturing and optimization (Van Weele & Van Rijnsoever 2015). Market knowledge refers to knowledge about what customers need and how markets operate. It includes knowledge about potential customer's problems and preferences, as well as knowledge about market size, distribution channels, pricing and entry barriers, such as competition and regulations (Van Weele & Van Rijnsoever 2015). Besides the technological and market knowledge, spin-offs also need to develop business knowledge, which is also referred to as 'organizational knowledge', 'managerial knowledge', 'management know-how' or 'venture development knowledge' (Barbero et al. 2013; Becker and Gassmann 2006; Vohora et al. 2004, Shane 2004, Mosey & Wright 2007). Management knowledge refers to knowledge about how to start, manage and grow a business and includes knowledge on hiring employees, raising capital, defining a business plan and drawing contract. Building on these principles a new model of university startup development was derived for this study, focusing on three different development domains:

1. **Technological and product development:** refers to the transformation of new research findings, technologies and prototypes into viable products or services.
2. **Market and business development:** gathering market information and identifying customer needs as well as marketing and selling your products or services. Principles of customer development (Blank 2006), business model generation (Osterwalder et al. 2010) and the lean startup (Roes 2011) are central concepts.
3. **Organizational development:** starting, managing and growing a professional company. The integration of a complementary founder team of business, technology and design experts is as important as financial, legal and strategic aspects.

Following this model a startup or spin-off company is situated at the intersection of these three domains (see figure below) and needs to develop all three domains in parallel in order to be successful.

**Figure 3: Startup development domains**



Source: own depiction

The three domains described above are necessary to develop a great product or service that appeals to customers on the market and to build a scalable organization. In order to accomplish all that the entrepreneurs has to be resilient towards rapid changes in the environment and keep his or her emotional stability (Brüderle & Preisendörfer 1998). In many situations of daily operations encouragement is needed to cope with work-related stress. Different people in the entrepreneur's network, especially informal relations, satisfy those different socioemotional needs (Batjargal 2013) and provide the founder with the strength to overcome these challenges (= **emotional support**).

### 3 Research questions and hypotheses

The literature review revealed that structural holes between scientific networks (academics) and industry networks (financiers, professional managers, industry partners, potential customers) are one of the main barriers to successful tech transfer from university to the market (Mosey & Wright 2007). Thus, it became clear that more research (i.e. research gap) is needed to explore which kind of social networks allow potential academic entrepreneurs to access the know-how, expertise and resources needed to successfully develop their new venture. Hence, the study investigates how an academic entrepreneur's social capital (resources received from actors within and outside the university network) and the surrounding ecosystem (cultural and institutional factors) influence the success of university spin-offs in the USA and Europe. The specific research questions addressed are the following:

1. What is the difference between the social capital of university spin-offs in the USA and Europe?
2. To what extent does social capital affect the early stages of university spin-off development and their performance?
3. Who are the most important actors within and outside the research network and how do they support the early stages of spin-off development?
4. To what extent do spin-off support organizations at universities (e.g. incubators and accelerators) contribute to the development of the spin-off's social capital by providing contacts to actors outside the research network (cp. external networking)?
5. How does the surrounding entrepreneurship ecosystem (cp. cultural and institutional environment) influence university spin-off development in the USA and Europe?

Based on the literature review the following hypotheses were derived in terms of social capital impact on university startup development:

1. Research actors support technological and product development comparatively more than non-research actors
2. Non-research actors (esp. industry & business actors, public support actors) support market and business development comparatively more than research actors
3. Non-research actors (esp. professional support actors, private financiers) support organizational development comparatively more than research actors
4. Private support actors provide comparatively more emotional support than other support actors

In terms of the difference in social capital of university start-ups in USA and Europe additional hypotheses were formulated:

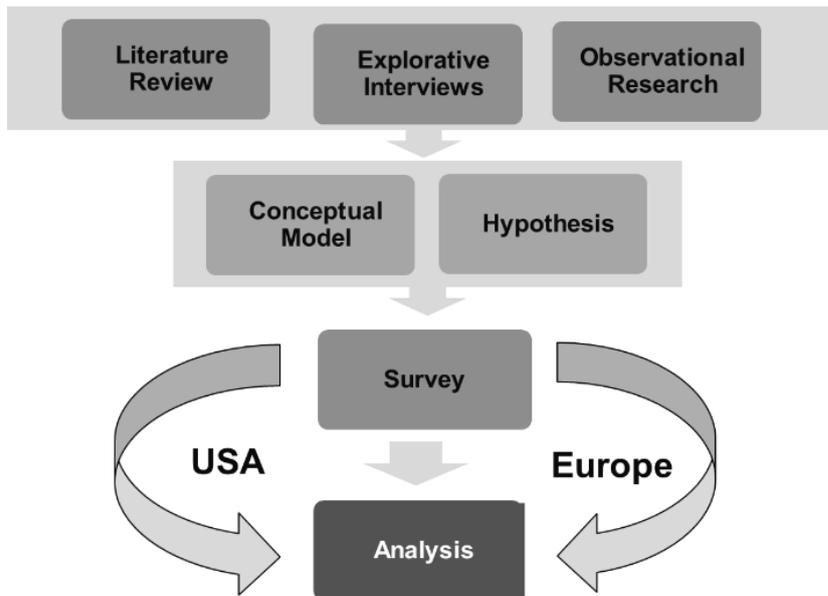
5. The main supporting actors differ between the USA and Europe
6. In Europe the central supporting actors are more often government related than in the USA
7. In the USA the central supporting actors are more often from the private sector compared to Europe
  - a. In particular spin-offs in the USA receive more support from private financiers than in Europe
8. Spinoffs in Europe receive more financial capital from government related actors than from private ones
9. Spinoffs from the USA receive more financial capital from private financiers than in Europe

## 4 Methodology and data

In order to answer the research questions a web-based survey was compiled and sent out to collect empirical data from university start-ups in the USA and Europe. For this study a new model of spin-off development was derived, focusing on three different development domains (technological and product, market and business, organizational). This new perspective on spin-off development is combined with a social network approach, allowing a quantitative assessment of the influence of actors in the entrepreneurship ecosystem on spin-off performance.

In a first step of the study a thorough literature review was performed and explorative interviews were conducted with research scholars and professors in the field, incubator managers, venture capitalists and startup founders themselves. Furthermore, observational research at Stanford's Accelerator Program StartX offered unique insights in one of the world's most prestigious accelerator program. The first steps in the research process revealed the importance of contacts and networking opportunities (social capital) for newly established companies and the important role startup support organization can play in this regard. Based on those findings a conceptual framework was developed and specific hypotheses with regard to the influence of social capital on spin-off development in the USA and Europe were derived. In order to verify those hypotheses a quantitative, large-scale, web-based survey was conducted among university startups that attended a startup support program in selected ecosystems in the USA or Europe. The data received from 409 respondents was analyzed by a number of statistical methods in order to investigate the research questions and test the formulated hypotheses.

**Figure 4: Methodological approach**



Source: own depiction

## 4.1 Survey

The aim of this study is to identify the influence of social capital in university start-up development. In particular it was examined who the most helpful actors in the ecosystem are and how they support academic entrepreneurship. For this reason it was necessary to ask the founders of the newly established companies a) about the actors in the ecosystem that supported them (cp. network structure) and b) how they supported them (cp. network content). The study also examines the role of startup support organizations (like incubators and accelerators, short SSO) in the development process of university start-ups. Hence, the survey was restricted to start-ups that also participated in such startup support programs on either side of the Atlantic. Furthermore there was a regional focus on companies and startup support organizations in Europe (Austria, Germany, Sweden and Switzerland) and USA (East and West Coast).

In a first step, the main entrepreneurship ecosystem/s in each country were identified (Vienna in Austria, Berlin and Munich in Germany, Zurich in Switzerland, Stockholm in Sweden and Silicon Valley, Boston and New York in the USA) and the main universities and their according SSO in each ecosystem selected. In the first place, we tried to contact the manager at each SSO to encourage him or her to partner with us in this study and encourage the tenant companies in their SSO to participate in the survey. This approach, however, turned out to be very time consuming and, with some notable exceptions, the results in terms of participating start-ups was limited. Moreover, since most of the SSO managers were reluctant to hand out their tenants email addresses, the survey was usually sent out through SSO personnel. Besides having a limited response rate there was also no possibility to track which of the companies has already filled out the questionnaire and which have not. This made it hard to selectively send reminders to those missing companies.

For those reasons the approach to receive survey responses was changed to a more direct one: most of the selected SSOs have a list of their tenant companies featured on their website. Based on this publicly available data we compiled our own database of university startup companies, containing founder's name, role email, company name, office email, phone number(s), website URL, founding year and short company description. This database enabled us to contact each company directly via email by addressing the founders with their names and also mention their company name in the email. Previous studies have shown that this kind of personalization increases the response rate. We

reviewed several online web survey tools, but opted for *SurveyMonkey* because of its usability, reliability and the easy transferability of data to the statistics software *SPSS*.

## 4.2 Sample and data description

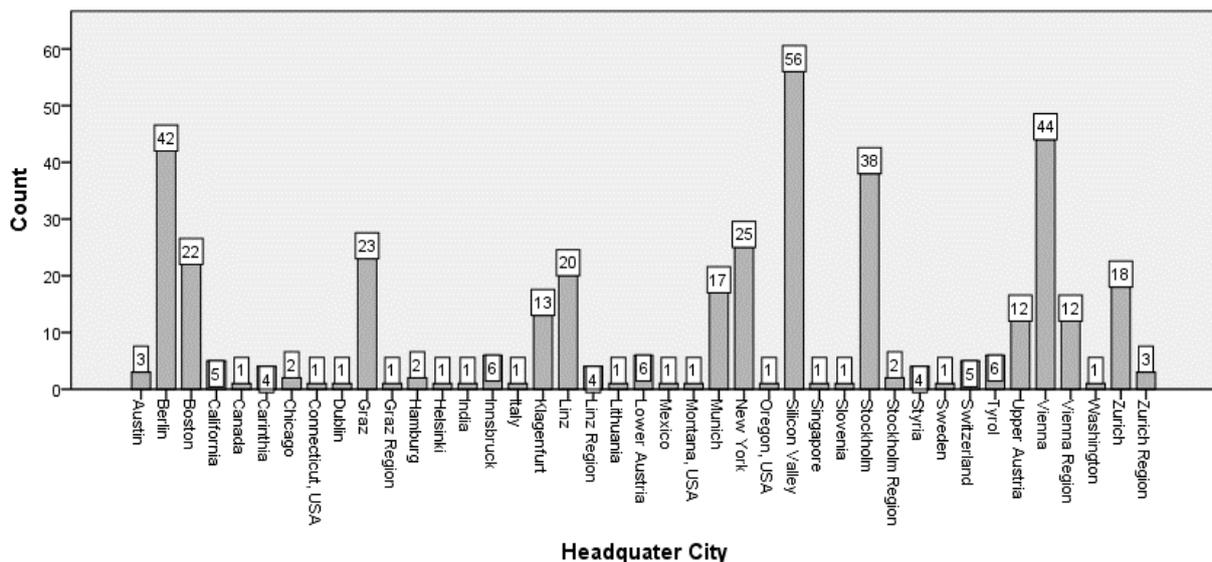
In total, across all countries, 2314 companies were invited to participate in the study and were reminded four or five times in the course of two month in which the survey took place. Responses from 409 university startups were received which is a total response rate of 18%. More specific numbers regarding the companies contacted and answers received are listed in the table below.

**Table 2: Survey details by country**

Country	Companies contacted	Completed surveys	Response rate
Austria	529	155	29%
Germany	402	64	16%
Sweden	182	40	22%
Switzerland	125	26	21%
USA	1076	124	12%
Total	2,314	409	18%

Across all countries 86% of the respondents are male and only 14% are female. The highest percentage of male founders was in Austria (90.9%) and the lowest in Sweden (80%). 72.3% of the respondents are younger than 40 years and 26% younger than 30. In terms of a differentiation of university spin-offs (dependent on new scientific processes/methods/skills developed at the university) and university startups (not dependent) we observe a close to 2 to 1 ratio of startups to spin-offs in Austria, Germany and the USA, whereas in Sweden this ratio is about 3 to 1. More descriptive analyses with regard to the respondents can be found in the figures and tables below.

**Figure 5: Company headquarter location**



**Table 3: Industry distribution**

Country	Total number of respondents (N)	IT/software	Life science/medical devices	Light manufacturing/hardware	Service, trade & other
Austria	155	45.2%	13.5%	22.6%	18.7%
Germany	64	39.1%	15.6%	14.1%	31.3%
Sweden	40	47.5%	20.0%	5.0%	27.5%
USA	124	34.7%	27.4%	16.1%	21.8%

**Table 4: Company founding year**

Country	Total number of respondents (N)	2009 and before	2010-12	2013/14	2015/not yet
Austria	155	20.6%	18.7%	31.6%	29.0%
Germany	64	6.3%	26.6%	35.9%	31.3%
Sweden	40	5.0%	30.0%	40.0%	25.0%
USA	124	8.9%	26.6%	40.3%	24.2%

**Table 5 Company development stage**

Country	Total number of respondents (N)	Research & opportunity framing	Pre-organization	Re-orientation	Sustainable returns
Austria	155	26.5%	20.6%	21.3%	31.6%
Germany	64	18.8%	15.6%	34.4%	31.3%
Sweden	40	20.0%	27.5%	35.0%	17.5%
USA	124	23.4%	24.2%	32.3%	20.2%

Stages refer to Vohora et al. 2004

**Table 6 Product/Service development stage**

Country	Total number of respondents (N)	Idea/concept, initial development	Tested on customers	Ready for sale or delivery
Austria	155	24.7%	29.2%	46.1%
Germany	64	25.0%	20.3%	54.7%
Sweden	40	15.0%	25.0%	60.0%
USA	124	22.8%	26%	51.2%

## 5 Results

In this section the results of the study, mainly referring to the findings derived from the survey data, are presented. The results will be structured with regard to the research questions stated in the previous chapter.

### 5.1 Research and non-research actors supporting university startup development

The discussion about who the most supportive actors are during the early stages of startup development lead to the following specific research question: *Who are the most important actors within and outside the research network and how do they support the early stages of spin-off development?*

The respondents were asked the following question: “Which type of actors have you used to develop your company?” (see question 35 in appendix). They could select none to all twelve types of actors that helped them build their company. The high percentage of startup support organization (short “SSO”) used can be explained through the sampling process: the contact details of the founders were retrieved from the websites of the selected incubators and accelerators. It does not sum up to 100% since some of the respondents might not identify their support organization as the type of organization it was asked for: SSO (Incubator, Accelerator, etc). The numbers presented in the table below are across all countries and do not differentiate between certain ecosystems. The comparative analyses are part of the following sub-chapter.

**Table 7: Support actors used by founders to develop their company**

Actor groups	Count	Percentage of sample size (N = 409)
Department colleagues	106	25.9%
Other university colleagues	96	23.5%
Tech Transfer Office	72	17.6%
Startup Support Organization	311	76.0%
Other universities	77	18.8%
Research laboratories	84	20.5%
Private financiers	162	39.6%
Entrepreneurs & Small Firms	151	36.9%
Large Firms	69	16.9%
Public Support	195	47.7%
Professional Support	226	55.3%
Private Support	239	58.4%

Upper six are research actors, lower six are non-research actors

Overall, all actors in the non-research field (besides large firms) were used more often than the actors in the research field (besides the SSO for previously explained reason). More than half of the respondents have been supported by their private network, like family and friends, and received professional support from consultants, accountants or lawyers. Almost 50% used public support actors, like governmental expert organizations, government grant providers and regional development agencies for example. In comparison, private financiers (cp. business angels and venture capitalists), entrepreneurs and small business owners were used only from slightly less than 40% of the respondents. This is an interesting finding and will be discussed in the sub-chapter on Europe and USA differences in more detail. On the research actors side we can identify department colleagues and

other university colleagues as the groups that were used the most to develop the start-up company – around one quarter of the founders has collaborated with either of the groups. With regard to research actors this is not surprising, since it can be expected that people closer to the founder (cp. at the same university) are more likely to be asked for support than people from other external organizations (e.g. other universities, research labs). Whereas in average (without SSO) 21% of the respondents have used research actors to develop their start-up, the percentage goes up to almost 40% for non-research actors. Hence, the latter group of actors was used almost twice as much by university startup founders.

We analyzed the frequency with which actors are used for company development. To gain a better understanding of new venture development a new model of university startup development was derived for this study, focusing on three different development domains (technological and product, market and business, organizational). This allows us to examine which actors were most helpful in each of this development domains. Specifically the research question was “*to what extent does social capital affect the early stages of university spin-off development?*” Based on scientific literature, a set of hypotheses was derived that assumed certain relationships between specific type of actors and their expected contribution to the development domains (see table at the end of this sub-chapter). We operationalized these hypotheses by a set of questions that were part of the survey (see question 36-39 in appendix). The respondents were asked to rank each actor group according to the level of support they received in each category (from 1...not at all useful to 5...very useful). Obviously the respondents only answered those questions if they have previously selected that they have used this actor in the first place (question 35). Hence, there is a different sample size for each of the actor groups.

**Table 8: Actors influence on university startup development domains**

Actor groups	Technological and product development	Market and business development	Organizational development	Emotional support	Average Score by actor (without emotional support)
Department colleagues	<b>3.80</b>	2.72	2.25	3.06	2.92
Other university colleagues	<b>3.57</b>	2.55	2.22	2.96	2.78
Tech Transfer Office	2.91	2.33	2.15	2.25	2.46
Startup Support Organization	3.29	<b>3.54</b>	<b>3.51</b>	<b>3.33</b>	<b>3.45</b>
Other universities	3.23	2.25	2.01	1.91	2.50
Research laboratories	<b>3.90</b>	2.21	1.77	1.97	2.63
Private financiers	3.36	<b>3.33</b>	3.05	2.87	<b>3.25</b>
Entrepreneurs & Small Firms	3.42	<b>3.43</b>	<b>3.23</b>	<b>3.36</b>	<b>3.36</b>
Large Firms	3.44	3.20	2.00	1.97	2.88
Public Support	3.48	2.64	2.48	2.12	2.87
Professional Support	2.89	2.97	<b>3.28</b>	2.25	3.05
Private Support	3.21	2.82	2.70	<b>4.38</b>	2.91

Upper six are research actors, lower six are non-research actors; Survey respondents selected level of support in each field (1...not at all useful to 5...very useful), the three highest scores in each domain are in bold

**Table 9: Average influence of actors in research and non-research field**

	Technological and product development	Market and business development	Organizational development	Emotional support	Average by field
Average across actors in research field	3.45	2.60	2.32	2.58	2.74
Average across actors in non-research field	3.30	3.07	2.79	2.83	3.00
Average across both fields	3.38	2.84	2.56	2.71	2.87

In order to check the hypothesis in terms of research and non-research actors' influence on the different development domains *paired-sample T-test* were conducted.

Even though we see higher support values in terms of technological and product development with some research actors (research labs and department colleagues) there is no statistically significant difference between research and non-research actors. This suggests that research as well as market know how is necessary for a successful transformation of new technologies (developed at universities) and prototypes into viable products or services. Hence, hypothesis 1 can be rejected.

Regarding market and business development the mean support values of SSO, entrepreneurs and small businesses, private financiers and partially also for large firms are significantly higher than those of the other actors – especially compared to the research actors. This means that non-research actors are more valuable in marketing and selling products or services than research actors. Hence, hypothesis 2 can be accepted.

SSOs came out on top of all other actors in terms of organizational development. Still very helpful – even though significantly less than SSOs – are private financiers, entrepreneurs and small businesses and professional support organizations. Since hypothesis 3 suggests a higher level of support by non-research actors it can be accepted.

Again, SSOs and entrepreneurs and small businesses play an important role in supporting the founders on an emotional level. But private actors (cp. family and friends) are by far the most supportive actors in terms of emotional stability and are significantly on top of all other actors – research and non-research actors alike. For this reason hypothesis 4 can be accepted.

**Table 10: Hypotheses overview: Social capital and university startup development**

No.	Independent variable	Dependent variable	Hypotheses	Accepted / rejected
1	Research actors	Technological and product development	Research actors support technological and product development comparatively more than non-research actors	rejected
2	Non-research actors Industry & business actors, public	Market and business development	Non-research actors (esp. industry & business actors, public support actors) support market and business development comparatively more	accepted

	support actors		than research actors	
3	Non-research actors, professional support actors, private financiers	Organizational development	Non-research actors (esp. professional support actors, private financiers) support organizational development comparatively more than research actors	accepted
4	Non-research actors, private support actors	Emotional support	Private support actors provide comparatively more emotional support than other support actors	accepted

Overall it can be noted that - besides the technological and product development domain – non-research actors are more supportive in developing the new company. One notable exception are SSOs – who can be directly affiliated to a university or just partner with them – who were ranked highly across all development domains. Among non-research actors especially private financiers and entrepreneurs and small businesses play a central role in the development process by supporting especially the business and organizational development domain.

## 5.2 Social capital of university startups in the USA and Europe

One of the main premises of this study is that the social capital of university startups – due to different institutional and cultural environments they are embedded in – differs in the USA and Europe. The previous set of questions focused on the role of each actor group in the development process of spin-offs. The main research question in this chapter rather focuses on the comparison of social capital in these two regions: “*What is the difference between the social capital of university spin-offs in the USA and Europe?*” Since spin-off generation and development is a complex phenomenon it needs to be examined on several levels. For the comparison of spin-offs in Europe and the USA we examined their social capital structure on three different levels: a) continents, b) countries and c) city regions.

The same set of research and non-research actors presented in the previous chapter was analyzed in order to find differences in social capital in these two regions. Overall, no significant differences were found in the group of research actors, but among non-research actors. For this reason the table below only shows non-research actors which were used in a different extend by university start-ups in Europe and USA, on at least one aggregation level. Besides private support (cp. family and friends) we found difference in all other five non-research actors on at least the most aggregated level of comparison (continent level).

**Table 11: Comparison of support actors used by university startups on different levels of aggregation**

Supporting Actors	Level of comparison			
	Continent	Country <sup>1</sup>	City Region <sup>2</sup>	Startup Support Organization
Private Financiers	Sign. Diff.	Sign. Diff.	Sign. Diff.	Sign. Diff.
Entrepreneur & Small Businesses	Sign. Diff.	-	-	-
Large Firms	Sign. Diff.	-	-	-
Public Support	Sign. Diff.	Sign. Diff.	Sign. Diff.	Sign. Diff.
Professional Support	Sign. Diff.	-	-	-

Sign. Diff. based on a Chi Square test, p of 0.05 or less.

1...Austria, Germany, Sweden and USA; 2...Vienna, Berlin, Stockholm, Silicon Valley, Boston and New York

On continent, country and city region level the social capital questions refer to the type of actors the startup has used to develop the company (see question 35 in questionnaire). On the startup support organization (SSO) level it was asked for the numbers of introductions the SSO has made between the startup and the actors in the surrounding ecosystem (see question 46 in questionnaire).

### 5.2.1 Continent level comparison

The continent level is the most aggregated form of comparison between the USA and Europe. The responses of all European countries (Austria, Germany, Switzerland and Sweden) were compared with the responses from all ecosystems in the USA (Boston, New York and Silicon Valley). In the table below one can observe the differences with regard of the actors used on both sides of the Atlantic. Start-ups in the USA used entrepreneurs and small business owners, large firms, private financiers (business angels and venture capitalists) and professional support significantly more often than their European counterparts. On the other hand, European companies received significantly more support from public support organizations.

**Table 12 Actors used by spin-offs for company development, continent level comparison**

Region	Total number of respondents (N)	Private Financiers	Entrepreneurs & Small Businesses	Large Firms	Public Support	Professional Support
EU	285	33.6%	32.6%	14%	54.4%	50.5%
USA	124	55.6%	46.8%	23.4%	32.3%	66.1%
Chi-Value		19.131**	7.421**	5.389*	16.96**	8.508**

\*\* p < 0.01, \* p < 0.05; Note: Separate Chi Square tests were conducted for each actor group

It is interesting to observe that the gap ( $\Delta \sim 22\%$ ) between Europe and the USA is about the same with private financiers and public support. Also with entrepreneurs and small businesses ( $\Delta 14.2\%$ ) and professional support ( $\Delta 15.6\%$ ) the gap is still considerable, whereas the difference is reduced to only 9% for large firms. More than half of the European companies have used public support, but only a third of them worked with private financiers or entrepreneurs and small businesses. In the USA this picture is reversed: about half of the companies have worked with either private financiers or entrepreneurs and small businesses, but only about a third had support from public organizations.

### 5.2.2 Country level comparison

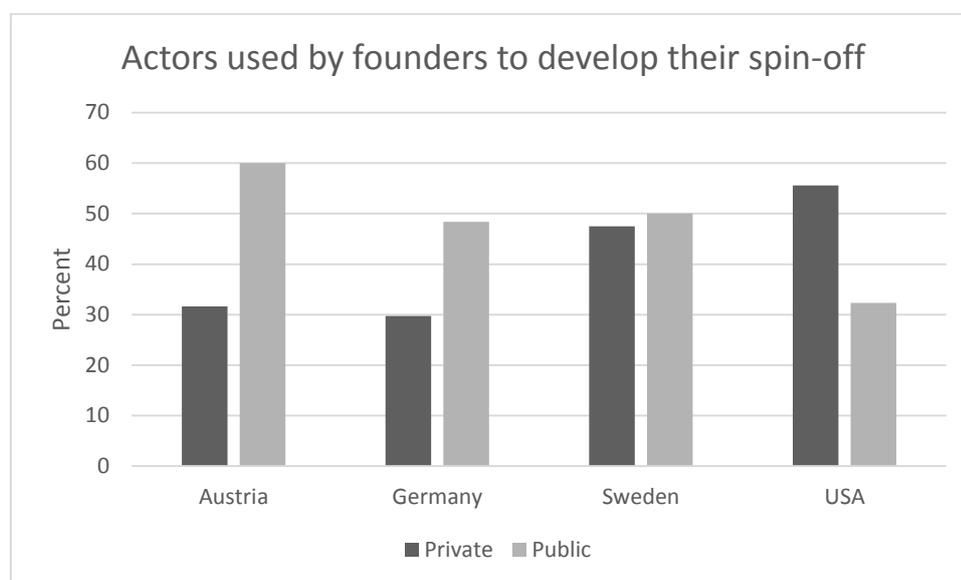
The analysis on the continent level revealed substantial differences in terms of the supporting actors and especially a divide in terms of public or private actor support, respectively. The next step of the analysis was a closer look at the individual European countries and comparing them to the USA. Switzerland was not analyzed in detail due to limited number of responses (26). In contrast to the continent level analysis one can only observe significant differences with regard to two actors, private financiers and public support. These are the two actors that already showed the highest difference on the continent level.

**Table 13: Actors used by spin-offs for company development, country level comparison**

Country	Total number of respondents (N)	Private Financiers	Public Support
Austria	155	31.6%	60%
Germany	64	29.7%	48.4%
Sweden	40	50%	50%
USA	124	55.6%	32.3%
Chi-Value		20.756**	21.321**

\*\* p < 0.01; Note: Separate Chi Square tests were conducted for each actor group

**Figure 6: Actors used by spin-offs for company development**



As the percentage in terms of public and private support for the USA respondents stay the same, it is interesting to compare the European countries with each other. In Austria only a third of the companies have worked with private financiers but almost double as many received support from public organizations. The support from private financiers in Germany is about the same as in Austria, but only every second spin-offs worked with public support to develop the company. Sweden has about the same level of public support as in Germany, but considerably more companies worked with private financiers (almost 50%). Among the four countries Sweden has the most balanced support between private and public actors. The USA shows basically an inverse picture to the situation in Austria: only about one third of the respondents indicated to work with public actors, whereas more than every second received support from private financiers.

### 5.2.3 City region level comparison

It was interesting to identify those differences of private and public support on the country level. Are we able to observe the same pattern on the city region level? This question is particularly of interest since it allows us to look at the three ecosystems in the USA (Boston, New York and Silicon Valley) in more detail. The results for Stockholm, the main ecosystem for startups in Sweden, and Berlin, the main ecosystem in Germany, in terms of public and private support are similar to the country level. This is not surprising since data collection in those two countries was mainly conducted in those two cities (in Germany Munich was the second ecosystem data was collected from). In Austria, however, also founders from the other federal states were included in the sample, which allows a comparison between Vienna, the main ecosystem in Austria, and the rest of the country. In this regard it was

surprising that the amount of spin-offs that worked with public support organizations to develop their companies was even higher than the Austrian average: 3 out of 4 companies in Vienna have worked with such organizations. On the other hand, the level of private financiers' engagement stays about the same for these companies.

**Table 14: Actors used by spin-offs for company development, city region level comparison**

City Region	Total number of respondents (N)	Private Financiers	Public Support
Vienna	56	33.9%	75%
Berlin	42	33.3%	47.6%
Stockholm	40	50%	50%
Silicon Valley	56	64.3%	30.4%
New York	25	44%	32%
Boston	22	45.5%	27.3%
Chi-Value		13.841*	29.705**

\*\* p < 0.01, \* p < 0.05; Note: Separate Chi Square tests were conducted for each actor group

In comparison to Europe, we see the same low level of public engagement across the main ecosystems in the USA – only every third company has worked with public organizations to develop their companies. Looking at the role of private financiers we see some notable differences between the ecosystems on the East Coast and the West Coast. The percentage of spin-offs who worked with private financiers in New York and Boston is about 10 percent points higher than in Vienna and Berlin and even a bit lower than in Stockholm. In Silicon Valley, however, almost 2 out of 3 companies have worked with private financiers. This is double the percentage compared to Vienna and Berlin and even 20% more than in the ecosystems on the East Coast.

#### 5.2.4 The role of Startup Support Organizations

In the previous chapters it was analyzed which actors are used by the spin-off companies in the different regions. A significant difference was identified in terms of the engagement of public and private support actors in the companies' development process. Startup support organizations (SSOs) play an important role as intermediary organizations, connecting the academic field with actors in the surrounding ecosystem. By providing access to important contacts outside the research network they act as boundary spanners and help newly established companies to get access to non-research actors. Analyzing the kind of introductions made by the SSO to the spin-off company allows us to draw conclusion of their effectiveness in terms of their boundary spanning role. Hence, it was examined the a) type of introductions (e.g. private vs. public actors) made and b) the number of introductions (to how many of these actors was the new company introduced to) made by each type.

The question in the survey was related to the number of introductions the respondent received through the SSO (see question 46 in appendix). The respondents were able to choose for each non-research actor group (see list above) 0, 1, 2, 3, 4 or "5 or more". During analysis we reduced the categories to "None", 1, 2 or "3 or more" to allow better comparability between countries. The results regarding introductions to "entrepreneurs and small businesses" as well as "large firms" were not significant and will be not further discussed here. However, the results for the actor groups "private financiers" and "public support organizations" are presented in the tables below.

**Table 15: Startup Support Organization introducing founders to Private Financiers**

Country	Total number of respondents (N)	No intro to Private Financiers	Intro to 1 Private Financiers	Intro to 2 Private Financiers	Intro to 3 or more Private Financiers
Austria	114	43.9%	25.4%	18.4%	12.3%
Germany	45	42.2%	28.9%	13.3%	15.6%
Sweden	36	27.8%	27.8%	8.3%	36.1%
USA	97	19.6%	19.6%	15.5%	45.4%

Chi-Value = 38.897,  $p < 0.01$

The SSOs in Austria and Germany introduce their tenant companies to only a limited number of private financiers. About 2/3 of the spin-offs gain none or only 1 contact to this type of actors, and only one third to 2 or more. Compared to Sweden (55.6% received intros to none or 1, and 44.1% to 2 or more) and especially the USA, where 60.9% of the tenants are introduced to 2 or more private financiers, this number is rather low.

**Table 16: Startup Support Organization introducing founders to Public Organizations**

Country	Total number of respondents (N)	No Intro to Public Organizations	Intro to 1 Public Organizations	Intro to 2 Public Organizations	Intro to 3 or more Public Organizations
Austria	116	19%	31%	26.7%	23.3%
Germany	46	39.1%	26.1%	21.7%	13.0%
Sweden	35	42.9%	28.6%	14.3%	14.3%
USA	93	67.7%	10.8%	11.8%	9.7%

Chi-Value = 52.866,  $p < 0.01$

Similar to the other levels of comparison the picture is reversed when looking at the introductions made to public support organizations. The vast majority of spin-offs in the USA (78.5%) receive no or maybe one introduction to public actors. This number drops continuously in Sweden (71.5%), Germany (65.2%) and Austria (50%). To formulate it in a different way, whereas less than one quarter of companies are introduced to 2 or more public support organizations in the USA, this number is twice as high in Austria where every second company receives this number of introductions.

In this chapter the role of supporting actors in Europe and the USA was analyzed. Shifting the focus on different levels of aggregation allows us to understand those regional differences in more detail. Whereas the macro level (cp. continent level comparison) gave a rough overview of the support situation on both sides of the Atlantic, the more detailed levels of comparison (country and city region level) revealed even more nuanced differences within each continent and between the various ecosystems. Especially on the continent level notable differences in social capital endowment of university startups in the USA and Europe were found. Only on this macro level of comparison significantly differences in the usage of entrepreneurs & small businesses, large firms and professional support are existent. But also on the country and city region level there are notable differences in terms of private financiers support and the engagement of public support organizations. Hence, hypotheses 5 to 7 can be accepted (see table).

### 5.2.5 Sources of funding for university startups in the USA and Europe

Additional to supporting the different development domains (see previous chapter) some actors in the ecosystems can also be a source of financing for a university startup. In this study we examined the source (differentiated between by Government Funding, Business Angel Funding, Venture Capital

Funding, Corporate Funding, Bank Funding) and the amount of funding received by each university startup (see question 65 in the questionnaire). In a first step it was analyzed whether the companies received funding from each source, or not. In the table below the results according to the different comparison levels are depicted.

**Table 17 Sources of funding for university startups, different levels of comparison**

Region	Total number of respondents (N)	Government Funding	Business Angel Funding	Venture Capital Funding	Corporate Funding	Bank Funding
EU	285	69.5%	24.6%	6.3%	3.2%	14.7%
USA	124	28.2%	44.4%	40.3%	17.7%	4.8%
Chi-Value		59.969**	15.952**	72.087**	26.236**	8.172**
Austria	155	80.0%	21.9%	5.2%	3.2%	18.1%
Germany	64	70.3%	23.4%	7.8%	3.1%	9.4%
Sweden	40	50.0%	45.0%	7.5%	2.5%	10%
USA	124	28.2%	44.4%	40.3%	17.2%	4.8%
Chi-Value		86.068**	23.59**	72.416**	26.279**	14.135**
Vienna	56	89.3%	25.0%	3.6%	5.4%	8.9%
Berlin	42	73.8%	23.8%	4.8%	4.8%	14.3%
Stockholm	40	50.0%	45.0%	7.5%	2.5%	10.0%
Silicon Valley	56	23.2%	55.4%	53.6%	19.6%	3.6%
New York	25	28.0%	36.0%	28.0%	20.0%	4.0%
Boston	22	27.3%	31.8%	22.7%	9.1%	9.1%
Chi-Value		69.052**	16.065**	59.247**	13.756**	not sign.

\*\* p < 0.01, \* p < 0.05; Note: Separate Chi Square tests were conducted for each actor group

There are significant differences regarding the source of funding between university startups in the USA and Europe. Similar to the structure of their support network we can observe a majority of European startups receiving funding from public source (almost 70%). In comparison, the percentage of startups in Europe that receive investment from non-public actors is rather limited. For example, only about 25% got financed by business angels (6.3% for venture capital). In the USA, on the other hand, public funding is received by less than 30% of the startups – less than half the percentage compared to Europe. The role of private actors as financiers is much more pronounced in the USA than in Europe. More than 40% of the university startups in the USA received investment from business angels or venture capitalists - a significant gap ( $\Delta$  ~20% in business angel funding and  $\Delta$  34% in VC funding) compared to Europe. Still, 18% of the US-companies indicated to take corporate funding, whereas the corresponding number in Europe is insignificant (~3%).

On the level of individual ecosystems (city regions) the difference between USA and Europe becomes even more obvious. On the one end of the continuum in Vienna almost 90% of the companies received public funding. Silicon Valley, on the other end, has only about 23% publicly-funded startups. In terms of private investment the percentage of companies in Silicon Valley is by far the highest, with more than 50% in business angel as well as venture capital funding. Even compared to other ecosystems in the USA, New York and Boston, these numbers are high. In Vienna and Berlin only about every fourth company received business angel funding, while in Stockholm/Sweden this number increases to respectable 45%. In terms of venture capital investment the numbers are low

across all ecosystems in Europe and at the most only one third (Stockholm, 7.5%) of the lowest number in the USA (Boston, 22.7%).

The higher the amount of business angel funding the higher the probability for a startup to also receive venture capital funding. Whereas only 9.2% of the startups that received no business angel funding received venture capital, this percentage rises to 22.5% (51.-250.000 Euro/Dollar angel funding) and around 50% for startups that received more than 251.000 Euro/Dollar in business angel funding (Chi-Value = 66.058, Chi Square < 0.01). This is one reason why the in developed ecosystems, like Silicon Valley, we can observe a high rate of both business angel and venture capital funding. To sum up, looking at the three levels of analysis one can observe a higher rate of engagement of private financiers in the USA and public financing in Europe. Thus, hypotheses 8 and 9 can be accepted.

**Table 18: Hypotheses overview: Social capital and sources of funding of university start-ups in USA and Europe**

No.	Independent variable	Dependent variable	Hypotheses	Accepted / rejected
5	a) Continent b) Country c) City Region	Supporting Actors (Research and non-research)	The main supporting actors differ between the USA and Europe	accepted
6	a) Continent b) Country c) City Region	Public support actors	In Europe the central supporting actors are more often government related than in the USA	accepted
7	a) Continent b) Country c) City Region	Private financiers, Entrepreneurs & small businesses, large firms	In the USA the central supporting actors are more often from the private sector compared to Europe	accepted
7a	a) Continent b) Country c) City Region	Private financiers	In particular spin-offs in the USA receive more support from private financiers than in Europe	accepted
8	a) Continent b) Country c) City Region	Government funding	Spinoffs in Europe receive more financial capital from government-related actors than from private ones	accepted
9	a) Continent b) Country c) City Region	Private financiers funding	Spinoffs from the USA receive more financial capital from private financiers than in Europe	accepted

## 6 Conclusion and implications

Academic entrepreneurship is as a multilevel phenomenon. A holistic approach is needed to better understand the complexity of the university start-up development process and the interrelatedness of the various levels and actors involved. Factors on the macro level – like the institutional and cultural environment - influence the entrepreneurial activities on the micro level, and vice-versa. One has to understand the underlying social dynamics between the academic entrepreneur and the actors in the surrounding entrepreneurship ecosystem in order to be able to develop better policies (on university, regional and national level) and to design more effective start-up support programs.

It was the aim of this study to analyze the role of social capital on university startup development and to highlight the differences of the entrepreneurs' social capital in selected ecosystems in Europe and

the USA. These social networks exist within the universities and between the university and its surrounding ecosystem. A specific challenge for universities for building competencies in technology transfer is to bridge those existing networks and support university startups by bringing their (science based) products and services to the market.

Overall, the analysis shows that actors in the non-research field - private financiers (like business angels and venture capitalists), entrepreneurs and small businesses, public support organizations, professional support actors (e.g. consultants, legal firms, accountants) and family and friends - were used more often than the actors in the research field to support the development of the university startup. Especially for business development and organizational development these actors turned out to be more helpful than the research actors (e.g. university colleagues, other universities and research labs). Only for technology and product development the support of both research and non-research actors was used in the same extend. This suggests that research as well as market know how is necessary for a successful transformation of new technologies (developed at universities) and prototypes into viable products or services. With regard to the discussion of internal vs. external "boundary spanners" (agents moderating between academia and industry) there is a clear tendency towards actors outside the university network (cp. external boundary spanners) to fulfil this role.

Comparing university startups in Europe and the USA no significant differences were found in the group of research actors. In both regions this group of actors was engaged more or less to a similar extend in the start-up development process. However, the analysis shows significant differences with regard to the usage of non-research actors. Whereas start-ups in the USA rely more on private actors (especially private financiers and other entrepreneurs and small business owners) to support them with company development, their European counterparts use more public support. This difference is even more pronounced between Austria and the USA, than between Germany or Sweden and the USA.

This is a disadvantage for university start-ups in Europe since our analysis has shown in the first place that especially private financiers and other entrepreneurs and small businesses play a central role in business and organizational development. If a new company receives less support from these private actors they are lacking the experience, knowledge and contacts those people and organizations could offer them. Hence, more engagement of entrepreneurs and small business owners, as well as private financiers, is needed in Europe – and especially Austria - in order provide better support for university start-ups.

Startup support organizations (SSOs), acting as intermediaries between the university and the market, could connect more European start-ups to those helpful private actors. Our analysis shows, however, that SSOs in Europe - compared to the ones in the USA – introduce their tenant start-up companies primarily to public support organizations and only to a limited number of private financiers or entrepreneurs and small business owners. Hence, new policies and initiatives of SSOs should focus on more networking activities between start-up companies and these private actors. Bringing their tenant companies in touch with more of the right business contacts could help them reach their full potential and be more successful. Besides this area of improvement SSOs already fulfil an important role in the ecosystem by providing support in all three development domains (product, business and organizational) and also they also rank highly – next to family and friends – in terms of emotional support for the entrepreneurs.

## References

Barbero, J. L., Casillas, J. C., Wright, M., Ramos Garcia, A. (2013): Do different types of incubators produce different types of innovations? *The Journal of Technology Transfer*, 39, 151-168. doi:10.1007/s10961-013-9308-9

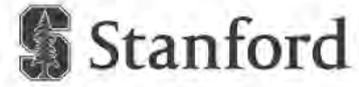
Batjargal B. (2003): Social capital and entrepreneurial performance in Russia: A longitudinal study, *Organization Studies*, 24 (4) (2003), pp. 535-556.

- Becker, B., Gassmann, O. (2006): Gaining leverage effects from knowledge modes within corporate incubators. *R and D Management*, 36(1), 1–16. doi:10.1111/j.1467-9310.2005.00411.x
- Bercovitz J., Feldman M. (2008): Academic entrepreneurs: organizational change at the individual level. *Organization Science* 19 (1), 69–89.
- Bhave, M. P. (1994): A process model of entrepreneurial venture creation. *Journal of Business Venturing*, 9, 223–242. doi:10.1016/0883-9026(94)90031-0
- Blair, D., Hitchens, D. (1998): *Campus Companies – UK and Ireland*. Aldershot. UK: Ashgate.
- Blank S. (2006): *The Four Steps to the Epiphany*. Cafepress.com, Foster City 2006, ISBN 0-9764707-0-5.
- Bottazzi, L., & Da Rin, M. (2005). Financing entrepreneurial firms in Europe: Facts, issues, and research agenda. In V. Kannianen & C. Keuschnigg (Eds.), *Venture capital, entrepreneurship, and public policy*. Cambridge, MA: MIT Press.
- Brüderle J. & Preisendörfer P. (1998) Network Support and the Success of Newly Founded Business, *Small Business Economics*, Vol. 10, No. 3 (May, 1998), pp. 213-225.
- Burgers, J. H., Van Den Bosch, F. a. J., & Volberda, H. W. (2008): Why New Business Development Projects Fail: Coping with the Differences of Technological versus Market Knowledge. *Long Range Planning*, 41(1), 55–73. doi:10.1016/j.lrp.2007.10.003
- Dushnitsky, G. (2006): Corporate venture capital: Past evidence and future directions. In M. Casson, N. Wade-son, N. Yeung, & A. Basu (Eds.), *The Oxford handbook of entrepreneurship*. Oxford: Oxford University Press.
- Egeln, Jürgen; Fryges, Helmut; Gottschalk, Sandra; Rammer, Christian (2007) : Dynamik von akademischen Spinoff-Gründungen in Österreich, *ZEW Discussion Papers*, No. 07-021.
- Etzkowitz H. (2002): Incubation of incubators: innovation as a triple helix of university–industry–government networks. *Science and Public Policy*, volume 29, number 2, April 2002, pages 115–128, Beech Tree Publishing, 10 Watford Close, Guildford, Surrey GU1 2EP, England.
- Etzkowitz, H. (2003): Research Groups As ‘Quasi-Firms’: The Invention of the Entrepreneurial University. *Research Policy*, 32(1): 109–121.
- Fetters M., Greene P., Rice M. and Butler J. (2010): *The Development of University-Based Entrepreneurship Ecosystems – Global Practices*, Edward Elgar Publishing, Northampton.
- Freeman J. Engel J. S. (2007): *Models of Innovation: Startups and Mature Corporations*, Fall 2007, Vol. 50, No. 1, UC Berkeley.
- Fuerlinger G., Funke T., Fandl, U. (2015): The Role of the State in the Entrepreneurship Ecosystems: Insights from Germany, *Triple Helix - A Journal of University-Industry-Government Innovation and Entrepreneurship*, Vol. 2, Issue 3.
- Fürlinger, G. (2014): Die Bausteine eines Gruenderoekosystems. In Thomas Funke & W. Axel Zehrfeld (Hg.) *Abseits von Silicon Valley: Beispiele erfolgreicher Gruendungsstandorte*, Frankfurter Allgemeine Buch, Frankfurt, 22-56.
- Fürlinger, G., Leitner, K-H. (2015): *Kulturelle Aspekte der Förderung universitärer Spin-offs*, *Wissenschaftsmanagement - Handbuch & Kommentar 2015*, in press.
- Grimpe Ch. and Fier H. (2014): *Informal University Technology Transfer: A Comparison Between the United States and Germany*, Discussion Paper No. 09-033, Center for European Economic Research, <ftp://ftp.zew.de/pub/zew-docs/dp/dp09033.pdf>
- Hackett, S. M., Dilts, D. M. (2004): A systematic review of business incubation research. *The Journal of Technology. Transfer*, 29 (1), 55-82.
- Hansen M. T., H. W. Chesbrough, N. Nohria and D. N. Sull (2000): Networked incubators: Hothouses of the new economy, *Harvard Business Review* 78(5), 75-84.
- Hellmann, T., Puri, M. (2002): Venture capital and the professionalization of start-up firms: Empirical evidence. *Journal of Finance*, 57, 169–197.
- Isenberg, D. (2010): *How to Start an Entrepreneurial Revolution*, *Harvard Business Review*. Retrieved June 2010.
- Isenberg, D. (2011): *The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship*, Presentation at the Institute of International and European Affairs, May 12, 2011, Dublin, Ireland.

- Kambil A., E. D. Eselius, K. A. Monteiro (2000): Fast venturing: The quick way to start web businesses, *Sloan Management Review* 41(4), 55-67.
- Kenney M. Goe R.W. (2004): The role of social embeddedness in professorial entrepreneurship: a comparison of electrical engineering and computer science at UC Berkeley and Stanford, *Research Policy*, Volume 33, Issue 5, July 2004, Pages 691–707.
- Leyden D.P., Link A.N., Siegel D.S. (2013): A Theoretical Analysis of the Role of Social Networks in Entrepreneurship, No 13-22, Working Papers, University of North Carolina at Greensboro, Department of Economics.
- Lichtenstein, G.A. (1992): The Significance of Relationships in Entrepreneurship: A Case Study of the Ecology of Enterprise in Two Business Incubators, Unpublished Dissertation, Philadelphia: University of Pennsylvania.
- Mason C., Stark M. (2004): What do Investors Look for in a Business Plan? A Comparison of the Investment Criteria of Bankers, Venture Capitalists and Business Angels, *International Small Business Journal*, SAGE Publications (London, Thousand Oaks and New Delhi).
- McDevitt V. L., Mendez-Hinds J., Winwood D., Nijhawan V., Sherer T., Ritter J, Sanberg P. (2014): More than Money: The exponential impact of Academic Technology, *Technology and Innovation*, Volume 16, pp. 75–84.
- Mosey S., Wright M. (2007): From human capital to social capital: a longitudinal study of technology-based academic entrepreneurs, *Entrepreneurship in Theory and Practice*.
- Murray F. (2004): The Role of academic inventors in entrepreneurial firms: sharing the laboratory life. *Research Policy* 33, 643–659.
- Nohria N., Eccles R. (Eds.) (1992): *Networks and organizations: Structure, form, and action*, Harvard Business School Press, pp. 288-308
- Osterwalder A., Pigneur Y., Wegberg J. T. A. (2010): *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, 1 edition July, Wiley
- Rasmussen E., Borch O.J. (2010): University capabilities facilitating entrepreneurship: a longitudinal study of spin-off ventures at mid-range universities. *Research Policy* 39(5): 602-612.
- Ries E. (2011): *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*, First Edition, September 13, Crown Business.
- Scillitoe JL & Chakrabarti AK (2010) The role of incubator interactions in assisting new ventures, *Technovation*, Vol 30, Issue 3, Pages 155-167.
- Senor and Singer (2011): „Start-Up Nation The Story of Israel's Economic Miracle“. Council on Foreign Relations. April 2011.
- Shane S.A. (2004): *Academic Entrepreneurship: University Spinoffs And Wealth Creation* (New Horizons in Entrepreneurship Series), Cheltenham, UK and Northampton, MA, USA, Edward Elgar
- Shane, S. A. (2004). *Academic Entrepreneurship – University Spin-offs and Wealth Creation*. Edward Elgar Publishing Ltd. Cheltenham/UK
- Siegel D.S., D. Waldman, A. Link (2003): Assessing the Impact of Organizational Practices on the Relative Productivity of University Technology Transfer Offices: An Exploratory Study, *Research Policy* 32, 27-48.
- Stuart T.E., Ding W.W. (2006): When do scientists become entrepreneurs? The social structural antecedents of commercial activity in the academic life sciences. *American Journal of Sociology* 92, 92–144.
- Sullivan, D. M., Marvel, M. R. (2011): Knowledge Acquisition, Network Reliance, and Early-Stage Technology Venture Outcomes. *Journal of Management Studies*, 48(6), 1169–1193. doi:10.1111/j.1467-6486.2010.00998.x
- Totterman H., Sten, J. (2005): Start-ups: Business incubation and social capital. *International Small Business Journal*, 23 (5), 487-511.
- Van Weele & Van Rijnsoever (2015): Between a Soft Landing and a Hard Place: How Silicon Valley Software and Life Sciences Incubators Facilitate Lower and Higher Order Learning, *Utrecht University Innovation Studies*, Paper to be presented at DRUID15, Rome, June 15-17, 2015.
- Veugelers, R. (2014). The contribution of academic research to innovation and growth (No. 71). WWWforEurope, [http://www.foreurope.eu/fileadmin/documents/pdf/Workingpapers/WWWforEurope\\_WPS\\_no071\\_MS65.pdf](http://www.foreurope.eu/fileadmin/documents/pdf/Workingpapers/WWWforEurope_WPS_no071_MS65.pdf)
- Vohora A., Wright M., Lockett A. (2004): Critical junctures in the development of university high-tech spinout companies *Research Policy*, 33 (1) (2004), pp. 147–176.
- Wright M., Piva E., Mosey S., Lockett, (2009): Business schools and academic entrepreneurship. *Journal Of Technology Transfer* 34 (6), 560–587.

# Appendix: Questionnaire





## Social Capital & Startup Performance

Welcome!

**Social capital is a main success factor for entrepreneurs and startups. However, little is still known about the impact of personal connections on startup performance. In order to increase our knowledge base on social capital we need your help in completing our survey.**

**In addition your contribution will also allow us to develop and design better support programs for the next generation of entrepreneurs. We would therefore much appreciate your time and consideration in completing our survey.**

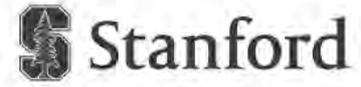
**This study is conducted by the Austrian Institute of Technology in collaboration with the Vienna University of Technology and Stanford University.**

**It should be filled out by one founder of the startup company and should not take more than 15 minutes to complete. All of your responses will be kept confidential and no personally identifiable information will be provided in any results of the study.**

**For any further questions or comments please feel free to contact me directly at [fuerlinger.georg.fl@ait.ac.at](mailto:fuerlinger.georg.fl@ait.ac.at) or +43 650 627 5786**

**Thank you again for your participation!**

**Georg Furlinger  
Innovation Systems Department  
Research, Technology & Innovation Policy  
AIT Austrian Institute of Technology GmbH  
Donau-City-Straße 1 | 1220 Vienna | Austria**



## Social Capital & Startup Performance

### Demographics and Contact Details

1. What is your age?

- ≤ 25
- 26 to 30
- 31 to 35
- 36 to 40
- 41 to 45
- ≥ 46

2. What is your gender?

- Female
- Male

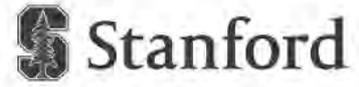
3. What is the name of your company? (it will not be associated with your responses)

4. Please provide your email address (it will not be published or shared) so we can

- send you the results of the study if you are interested
- maybe ask some questions for clarification

5. Do you want to receive the results of the study?

- yes
- no



## Social Capital & Startup Performance

### Respondent Details

\* 6. What is your position in the company? (more than 1 answers possible)

- (Co-)founder
- CEO/Managing Director
- Other (please specify)

7. What role do/did you assume in the university?

- Full Professor
- Associate Professor
- Assistant Professor
- PostDoc
- Phd Student
- Master Student
- Bachelor Student
- Other (please specify)

8. What is the highest level of education you have completed or the highest degree you have received?

- Less than Bachelor
- Bachelor
- Masters
- Doctorate

9. Please indicate your startup experience before starting your current company

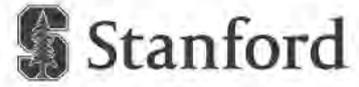
- No prior startup experience
- Worked in a startup before as a non-founding employee
- Founded a startup before as part of the founding team
- If you founded more than one company please state how many

10. Please indicate your experience in the current industry your company operates in before starting the current company

- I do not have any considerable industry experience
- I have prior industry experience in a research role
- I have prior industry experience in a non-research role
- I have prior industry experience in a research role and non-research role

11. How many years have you worked in a management position before starting your current company?  
(0 if none)

12. How many years have you worked in research before starting your current company? (0 if none)



## Social Capital & Startup Performance

### Company related questions

\* 13. In what year was the current company founded? (please write "0" if the company is not officially founded yet)

\* 14. In which city is the headquarter of the company?

15. Where are you incorporated?

\* 16. In which industry does your company operate in?

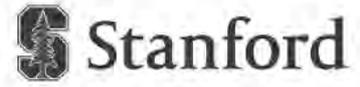
- Life sciences/medical devices
- Information technology (IT)/software
- Light manufacturing/hardware
- Service
- Trade
- Other (please specify)

\* 17. In which stage of development is your company currently in?

- Research phase**  
Conducting research with the potential opportunity for commercialization.
- Opportunity framing**  
Evaluating technological validity (towards proof of concept) and commercial potential (towards problem/solution fit).
- Pre-organization**  
Prioritizing market(s) to focus on and developing/implementing strategic plans.
- Re-orientation**  
(Attempting to) Generating returns by offering something of value to customers. Often changing business model, market, marketing or the strategic focus.
- Sustainable returns**  
The company has figured out its precise business model, has traction on the market and is attaining sustainable returns.

18. Which market region is your company planning to serve in the long-term?

- A specific neighborhood
- City or metropolitan area the company is operating in
- State
- Multistate
- National
- International (home continent)
- International (several continents / global)



## Social Capital & Startup Performance

### Founding Team

\* 19. How many founders were in the company during the time of incorporation?

- 1
- 2
- 3
- 4

Other (please specify)

20. How many founders are currently working in the company?

- 0
- 1
- 2
- 3
- 4

Other (please specify)

21. How many of them are women?

- 0
- 1
- 2
- 3
- 4
- more than 4

22. How many of the founders, before entering the company, have worked more than two years...  
(in each line insert between "0" and the total number of founders)

...in a start-up?

...in the industry of the current company?

...in a management position?

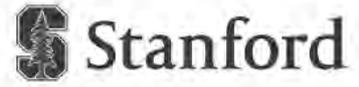
...in research?

23. How many of the founders are presently devoting full time (35 or more hours per week) to the business?

\* 24. At least one founder was officially affiliated (student, staff, faculty) with a university prior to the founding of the company

Yes

No



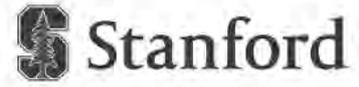
## Social Capital & Startup Performance

### University and research related questions

25. Which university were the founders affiliated with? (separate by comma if more than one)

\* 26. The establishment of the company was dependent on new research findings or new scientific processes/methods/skills developed at the university.

- Yes
- No



## Social Capital & Startup Performance

### Research & IP questions

27. Which university did it originate from?

28. Which department did it originate from?

29. Please indicate the role of the academic inventor of the commercialized research finding

- at least one of the academic inventors is fully engaged in the new company (quits his/her university position)
- at least one of the academic inventors has some kind of part time position within the company (retaining his/her university position)
- none of the academic inventors has a formal connection with the newly established company (might have equity in the company and/or offering advice on a consultancy basis)
- Other (please specify)

30. At what stage of development is the product or service?

- Idea or concept
- Initial development
- Tested on customers
- Ready for sale or delivery

31. Have you applied for a patent, copyright or trademark?

- Patent
- Copyright
- Trademark

32. Has the patent, copyright or trademark been granted?

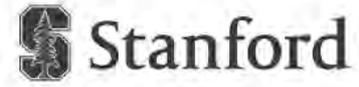
- Patent
- Copyright
- Trademark

33. Who is the patent/copyright/trademark holder?

- University
- Inventor
- Other (please specify)

34. Who has the exploitation rights?

- University
- Inventor
- Other (please specify)



## Social Capital & Startup Performance

### Social Capital Questions

\* 35. Which type of actors have you used to develop your company? (check all that apply)

- Department colleagues
- Other university colleagues
- Tech Transfer Office (or equivalent)
- Startup Support Organization (Incubator, Accelerator, etc.)
- Other universities
- Research laboratories (public or private)
- Private Financiers (like Business Angels or Venture Capitalists)
- Entrepreneurs & small firms
- Large firms
- Public Support (governmental expert organizations, government grant providers, regional development agencies, etc.)
- Professional Support (e.g. consultants, legal firms, accountants, etc.)
- Private Support (family, friends, etc.)

In the following section please provide more information on how helpful the selected actor groups have been in supporting the following areas of your company:

- 1) Technological and product development
- 2) Market and business development
- 3) Organizational development
- 4) Emotional support

## Social Capital & Startup Performance

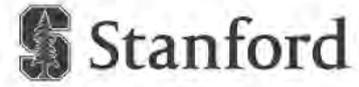
Technological and product development support

**in this questions only the actors selected in question 35 will be shown**

36. Please indicate for all actor groups you have used how useful they were in supporting your company with regard to

Technological and product development: support you received for the transformation of technologies and prototypes into viable products or services

	(1) not at all useful	(2)	(3)	(4)	(5) very useful
Department colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other university colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tech Transfer Office (or equivalent)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Startup Support Organization (Incubator, Accelerator, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other universities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research laboratories (public or private)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Private Financiers (like Business Angels or Venture Capitalists)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Entrepreneurs & small firms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large firms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public Support (governmental expert organizations, government grant providers, regional development agencies, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional Support (e.g. consultants, legal firms, accountants, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Private Support (family, friends, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## Social Capital & Startup Performance

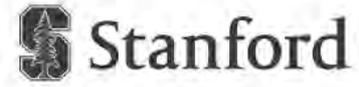
Market and business development support

in this questions only the actors selected in question 35 will be shown

37. Please indicate for all actor groups you have used how useful they were in supporting your company with regard to

Market and business development: support you received with gathering market information and identifying customer needs and with marketing and selling your products or services

	(1) not at all useful	(2)	(3)	(4)	(5) very useful
Department colleagues	<input type="radio"/>				
Other university colleagues	<input type="radio"/>				
Tech Transfer Office (or equivalent)	<input type="radio"/>				
Startup Support Organization (Incubator, Accelerator, etc.)	<input type="radio"/>				
Other universities	<input type="radio"/>				
Research laboratories (public or private)	<input type="radio"/>				
Private Financiers (like Business Angels or Venture Capitalists)	<input type="radio"/>				
Entrepreneurs & small firms	<input type="radio"/>				
Large firms	<input type="radio"/>				
Public Support (governmental expert organizations, government grant providers, regional development agencies, etc.)	<input type="radio"/>				
Professional Support (e.g. consultants, legal firms, accountants, etc.)	<input type="radio"/>				
Private Support (family, friends, etc.)	<input type="radio"/>				



## Social Capital & Startup Performance

Organizational development support

in this questions only the actors selected in question 35 will be shown

38. Please indicate for all actor groups you have used how useful they were in supporting your company with regard to

Organizational development: support you received with starting, managing and growing a professional company

	(1) not at all useful	(2)	(3)	(4)	(5) very useful
Department colleagues	<input type="radio"/>				
Other university colleagues	<input type="radio"/>				
Tech Transfer Office (or equivalent)	<input type="radio"/>				
Startup Support Organization (Incubator, Accelerator, etc.)	<input type="radio"/>				
Other universities	<input type="radio"/>				
Research laboratories (public or private)	<input type="radio"/>				
Private Financiers (like Business Angels or Venture Capitalists)	<input type="radio"/>				
Entrepreneurs & small firms	<input type="radio"/>				
Large firms	<input type="radio"/>				
Public Support (governmental expert organizations, government grant providers, regional development agencies, etc.)	<input type="radio"/>				
Professional Support (e.g. consultants, legal firms, accountants, etc.)	<input type="radio"/>				
Private Support (family, friends, etc.)	<input type="radio"/>				

## Social Capital & Startup Performance

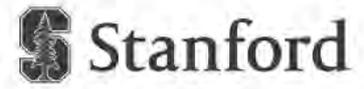
### Emotional support

in this questions only the actors selected in question 35 will be shown

39. Please indicate for all actor groups you have used how useful they were in supporting your company with regard to

Emotional support: encouragement you received or support to cope with work-related stress

	(1) not at all useful	(2)	(3)	(4)	(5) very useful
Department colleagues	<input type="radio"/>				
Other university colleagues	<input type="radio"/>				
Tech Transfer Office (or equivalent)	<input type="radio"/>				
Startup Support Organization (Incubator, Accelerator, etc.)	<input type="radio"/>				
Other universities	<input type="radio"/>				
Research laboratories (public or private)	<input type="radio"/>				
Private Financiers (like Business Angels or Venture Capitalists)	<input type="radio"/>				
Entrepreneurs & small firms	<input type="radio"/>				
Large firms	<input type="radio"/>				
Public Support (governmental expert organizations, government grant providers, regional development agencies, etc.)	<input type="radio"/>				
Professional Support (e.g. consultants, legal firms, accountants, etc.)	<input type="radio"/>				
Private Support (family, friends, etc.)	<input type="radio"/>				



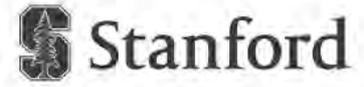
## Social Capital & Startup Performance

### Support organization participation

40. With the current company, have you participated in a startup support organization (like an incubator, accelerator, etc.) that is affiliated with the university?

yes

no

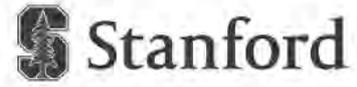


## Social Capital & Startup Performance

### Support organization participation

41. With the current company, have you participated in any startup support organization, like an incubator, accelerator, etc.?

- yes
- no



## Social Capital & Startup Performance

### Support Organization Questions

question 42-46 only will be shown if "yes" is selected in either question 40 or 41

42. What is the name of the startup support organization (incubator, accelerator etc.) you participated in?

(if you have participated in more than one please refer to the most helpful one)

43. Which year did you participate?

44. Please indicate the importance of individual types of business assistance services provided by the support organization (N/A = did not offer this kind of service)

	1 - not at all important	2 - little	3 - moderate	4 - very important	N/A
Exchange with peers in the support organization (internal networking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to contacts outside the university and support organization (external networking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facilities related services (cp. access to shared office space, technical equipment, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional business support and related services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

45. Please indicate the effectiveness of the support organization to provide individual types of business assistance services (N/A = did not offer this kind of service)

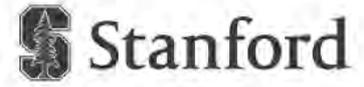
	1 - not at all effective	2	3	4 - very effective	N/A
Exchange with peers in the support organization (internal networking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to contacts outside the university and support organization (external networking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facilities related services (cp. access to shared office space, technical equipment, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional business support and related services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

46. Please indicate the number of people (in each group) who provided especially important information or advice you were introduced to via the support organization 'Especially important' means critical to your success in developing this company.

	Please select
Other universities	<input type="text"/>
Research laboratories (public or private)	<input type="text"/>
Private Financiers (e.g. Business Angels or Venture Capitalists)	<input type="text"/>
Entrepreneurs & small firms	<input type="text"/>
Large firms	<input type="text"/>
Public Support (e.g. governmental expert organizations, government grant providers, regional development agencies, etc.)	<input type="text"/>
Professional Support (e.g. consultants, legal firms, accountants, etc.)	<input type="text"/>

47. Please describe the support organization's level of involvement on external networking activities

	1 - none	2	3	4 - very much
A formal matching process between you and the external actors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training, orientation, or other interaction support you and/or the external actors received	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An evaluation or assessment of the interaction between you and the external actors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## Social Capital & Startup Performance

### Add-on questions

48. Are you willing to answer additional questions regarding supportive people in you network (~5 min)?

yes

no

## Social Capital & Startup Performance

Most supportive people

question 48-55 only will be shown if "yes" is selected in question 47

Please think about the three people who provided especially important information, advice, contacts and encouragement to you at the time you started or joined your present company. 'Especially important' means critical to your success in developing this company.

In the following we will refer to this three people as Person A, Person B and Person C

49. How was the contact to these three people made? Through the...

Please select

Person A	Select for each person: • Personal network (family and friends) • Research network (universities, research institute) • Business network • Support organization network (incubator, accelerator, etc.)	▼
Person B		▼
Person C		▼

50. What is the current position/profession of each person?

Please select

Person A	Owner or managers of large firms Other staff member of large firms Owner or manager of medium and small firms Other staff member of medium and small firms High-rank official in local government, ministry or agency Middle- and low-rank official in local government, ministry or agency Professional in universities, research institute or government lab Manager of a bank, venture capital firm or other financial institution Other staff members of a bank, venture capital firm or other financial institution	▼
Person B		▼
Person C		▼

Other (please specify for each person if applicable)

51. Are these people invested in your company or do they get any other form of return?

Please select

Person A	▼	Holds stock in the company Receives monetary return Receives other form of return No return
Person B	▼	
Person C	▼	

52. How well do you know these people?

Please select

Person A	<input type="text"/>
Person B	<div style="border: 1px solid red; padding: 2px;">                     Very well                      Somehow                      Very little                 </div>
Person C	<input type="text"/>

53. Please provide more information about the three most supportive people:

	How many years have you known this person?	How often do you meet with this person?
Person A	<input type="text"/>	<input type="text"/>
Person B	<div style="border: 1px solid red; padding: 2px;">                     less than two years                      between two and four years                      more than five years                 </div>	<div style="border: 1px solid red; padding: 2px;">                     (more than) 1 day a week                      (more than) 1 day a month                      Less than 1 day a month                 </div>
Person C	<input type="text"/>	<input type="text"/>

54. Please indicate if the person has significant experience in the following areas:

	Person A	Person B	Person C
Mentoring/coaching experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Startup founding experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Management experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Industry experience (industry you are operating in)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

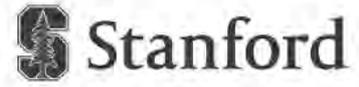
55. Please indicate in which field you received support from each person:

	Person A	Person B	Person C
Technological and product development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Market and business development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organizational development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal/professional development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

56. Please indicate by what means each person supported you:

	Person A	Person B	Person C
Knowledge and advice (e.g., information and suggestions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contacts (e.g. to suppliers, customers, investors)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other resources (e.g., finances, supplies)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emotional support (e.g. encouragement)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





## Social Capital & Startup Performance

### Company Performance

\* 57. How many employees worked at the company at the end of 2013 (full-time equivalent)?

\* 58. How many employees worked at the company at the end of 2014 (full-time equivalent)?

\* 59. How many employees (are expected to) work at the company by the end of 2015 (full-time equivalent)?

60. What was your company's revenue by the end of 2013? (write "0" if no revenue yet)

61. Currency

US Dollar  Euro

62. What was your company's revenue by the end of 2014?

63. What is your company's revenue by the end of 2015?

64. What is your projected annual revenue in five years from now?

65. Please indicate the amount of funding you have received so far from the actor groups listed below

	nothing	≤ 50,000	51,000 - 250,000	251,000 - 1,000,000	1 mio - 5 mio	> 5 mio
Government	<input type="radio"/>					
Business angels	<input type="radio"/>					
Venture capitalists	<input type="radio"/>					
Corporate venture fund	<input type="radio"/>					
Family members & friends	<input type="radio"/>					
Bank	<input type="radio"/>					
Other (please specify below)	<input type="radio"/>					

Please specify "Other" here

66. How satisfied are you with the development of the company in comparison with that of your competitors?

very unsatisfactory very satisfactory

67. How satisfied are you with the overall development of the company?

very unsatisfactory very satisfactory

## **Impressum**

AIT-IS-Report  
ISSN 2075-5694

Herausgeber, Verleger, Redaktion, Hersteller:  
AIT Austrian Institute of Technology GmbH  
Innovation Systems Department  
1220 Wien, Donau-City-Straße 1  
T: +43(0)50550-4500, F: +43 (0)50550-4599  
is@ait.ac.at, <http://www.ait.ac.at/departments/innovation-systems/>

Alle Rechte vorbehalten.

Kein Teil des Werkes darf in irgendeiner Form (Druck, Fotokopie, Mikrofilm oder in einem anderen Verfahren) ohne schriftliche Genehmigung des Herausgebers reproduziert oder unter Verwendung elektronischer Systeme verarbeitet, vervielfältigt oder verbreitet werden.