THE START-UP LANDSCAPE OF SWITZERLAND
First Insights from the Swiss Start-up Monitor
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Start-up Hot Spots in Switzerland
(source: www.startupmonitor.ch)
Commission for Technology and Innovation (CTI)

“The Commission for Technology and Innovation (CTI) is the Federal Administration’s decision-making body for all matters pertaining to the promotion of innovation” (Walter Steinlin). As the Confederation’s innovation promotion agency, CTI lends its support to R&D projects, entrepreneurship and the development of start-up companies. CTI helps to optimize knowledge and technology transfer through the use of national thematic networks.

“The Swiss Start-up Monitor does not only support our label start-ups but helps us to track their performance with an interactive platform, thus providing start-ups with added value. This allows us to identify the critical points and offer our start-ups individual coaching.”

(Klara Sekanina)

Gebert Rüf Stiftung

Gebert Rüf Stiftung is committed to providing project-related start-up financing and funding projects with keystone potential. The foundation aims to use its limited resources as a form of risk financing subject to ongoing evaluation, to provide a platform for pioneering approaches and to help to get novel pilot projects off the ground. Gebert Rüf Stiftung sees itself not as a mere sponsor or distributor of funds but as a partner and an active member of the project team. Thus, conventional grant allocation goes hand-in-hand with strategic and effective action.

“Our main interest is to foster entrepreneurial activities in Switzerland and to help start-ups achieve a breakthrough. But first of all, we need to understand what the driving forces are. The Swiss Start-up Monitor is the instrument to fill this gap and add enormous value to the ecosystem.”

(Pascale Vonmont)

AVINA STIFTUNG

AVINA STIFTUNG promotes innovative projects in the areas of Social Issues, Education, Arts & Culture and the Environment. The foundation is mainly active in Switzerland, but it also supports private, Swiss development work in Latin America as well as selected initiatives with a global focus. AVINA STIFTUNG is a founding member of “Swiss Foundations” and also engages in fostering new venture creation in Switzerland.

“The Swiss Start-up Monitor matches Swiss players in the entrepreneurial scene, creating a win-win situation for all participants. This makes it a really relevant project for Switzerland’s economy.”

(Sybille Feltrin)
ABOUT US – WHO WE ARE

Steering Committee

Prof. Dr. Elgar Fleisch
Professor of Information and Technology Management at ETH Zurich and University of St. Gallen

Prof. Dr. Pascal Gantenbein
Professor of Financial Management and Head of the Department of Financial Management at University of Basel

Prof. Dr. Dietmar Grichnik
Professor of Entrepreneurship at University of St. Gallen

Dr. Alexander Ilic
CTO of Dacuda AG

Dr. Klara Sekanina
Director of the Innovation Promotion Agency CTI

Dr. Pascale Vonmont
Deputy Director of the Gebert Rüf Stiftung

Advisory Board

Prof. Dr. Siegfried Alberton
Professor of Economics of Innovation & Technoscience at SUPSI-DSAS

Jean-Philippe Lallement
Managing Director at Science Park – EPFL & President at SwissParks.ch

Jean-Pierre Vuilleumier
Managing Director at CTI Invest & W.A. de Vigier Foundation

Operational Team

Maria Fantetti
Research Associate at the University of St. Gallen

Dr. Uwe Gross
Head of the Competence Center Technology Entrepreneurship the at University of St. Gallen

Dominik Wensauer
Project Manager of the Swiss Start-up Monitor at the University of St. Gallen
1 INTRODUCTION

New Venture Creation in Switzerland

Switzerland is at the top of the Global Innovation Index. In 2010, more than 12,500 new business ventures were launched in Switzerland. 1,707 of them were companies in the technology-based industries Energy and ICT (Information, Communication, and Technology). A flashback of the last ten years shows that the total number of start-ups has been rising constantly. In contrast, an in-depth look into industry statistics shows that for example the number of start-ups in the energy sector declined from a maximum of 7.3% in 2004 to 4.9% in 2010. Will Switzerland be able to retain its top position in innovation ranking?

Publicly available databases, e.g. the Swiss Federal Statistical Office and Eurostat, provide an overview of the entrepreneurial climate in Switzerland. These sources reveal that 3.6% of all Swiss companies in 2006 were market newcomers, which is rather low compared to the average company birth rate of 9.9% in Europe. However, the company death rate (amount of closures among active companies in the respective report year) of 3.5% is equally low compared to the European average of 8.3%. Even though the company birth rate is relatively low, start-ups seem to fail less in Switzerland. According to the Global Entrepreneurship Monitor (GEM 2011), the rate of perceived opportunities to start a new business in Switzerland is at an above-average level. Many business opportunities are available, but compared to the European average, obviously only a few are exploited. This lack of opportunity exploitation may suggest that there is a need for better supporting activities and programs for start-ups in Switzerland to ensure that opportunities are not only perceived but transformed into real businesses. In Switzerland a large quantity of programs providing entrepreneurial support and new venture assistance have been established, and there are more than 150 organizations supporting entrepreneurial ideas and talents. About 120 of them grant awards for innovative business concepts and technological ideas, while other institutions provide labels to promising founders – e.g. CTI Label, EPFL Spin-off Label, ETHZ Spin-Off Label, Top 100 Start-ups, or Venture Leaders. Overall, the supporting landscape is widely spread out, but there is still a lack of information to analyze the efficiency of these supporting instruments. To overcome the existing lack of data and to gain insights into and boost the entire Swiss start-up scene, we created the “Swiss Start-up Monitor,” a project of the University of St. Gallen, ETH Zurich and the University of Basel, financially supported by the Commission of Technology and Innovation (CTI), Gebert Rüf Stiftung and AVINA Stiftung.

Swiss Start-up Monitor

The basic idea is to provide an independent, trusted database for the secure capturing and sharing of information on Swiss start-ups and their performance indicators. The Swiss Start-up Monitor enables tracking of the performance of single start-ups, entire sectors, regions, and university labels, and aims to motivate entrepreneurial activity in Switzerland. By tracking Swiss start-ups, the scientific project addresses both aspects of the scene – the start-ups and the financiers. Start-ups first introduce themselves with their own profile and benefit from their platform services (financial tools, job platform, deadline overviews, interaction with the community, benchmarking, etc.). In a subsequent step, financiers will be able to search for start-ups matching their portfolio and thus track their start-ups with no additional effort. The research community benefits from the data generated by all platform interactions and will be permitted to analyze support activities and evaluate their efficiency. A web-based system that enables start-ups to register and enter their data into an online platform, administer the data’s visibility, and control the dissemination of their data to different groups of stakeholders has been specifically developed (www.startupmonitor.ch). Data security is of highest priority and is guaranteed at all times. The web-based system can be split roughly into two areas: the public area, which is accessible to every internet user; and the community area, which is accessible only to registered users. The public area contains publicly available data such as sector, university affiliation, company type, founding year, address, and contact information collected by the project team. This kind of information has been aggregated to establish the so-called Swiss Start-up Directory (Figure 1), which shows the geographical distribution of Swiss start-ups on a map in real time since the database is constantly being updated. In addition to the Directory the private area offers functionalities for the users, e.g. start-up profiles, search and filter functionalities, and overviews. In this report we refer to the private area as “the Monitor”. For the purpose of this report the start-up profile is the most important data-collection instrument and is particularly relevant. Other functionalities have been implemented to create added value for the users.

Figure 2 – Project status and future plans
Within the profile page, start-ups are asked to enter information not only about their revenues, financing rounds, and employees, but also about the founding team members (education, position, age, etc.), awards, and their investment status. It also offers an overview of different stakeholder groups, e.g. prize and label-granting institutions, guarantees, loans, coaching organizations, R&D-funding organizations, and incubators. Currently, only start-ups are granted to have access to the private community area. The next step is to acquire and enable interested financiers to use the platform and thus extend the Swiss Start-up Monitor by another communication interface. Figure 2 shows the project status and describes the projected plan in more detail. Further steps consist not only of intensifying the data collection process, improving the platform functionalities, and setting up research cooperations but also in developing strategies to keep the initiative financed.

### Incentives for Start-ups

The data-collection process is fundamental for the entire functional model of the Swiss Start-up Monitor. Start-ups provide us with data that we transform and analyze to get new insights and thereby support the Swiss start-up scene. Thus the principle for the users is “You get what you give,” meaning that start-ups benefit from the platform by providing us with data. In order to attract users and increase registrations the web-based system offers more than one advantage for start-ups (refer to the following overview which summarizes the main platform add-ons for start-ups). The advantages are not only platform based but go beyond the online system: A lottery for all Swiss Start-up Monitor users with a complete profile was set up in December 2012. The start-up Savovation – a company that developed an app to track chronic pain thereby, producing valuable information for both patients and physicians – won the lottery and received an iPad sponsored by Swisscom. This kind of promotional tool significantly boosted the quantity and quality of the data. Moreover, mailings, personal enquiries at events and the integration of the Swiss Start-up Monitor in the HSG Entrepreneurship Campus – the Center for Entrepreneurship (CfE-HSG) at the University of St. Gallen – further helped to incite the data-collection process.

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**Activity Feed**

Overview of all platform activities, deadlines for business plan competitions, event dates, and new blog articles. It provides users with a website where comments, news, job descriptions, launches, etc., can be published.

**Job Board**

A job-offering website where users post their offerings for free. The postings are not only visible for registered community members but also for all interested internet users visiting the Swiss Start-up Monitor’s public homepage.

**Operations Board**

“My Operations” provides start-ups with intuitive financial and reporting tools to use within their communication with stakeholders or in start-up presentations, e.g., cash flow calculator, liquidity and budget tool.

**Data Sharing**

Start-ups are able to share document templates within an embedded tool called useKit and can quickly adapt them to their own company instead of wasting time in creating new ones.

**Benchmarking**

Start-ups compare themselves with a self-defined peer group and thus find start-ups in similar situations to swap ideas on possible solutions.
2 EXECUTIVE SUMMARY

THE BENEFITERS OF THE FINANCIAL CRISIS
In times of financial crisis, early-stage start-ups could profit from investors’ fear of failure who do not likely invest in later-stage start-ups, because those were more prone to become victims of the crisis.

IS THE DOT.COM BOOM OVER?
In comparison to other industries, the ICT sector showed fast growth until 2009. Then, in 2009, 2010 and 2012 (preliminary number) we see a light decrease compared to the years before.

THE GAP HAS NOT YET BEEN BRIDGED
There is still a lack of women in entrepreneurial activities.

A “B-IDEA” WITH AN “A-TEAM” IS BETTER THAN VICE VERSA
Venture capitalists prefer to invest in personalities. The more heterogeneous a team the more likely are investments.

SOMETIMES LESS IS BETTER
It’s not the granted award that counts! It is the enrichment of one’s own network as well as the business know-how that makes (business plan) competitions attractive for start-ups.

BEST PERFORMERS ON THE RADAR
CTI-labeled companies did not only peak perform in acquiring capital but constituted 50% of all jobs created by the Monitors’ start-ups.

SHOULD I STAY OR SHOULD I GO?
Spin-offs prefer to stay near their universities and profit from the closeness – even 20 years after market entry.
3 DATA & DESCRIPTION

After the initial technical specifications and implementation of the web-based platform, the project team started collecting data in the winter of 2012. The collection of development data (across the private area) depends on the decision of whether or not to accept the registration of a start-up. This collection process is stricter than for public data (across the Directory). All innovative and high-tech Swiss start-ups, belonging to the ICT, Consulting & Services, Medtech & Diagnostics, Engineering, Biotech & Pharma, Energy & Greentech, Consumer Products, Micro & Nanotech, Material Sciences, Sensors & Analytics, Agriculture, and Chemicals sectors are qualifying for a short profile on the Swiss Start-up Directory. Only start-ups with an innovative approach or using high tech and being not older than seven years can register and access the (private) community area. This selective approach benefits us in various ways. On the one hand it enables us to build a roadmap of existing Swiss start-ups. On the other hand we get the opportunity to directly observe the development of high-tech and innovative new ventures. This helps us to explain the mismatch between being one of the most innovative countries and simultaneously having a quite low birth rate (compared to the European average and the perceived opportunities). At the time of writing this report, the Swiss Start-up Monitor database counted 1,307 companies in its Directory. The majority was collected, input, and maintained by the project team. In so doing, we mainly searched for publicly available information, e.g., on the websites of Swiss technology parks (www.swissparks.ch), universities, investors, (business plan) competitions, and other financiers' websites. A small share of all the Directory's start-ups themselves requested to appear on the map and get a short profile; 244\(^4\) of them are registered users with an account and profit from all previously mentioned features (they have both a private profile in the Monitor and a public profile in the Directory).

In the analytical section of this report we will present the first findings of the data generated during the last few months. Both data streams, the public Directory and the Monitor, will be used. Our data collection process is continuous. Thus, our database is not only constantly updated and enriched by our users and our operative team but also supervised by experienced entrepreneurship researchers in Switzerland. Consequently, our report is a first cross-sectional overview of the Swiss Start-up Monitor database, which is the first initiative in Switzerland to capture start-up data and compile a start-up panel for entrepreneurship research. The sample size varies due to the exclusion of series with missing data. That is why our sample sizes ranges from 899 to 45 start-ups across the analyses. This also means that the representativity of our results has to be viewed with caution. The insights drawn from very small subsamples are more specific and refer to the specific group of Swiss Start-up Monitor users. We aim to counteract this limitation in future reports by minimizing the discrepancy between the Directory and the Monitor sample size. Since the goal is to observe the start-up scene, our first filter excluded all companies founded before 2005 to ensure the focus on companies in the start-up stage. Further, whenever the size of the corresponding subsamples was big enough, a comparison of CTI-labeled and non-labeled ventures was performed. Because of incomplete data, our conclusions concerning the CTI-labeled companies have a preliminary character. This applies also for data in 2012. For the sake of transparency each chapter clearly specifies the volume and type of data the findings are based on. Since this is the first year of data collection, no profound longitudinal results can be presented but will be included in subsequent reports.

\(^4\) Number of users at the time of writing of the report. Registered users appear automatically in the Directory.
Chapter 4 provides a demographical overview using all public available data from the Swiss Start-up Directory.

Chapter 5 describes founders’ characteristics and distinguishes between the individual and team profile. We therefore focused on the Monitor data entered by registered users in the so-called Founders’ Box.

Chapter 6 considers start-up networks and their structures focusing on the role of the university and the different capital sources. Thereby, we used different data sources, as Directory data, Monitor data entered by registered users in the so-called Financing History’ Box, and secondary data about university spin-offs.

Chapter 7 is concerned with the performance in terms of received financial means and job creation. Within this chapter we compare “high performers” with “low performers.” Therefore, we focused on the Monitor data provided by registered users.

Chapter 8 summarizes our results and provides an overview about steps for future research.
The aim of this chapter is to provide a demographic overview of the Swiss Start-up Monitor’s start-ups. It focuses on the number of start-ups per year, the sectoral distribution, and the cantonal allocation. As our descriptive analyses are based on data per year, we excluded start-ups found in 2013 due to missing data.

**New Ventures over Time**

Excluding start-ups founded before 2005 and during 2013, Figure 3 shows the number of new ventures per year over a cumulative sample of 899 start-ups represented in the Swiss Start-up Monitor in both the Directory and the Monitor area. It also highlights that one year after the Lehman financial crisis of 2008 the number of new ventures reached an unexpectedly high level, which is rather counterintuitive. Some experts in the field tried to find an explanation for this growth. An example is Block and Sandner (2009), who observed the same phenomenon in the US by collecting US internet start-up data from the CrunchBase platform in June 2009. Their explanation was as follows: Although firms in later financing rounds received fewer funds than before the crisis, no negative changes could be observed for start-ups wanting to obtain initial financing. One reason for this could be that investors give early-stage ventures a higher value than later stage ventures in times of crisis. This behavior is due to the fact that early-stage ventures are in a more flexible position to react to the unstable market dynamics, while later stage ventures cannot completely escape the crisis’ consequences and need additional funding to survive. Thus, there were more investments in early-stage ventures, which could also explain the high degree of Swiss start-up companies in 2008 and 2009.

An analogous trend seems to appear among the CTI-labeled companies founded between 2005 and 2012: The number of CTI-labeled companies increases among start-ups born in 2008 and 2009 as compared to earlier years. Similarly, the increasing number of assigned labels after 2008 (Figure 4) could partly be explained by this development since there exists a natural time gap between the founding date of a start-up and the label assignment. For instance, in 2010 CTI assigned 24 labels, 12 of which were start-ups of the same year. Hence, 12 start-ups among the label companies were at least older than one year. As a consequence, most CTI-labeled start-ups systematically build up market experience before receiving the label. Figure 4 shows the number of assigned labels from 1996. While we see a strong
increase from 1996 to 2006, the number of labels has leveled off at 25 to 27 since 2008. Obviously, there are more start-ups accomplishing the label requirements in comparison to the period before 2008.

**Sectoral Distribution**

For the sectoral distribution we firstly compared CTI-labeled start-ups (N1) and non-labeled start-ups (N2) founded between 2005 and 2013, which were represented in the Monitor and the Directory. Thereby, we focused on the top 5 sectors with the highest amount of start-ups. Worth noting is the fact that the top 5 sectors are nearly identical in both subsamples. The results are displayed in Figure 5. In both diagrams the ICT, Medtech, Engineering, and Biotech sector have a relevant proportion. The Energy & Greentech sector has the smallest share among the top 5 CTI sectors with 3%, whereas the Consulting sector is represented only in the top 5 of N2. Secondly, we analyzed the industry development over an eight-year-period, including all start-ups represented in the Swiss Start-up Monitor. Accordingly, we counted the new businesses per sector and presented the results within a bar chart (Figure 6). For reasons of simplification we displayed only the seven strongest sectors. Overall, the ICT sector seems to be the most attractive for start-ups. The comparison of the sectors’ numbers of new businesses in Figure 6 also reveals a nearly constant development of almost all observed sectors, apart from ICT, over the past eight years. Only in 2008 and 2009 did all sectors, except Consulting & Services and Medtech, show an increasing tendency.
A closer look at the mean start-up number per year and the standard deviation confirms these observations to a great extent, as the standard deviation of the start-up number is quite low (between 1.85 and 3.37) in the Biotech, Consumer Products, Energy, and Engineering sectors. However, the Consulting, Medtech, and ICT sectors appear to be more unstable in regards to their yearly development (the most inconsistent is the ICT sector). After a slight decrease in 2010 a notable growth in 2011 (the maximum) is observable. In 2012 we see again a decrease of ICT start-ups, although still bigger than the decrease of 2010. A statement with regard to the future development of the ICT sector is not possible at this moment since 2012 is the first year of a stronger descent.

Geographical Allocation

Figure 1 clearly illustrates where the “hottest” Swiss start-up centers are. A closer look at the CTI-labeled start-ups points out a similar picture (Figure 8, next page). Zurich and Vaud are the most powerful cantons and include together more than 50% of the Directory and Monitor’s start-ups. In relation to the total population in the respective cantons, Vaud and Zurich come in only at fourth and fifth place, fol-
ollowed by Zug, Basel-Stadt, and Basel-Landschaft. In describing the number of new ventures in relation to the population size, Zug has the lowest number of start-up activities with 0.00026 new ventures per inhabitant. Our results concerning geographical allocation are in line with those of the Swiss Federal Statistical Office, since it also mentions Zurich, Vaud, and Geneva as the most entrepreneurial cantons in Switzerland. On the one hand this consistency is counterintuitive since we do not include all kinds of new ventures (all entries in the commercial register) but only focus on innovative start-ups, unlike the federal office. On the other hand it suggests that the variation in the number of new ventures may be influenced by the existing ecosystems in the cantons, regardless of whether the company is highly innovative or not. A closer look at the sectoral distribution of the two “strongest” cantons (Zurich and Vaud; Figure 9) among the Swiss Start-up Monitor start-ups indicates a high rate of ICT ventures – especially in Zurich, where ICT start-ups have a clear incumbent role with 38% (in Vaud 29.5%). While no other sector – except ICT – stands out in Zurich, the proportion of medtech and engineering start-ups in Vaud is much higher than biotech and consulting. In general, the high start-up concentration in these two “strong” cantons is linked to the fact that the ETH Zurich (ETHZ) and EPF Lausanne (EPFL) are located there (see Chapter 6). Both technical universities positively influence the regional entrepreneurial activities. In contrast to Zurich and Vaud, most of the start-ups
based in Basel-Stadt (canton with fewer new ventures; Figure 8) operate in the biotech sector (36.6%). The medtech sector is also overrepresented compared to all other displayed cantons (31.7%). The ICT rate in Basel-Stadt is notably low as compared to the other cantons which makes Basel-Stadt the one and only “Biotech & Medtech Canton.”

**Company Form**

We further looked at the registered company form of each start-up and categorized it in the corresponding sector. The results illustrated in Figure 10 show a general preference for the Corporation (Corp./AG/SA), except in the Consulting sector, where the Limited (Ltd./GmbH/Sàrl) is prevalent. This preference is remarkably strong in the Biotech, Medtech, and ICT sectors, in which the difference between the chosen company types is the strongest. At first glance, these findings are counterintuitive, since the minimum capital for an AG is twice than for a GmbH, considering that start-ups have limited financial means. However, the preference for an AG is financially backed, because we identified annual average financial means of 287,503 CHF (further discussed in Chapter 7) in our sample versus the minimum capital injection for an AG, which is 50,000 CHF. Additionally, the AG generates a higher value with regard to the start-ups’ reputation, since it portrays financial strength. Furthermore, minimum capital for the AG refers to “working capital,” meaning that the venture has it at its disposal. Consequently, it can be assumed that ventures would choose AG over GmbH.

All in all, the intriguing outcome from this analysis is the high significance for start-ups to register an AG, even at a stage where money is a limited resource. This behaviour might be reduced to the added reputational value that start-ups get from the registration of an AG in comparison to the GmbH or other company forms.

![Figure 10 – Company form and strongest industries (N = 702)](image-url)
The following statistics are based on founders’ data extracted from the so-called Founders’ Box. Since this is in the member area, the analyzed sample does not include all start-ups. A subsample, 113 out of 244 registered start-ups, entered team details into their profile; 18% of which are CTI-labeled start-ups. Due to missing values, the population size (number of analyzed founders) varies from N=167 (Figure 12) to N=221 (Figure 11). Since 113 start-ups entered details about 221 founders, the average team size equals 1.8 team members per start-up.

The Founder’s Profile

Every user enters data about his or her founding team, enabling the Swiss Start-up Monitor to collect data about the education, graduation level, age, position, and gender of 221 founders. Among these only 13 were women – amounting to 5.9% – in 13 different start-ups, and 208 men. One would expect the “women-staffed” start-ups to be less technological, based on the stereotype that women are less technology-oriented than men. A frequency analysis of the relevant start-ups’ sectors indicates a high frequency of Medtech, Engineering, and ICT start-ups, refuting the stereotype as illustrated in Figure 11. Five of the start-ups are indeed CTI-labeled. The lack of women in entrepreneurial activities is obvious. This lack is even reflected in the database of the Swiss Federal Statistical Office, thus it is a national policy issue. Furthermore, the number of new ventures with women on board, according to the federal office, shows a decreasing tendency from 22% in 2006 to 14% in 2010. Simultaneously, a growth of new ventures founded exclusively by women has been observed (from 12.8% in 2006 to 17.9% in 2010). This growth of “women-only start-ups” may suggest a greater engagement of women in entrepreneurial activities, and therefore an increasing female quota in Switzerland. Future research should concentrate on the causes of this observable gender division and on possible mechanisms to overcome this kind of deficit. Contrary to public awareness, the typical founder is not in his twenties. Most of the founders are aged between 30 and 49 as shown in Figure 12.

\[8\] cf. Swiss Federal Statistical Office.
Women are on average 6.8 years younger than men. A more detailed analysis of the founders’ graduation levels may give an indication of the causes for the observed age structure: 181 founders entered their educational background into their Monitor profile, 38 of them from CTI-labeled companies. The majority (54.7%) holds a university degree, 33.7% have a doctor’s degree, and 7.2% possess a professor’s degree. Only 4.4% have a lower graduation level, such as “Matura,” “Höhere Fachschule,” etc.. Is education that essential for entrepreneurial success? Haug et al. (2013) recently investigated “Entrepreneurial Talent” in a meta-analysis. They considered 183 studies on entrepreneurial talent against venture performance and referred to education as an influencing factor. The analysis unexpectedly yielded a weak connection between education and performance. In contrast, experience in terms of entrepreneurial, management, industry or work experience is mostly significant and highly correlated with performance variables such as profit and growth, and also with qualitative performance. The discussion about the entrepreneurial talent is important, because it provides key insights for policy interventions towards entrepreneurial education and trainings. We join this discussion by delivering specific insights from the situation in Switzerland in order to improve environmental conditions for start-ups. Hence, our future research will analyze the influence of experience and education on performance in terms of revenue. The high rate of doctor’s degrees among CTI-labeled founders, 36.8%, was remarkable. What’s more, founders with a university of applied sciences degree were represented stronger compared to the group of non-labeled founders. As the mentioned types of higher graduation require a long time to achieve, these insights may explain the age structure in Figure 12. Furthermore, we found a broad range of education backgrounds among all founders. The over-represented six areas were Computer Science (28.2%), Economic Sciences (11.7%), Mechanical Engineering (9.6%), Medical Sciences (8%), Biology (7.4%), and Electrical Engineering (6.4%). Beyond that, we found entrepreneurs with a Physics, Chemistry, Social Sciences, Law, Mechatronics, Mathematics, Science of Art, Construction Engineering, Humanities, or Pharmacy background. The CTI-labeled companies were over-represented in the field of biology since more than 50% of the observed biologists were found to be members of labeled start-ups (Figure 13).

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9 Haug et al., 2013.
The Team’s Profile

Team composition is essential for start-ups’ survival and success. Many studies attempt to gain insights on how team composition and heterogeneity influence start-up performance, e.g., Carpenter 2002, Ensley et al. 2005, Chandler et al. 2005, Vanaelst et al. 2006, and Gruber et al. 2012. We analyzed team heterogeneity by counting how many different graduation types and educational areas were present in the respective founding teams. We built a heterogeneity index, indicating that the higher the number of different graduation types and educational areas among the founders, the more heterogeneous the team.

Graduation Types

We excluded all start-ups with only one founder (= 47%). Due to missing values, we came up with a total of 46 start-ups, 12 of them CTI-labeled. We identified a heterogeneity index ranging from 1 = homogeneous to 3 = very heterogeneous and compared this index with the total number of founders in each team.\(^\text{10}\) The index in relation to the team size indicates that the higher the index and the smaller the team size, the higher the team heterogeneity. Hence, the higher the quotient, the more heterogeneous the team. The bar height in the following chart indicates the number of teams with the specific heterogeneity index on the x-axis.

Most of the teams (in total 31) were found to be in a middle position, between 0.33 and 0.5 as shown in Figure 14. The mean index of 0.59 reflects this result. Only 12 (equivalent to 26%) start-ups are very heterogeneous possessing an index of 1.

Educational Areas

In order to analyze the heterogeneity of educational areas we again excluded all start-ups founded by one person and were left with a total of 48 teams, 12 of them CTI-labeled. This index ranged from 1 to 4 and thus was broader than the graduation type index. The relative heterogeneity index distribution (Figure 15) reveals that most of the teams lie between 0.33 and 0.5 (light red; 23 in total). As compared to Figure 14, very heterogeneous teams are represented stronger (dark red; 17 in total). With a mean index of about 0.67 (higher than the index in the section Graduation Type)
the observed start-ups are more heterogeneous with regard to educational areas. The heterogeneity with regard to graduation types tends to have a distribution more similar to a normal distribution. The heterogeneity with regard to the educational areas clearly shows two extremes representing two groups of start-ups, one more heterogeneous (leading group) and one more homogeneous. We focused on the results of Figure 15 and screened these contrasting teams for their financing history. In order to gain a deeper understanding of the influence of team heterogeneity on the start-up’s means acquisition performance, we compared the two teams with each other. Our results indicate that heterogeneity could be a signal for high potential teams from the point of view of venture capitalists (the main results are presented on the following page).
The more heterogeneous teams, in regards to their educational area, acquired nearly three times more capital than the homogeneous teams on average.

In contrast, the more heterogeneous teams, in regards to their graduation types, performed worse as they acquired, on average, a quarter of the financing of the homogeneous teams.

For the homogenous teams, the major part of financial means came from a public or governmental agency; for the heterogeneous teams they came from venture capitalists.

Both groups frequently participated in (business plan) competitions although the awards granted were low compared to other financial sources.

"An experienced investor does not invest in an idea, but in personalities"

Alexander Stöckel, Partner at b-to-v Partners AG, St. Gallen
Being well connected with relevant stakeholders affects a start-up’s success significantly. Founders compensate missing resources oftentimes via their network connections. Grichnik et al. (2013) showed the importance of this social capital for bootstrapping activities of nascent ventures. Relations to investors, incubators, or other financial or non-material supporters (weak ties) play a major role for resource acquisition in early stages. The type of support founders get from their weak or strong ties (the latter-mentioned consists primarily of family and friends) can be psychological, financial, non-monetary, or even in the form of infrastructure. The Swiss Start-up Monitor aims to analyze tie structures and characteristics by tracking how many start-ups are financed by venture capitalists or business angels, have received money from family or friends, have won awards or coaching services, or are supported by research institutions, e.g. universities. Since we identified 435 start-ups (out of 901; 48%) affiliated to a university or research institute, we focused on that group to gain insights into the relationship between the respective spin-off and the university it is affiliated to.

**Universities’ Ecosystems**

We identified start-ups affiliated to federal universities (ETH Zurich and EPF Lausanne), cantonal universities (University of St. Gallen, Basel, Berne, Fribourg, Zurich, and the University of Neuchâtel), universities of applied science (Berner Fachhochschule, Fernfachhochschule Schweiz, Fachhochschule Nordwestschweiz, FHS St. Gallen, Haute Ecole Spécialisée de Suisse occidentale, USI/ SUP Svizzera italiana, Zürcher Hochschule für Angewandte Wissenschaften), or specialized universities (Ecole Hôtelière de Lausanne, Ecole d’Ingénieurs et d’Architectes de Fribourg, Hochschule für Technik Rapperswil, etc.). We additionally found affiliations to the federal research institutions Paul Scherrer Institut and EMPA Dübendorf.
More than 50% of the CTI-labeled start-ups were found to be ETHZ or EPFL spin-offs. To gain a deeper understanding of the relationship that spin-offs have with their university, we focused on the two federal universities with the most affiliated start-ups (Figure 16). We analyzed the geographical distance from each registered company office of 216 ETHZ and 184 EPFL spin-offs to its affiliated university and calculated a mean distance for each founding year. We illustrated the mean distance by using it as the radius of a circle around the ETHZ and the EPFL (Figure 17). Each circle represents the mean distance of all start-ups, according to a particular founding year between 1989 and 2012. We finally calculated an overall trimmed mean which amounted to 18.7 km for the EPFL spin-offs and 15.4 km for the ETHZ spin-offs. Both details represent very short distances for a period of more than 20 years. The ETHZ spin-offs show even lesser willingness to move away from Zurich compared to the EPFL spin-offs. The higher circle density around the center in the right chart in Figure 17 emphasizes this lower moving disposition. It also shows the maximum mean distance is around 33 km. The university–spin-off relationship appears to be very strong and obviously has a long-term effect, which indicates that there must be a high-added value for the decision of start-ups to stay or move close to the university. 

“To be based near the ETHZ means to have one’s finger on the pulse of progress,” stated Alexander Ilic, founder of the start-up Dacuda and member of the Steering Committee of the Swiss Start-up Monitor. Other start-ups we talked to mentioned the possible use of the university’s infrastructure and the higher chance to get in touch with potential new employees or team members as reasons why remaining close to or even in university buildings is preferred to moving away.

Financial sources at a glance

63 start-ups recorded 144 financing transactions in their Financing History Box, an important part of their SSM profile. After counting the number of start-ups per financial source type, we came up with the results illustrated in Figure 18.
The most frequently mentioned financial sources were own money (internal sources) or money from friends and family. Important for the understanding of our results is that we focused on the origin of start-ups’ financial means, not on the type (investment, funding, credit, etc.). By public/government agency we refer to financial support given by federal or cantonal institutions, e.g. universities. Business plan competitions and business angels were the most frequent external sources of money, followed by public or government agencies (e.g. CTI), venture capitalists (VC), and banks. In contrast to transaction frequency, the financing total volumes coming from family and friends were lower than those coming from weak ties, e.g. venture capitalists. We calculated the quotient of both indicators (volume/number of financing transactions) and ranked them. Strong ties came in fifth, while venture capitalists came in first, followed by public or government agencies and corporate venture capitalists. Although the average amount of money per transaction coming from venture capitalists is very high, other sources are utilized more frequently, which indicates that VCs’ selection process is very strict and hard to pass. In the case of awards (“cash prizes”) the discrepancy between transaction number and amount is notably wide, meaning that a lot of start-ups participate in competitions and expend substantial effort, although the rewards are not high. Apparently, start-ups do not focus on the monetary value of such competitions, but aim at enlarging their business know-how in writing and submitting business documents. Most business plan competitions also offer workshops, seminars, and coaching sessions which profit start-ups because they learn how to manage their business and get in touch with relevant stakeholders of the Swiss start-up scene.

“The chance of winning a business plan competition is very low; most of the start-ups who won in the past were in an advanced stage and profited from their experience. Nonetheless, the benefits of participation are much higher than the effort, and the hope to win and get money to work with is the last to die,” said Dominic Zünd, Co-Founder of Stablish.me, an innovative talents platform. He recommended not applying for competitions at a too early stage as later-stage start-ups have higher chances to win. At the same time, he calls attention to how counterproductive these competitions are to early-stage start-ups, since they need relatively small amounts of money more than later-stage start-ups who mostly focus on growth strategies for which the cash prizes are insufficient anyway. In summary, the results suggest that business angels and VCs are remarkable in regards to the money volumes, whereas cash prizes (e.g. through start-up competitions) seem to have a more honorary non-monetary nature. Finally, strong ties (e.g. family, friends, or team members) are well represented in the categories total volume and frequency.
Financing History and Employee Development

Measuring the performance of start-ups by calculating the typical key performance indicators is often not possible at this early stage. Nonetheless, our dataset contains some valuable information referring to very early development steps of the respective start-ups; e.g. employee development, financing history, and survival in the market can be indicators for future success. The analyzed start-ups in this section are those that provided information about their financing rounds and about employee development. Figure 19 shows the total financing amounts per year. Therefore, we first filtered for the year of money acquisition, then summed up the amounts to reach the total sum of acquired means in the years 2006-2012. Our relatively small sample is due to the fact that only 62 start-ups out of 244 entered details about their financing sources. For the interpretation of Figure 19 it is important to know that not all of the 62 analyzed start-ups received money in each year. The acquired financial means tend to increase. Only in 2012 - for which values are preliminary - a small decrease is visible. Moreover, we calculated the average amount of received money per year per start-up over the entire period: it equaled to 285,002 CHF. This sum increases by almost 129% to reach a total of 653,773 CHF if we nar-
row down our calculations to only CTI-labeled start-ups. The Monitor’s users have a total volume of acquired capital of 64.45 million CHF, being in the market 3.6 years on average. A very high percentage of this sum emerged from CTI-labeled start-ups (68.5%). Beyond acquired capital per year, we looked closer at the sectoral money distribution and discovered that medtech and ICT both are “money intensive” sectors which claimed more than 50% of the total received amount among the start-ups in our sample (Figure 20). With regards to the size of the “piece of cake” it follows biotech (with 25.66%), engineering (with 6.8%), micro & nanotech (with 3.56%), and finally the certainly less technology-based sectors, consulting and consumer products.

The following bar chart displays the employee development of start-ups that entered data in the corresponding Team Development Box and Financing History Box of the Swiss Start-up Monitor. They entered data for the time period 2005–2012. In total they created 168 jobs in eight years, 3.6 jobs per start-up (over the whole period), and on average 21 jobs a year. Eighty-four jobs were created by the included CTI-labeled companies. In Figure 21 we contrasted the amount of new jobs per year and per start-up with the years in the market. The bar chart reveals two leaps, one after the first and one after the fourth year. Both nearly have an identical leap size. After the first and until the fourth year in the market, start-ups engage on average 0.98 to 1.23 persons in their business per year. Statistically, this means they employ more likely one instead of two persons. After the fourth year the average employee growth increases by almost one person a year. Hence, up to the fifth year in the market it is more probable that a start-up creates two jobs a year. Finally, we divided the start-up population according to above and below-average performance with regard to relative employee development (jobs per start-up depending on the years in the market). Some interesting differences between the two start-up groups emerged:

**Figure 20 – Sectoral money distribution (N = 63)**

**Figure 21 – Average number of created jobs, start-ups founded in 2005 were excluded in the chart because of missing values (N = 45)**
• Start-ups with an above-average employee growth were mainly financed by venture capitalists. In contrast, below-average performance start-ups were primarily financed by business angels or other non-specified sources.
• Both groups show a relatively high family-and-friends share.
• Public or government support is apparently big among high-performing start-ups.
• The outstanding start-ups’ financing volume is 31.5% higher than the one of low performers.

Innovation Power from Universities

The large number of start-ups affiliated to universities or research institutes as well as our distance analysis have already highlighted the important role of the scientific institutions for their start-ups. The survival rate of spin-off companies is believed to be higher in comparison with affiliated start-ups (e.g. Zhang, 2008). Additionally, these spin-offs are thought to be an innovation driver for Switzerland, since they transfer knowledge and technology from research facilities to the market. Since Zurich and Lausanne are the strongest spin-off ecosystems, we focused on the ETHZ and EPFL spin-offs and measured their innovation power by considering the number of registered patents by spin-offs and universities. We collected data from 212 EPFL and 283 ETZH spin-offs. In each group we checked whether the spin-off is still in the market (relying on the online commercial register “Moneyhouse,” www.moneyhouse.ch) and how many patents the spin-off had registered (relying on publicly available patent databases such as Espacenet). We also counted the patents registered and managed by the ETHZ and EPFL. The main findings can be found in the following Infobox.

Figure 22 – Spin-offs’ patents per sector (N = 491)

80% of EPFL and 88% of ETHZ spin-offs are still active in the market. About 7% of EPFL spin-offs and 5% of ETHZ spin-offs have been acquired, which is quite a low rate when compared to their survival rate. In relation to the total number of registered patents reported by the Swiss Federal Statistical Office from 2000–2010 in the respective cantons of Zurich and Vaud:

• 5.3% of all registrations were found to be from ETHZ spin-offs, while 7.2% were from EPFL spin-offs; and
• 3.1% of all registrations were found to be from the ETHZ, while 5.23% were from the EPFL itself.

ETHZ spin-offs registered together 649 patents, which is much higher than what most cantons registered in 10 years (e.g., Jura: 91, Schaffhausen: 278, Valais: 483). The “patent-richest” sectors among the spin-offs are biotech and electronics. A detailed sectoral analysis is shown in Figure 22.
8 CONCLUSIONS

The demographic overview confirms that Zurich and Vaud are the most fertile start-up grounds in Switzerland. Further, “our” collected data (Swiss Start-up Monitor) first shows a decrease of ICT start-ups after seven years of growth. We also provide insights into the enhanced capital activities in early-stage companies in times of financial crisis. The investigation of the founders’ and teams’ characteristics led to important results confuting two stereotypes in entrepreneurship:

1. The typical entrepreneur is on average 38.7 years old, male, and holds a university degree or higher, such as a doctor or professor. He is not a young man interrupting his studies due to a brilliant idea.
2. Women are definitely under-represented. They are positioned in high-tech companies in the Medtech, Engineering and ICT environments, rather than in non-technological fields.

Our descriptive analysis reveals that heterogeneity might have a positive influence on the means-acquisition process, since heterogeneous teams were found to receive more money than homogeneous teams - but only in the case of the educational area. Heterogeneity concerning the graduation type showed an inverse result. Additionally, heterogeneous teams were mostly financed by venture capitalists, homogenous teams by public or government agencies. There seems to be a difference in start-up type between university spin-offs and other start-ups. Self-contained ecosystems with own mechanisms and rules around the ETHZ and EPFL push regional entrepreneurial activities further. This phenomenon is visible even in the property-rights activities in the respective regions (Zurich and Vaud) which are relatively high compared to most of other cantons: While, for example, Schaffhausen reported 278 patents in the period between 2000 and 2010, the federal universities’ spin-offs registered 427 patents in the same time period.\(^\text{10}\) Future research within the Swiss Start-up Monitor initiative will acquire a deeper understanding of these mechanisms in order to foster and transfer them to less prosperous regions. In the chapter “Networks” we looked at the financing history and identified firstly that strong ties play a crucial role in both financing volume and frequency. Secondly, the financial means arising e.g. from businessplan competitions, though not considerably high, are obviously perceived to be of great non-material value (e.g. in the form of feedback, know-how, psychological support). Thirdly, business angels and VCs represent the most important source of financing with regards to the volume. Finally, performance was measured in terms of capital acquisition and employee deployment. CTI-labeled companies performed better than other start-ups in both cases. Further research will focus on exploring antecedents to both issues by collecting more detailed data about the Monitor’s start-ups in an annual survey. Existing or developing start-up ecosystems, e.g. spin-off-systems, will be studied in greater depth.

\(^{10}\) cf. Swiss Federal Statistical Office.
The following indicators at three levels are of interest and will be targeted each in relation to the new venture’s performance and survival.

**Individual Level**

- Founders’ family backgrounds and motivation
- Founders’ characteristics and leadership capabilities
- Roles and responsibilities in the team

**Organizational Level**

- Longitudinal analysis of financial and employment development
- Effects of start-up labels and awards
- Degree of formalization, centralization, hierarchies, and openness
- Network knowledge acquisition and exploitation

**Ecosystems**

- Characteristics of start-up hot spots in Switzerland
- Success factors of promotional activities, single agencies, and universities’ programs
- Identification of promotion gaps and traps
- Recommendations for government investment strategies

In order to enhance the quantity and secure the quality of our data we will concentrate on cooperation with relevant partners, e.g. coaches, foundations, and investors who need to monitor their portfolio of start-ups. We aim to provide them with a tracking system benefiting from the data input by the partners. We will also extend the communication interface between start-ups and (potential) partners and therefore strengthen the platform activities of the Start-up Monitor.
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