

Hackathons as a ground for creating start-ups: Evidence from THE Port 2014

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Abstract. This thesis researches why hackathons can be characterised as a ground for creating start-up companies, as well as what start-up teams emerging from hackathons have in common. A hackathon is a time-limited event where inter-disciplinary teams are put together to collaborate intensively on a specific idea or challenge, aiming to have a functional prototype by the end of the event. The purpose is to provide hackathon organisers and participants with insights on how to encourage, facilitate, and foster business creation within the framework of a hackathon. As small and medium sized enterprises employ more than 60 percent of the workforce in most countries, business creation is a crucial contributor to job and wealth creation all over the world. The subject is approached through an exploratory single case study of THE Port Hackathon 2014. Five representatives from three teams were interviewed, as well as representatives from the organising team behind the hackathon. In addition, the author took part in THE Port Hackathon 2015 as a coach. The findings suggest that the teams from the hackathon chose to move on with their ideas because they seek to use their past experience and knowledge in a more long term business setting than the research and science community currently offers. They have been encouraged by a role model to pursue their business concept, and they have a flat hierarchical structure within the business. Through the hackathon, they have been given access to valuable networks, both internal and external. All the teams were able to produce a prototype during the hackathon. These prototypes are still the skeletons of their products today. For the organisers of future hackathons, the author suggests to expand their external networks to include actors that provide business support for the teams when the hackathon is over. They should also encourage participants to involve industry actors during the hackathon in order to meet their wishes and requirements. To strengthen the findings, more extensive research is needed by following more teams in more hackathons, preferably over a longer period of time.



Sammendrag. Denne oppgaven forklarer hvorfor hackathons kan omtales som en grobunn for oppstartsselskaper, og undersøker fellestrekk mellom oppstartsselskaper med røtter i hackathons. Et hackathon er et tidsbegrenset arrangement der tverrfaglige team blir satt sammen for å intensivt jobbe med en spesiell idé eller utfordring, med mål for øye å ha en funksjonell prototype innen arrangementet er over. Formålet med oppgaven er å kunne gi hackathonarrangører og –deltakere informasjon om hvordan de kan oppfordre til, og tilrettelegge for, økt nyskaping og bedriftsetablering innenfor rammene tilbudt av et hackathon. Små og mellomstore bedrifter sysselsetter av mer enn 60 prosent av arbeidsstokken, det gjør etablering av nye bedrifter til en viktig faktor i verdensøkonomisk sammenheng. For å belyse disse temaene valgte artikkelforfatteren en *exploratory single case study* tilnærming til THE Port Hackathon 2014. Fem representanter fra tre hackathonteam ble intervjuet, samt representanter fra hackathonarrangøren. I tillegg deltok artikkelforfatteren på THE Port Hackathon 2015. Funnene indikerer at hackathonteamene valgte å gå videre med sine ideer fordi de ønsker å bruke tidligere erfaring og kunnskap i en mer forutsigbar jobbsituasjon enn det forskningsmiljøet tilbyr. De har alle blitt oppmuntret til å gå videre av én eller flere rollemodeller, og de praktiserer et flatt internt hierarki. Gjennom hackathonet har de fått tilgang til både eksterne og interne nettverk som har vært uvurderlige for videreutviklingen av oppstartsselskapet. Alle teamene produserte en prototype under hackathonet, og denne prototypen er fortsatt grunnlaget for produktene deres i dag. For fremtidige hackathonarrangører foreslår forfatteren at de bør utvide sine eksterne nettverk til å inkludere nettverksaktører som tilbyr støtte innen forretningsutvikling for teamene når hackathonet er over. De bør også oppmuntre deltakerne til å involvere industriaktører mens konseptet utvikles. For å styrke funnene trengs det mer forskning som følger flere hackathonteam fra forskjellige hackathons, fortrinnsvis over en lengre, dyptgående tidsperiode.

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This Master's Thesis is original, unpublished, independent work by me, Marthe N. Dehli, as a part of my degree in Entrepreneurship from the NTNU School of Entrepreneurship at the Norwegian University of Science and Technology (NTNU).

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Genève, 14.04.2016

A handwritten signature in black ink, appearing to read 'Marthe Dehli', written over a horizontal line.

Marthe Nøklebye Dehli

Introduction

They started off as pizza-parties for computer nerds, now they are used as a common method for innovation and business development in several global companies. *Hackathons* are becoming a household term.

Hackathons

If you type ‘Hackathon 2015’ in the Google search field you get 67.300 results. Features such as the *Like-button*, the chat function and the timeline are all results of Facebook’s very own internal hackathons (Keyani, 2012), while Google hosts several hackathons a year, like the humanitarian Vivacity Hackathon (Vivacity). Every year since 2012, NASA has invited people to join their International Space Apps Challenge, a two-day hackathon where publicly available data is used to find new solutions to global challenges (SpaceApps). Even on a governmental level, hackathons are winning territory: The British Consulate-General Toronto teamed up with HackerNest in Toronto, Canada and arranged DementiaHack – a hackathon devoted to solving problems caregivers and people with dementia meet in their everyday life (HackerNest). In 2011, roughly 80 software developers and designers in the city of Baltimore, US got together to further develop ideas gathered from teachers and school administrators to improve and solve education-related problems at the city’s very first Education Hack Day (Education Hack Day). The most renowned hackathon story is probably the one of the company GroupMe. The mobile group-messaging app was developed at the TechCrunch Disrupt hackathon in 2010, raised \$11.5 million USD in funding and was acquired by Skype in August 2011 (TechCrunch, 2010; Arrington, 2010; CrunchBase). Microsoft acquired Skype later that same year.

These are just a few examples of how hackathons have been embraced by different parts of society, but as this thesis will show, the hackathon world is still rather undiscovered turf in the entrepreneurial literature.

Hackathons as a ground for creating start-ups

If little has been written about hackathons in academia, even less has been written about hackathons as a ground for creating start-ups. Even though the concept has been adopted and adapted and is used in a wide range of different sectors, academia has not been able to keep up. An initial literature review on hackathons in the business world was conducted based on twelve internationally acknowledged journals that are focused on business development and entrepreneurship. The result was both surprising and disappointing; none of them had published articles on hackathons at all.

THE Port Hackathon

THE Port is an association that seeks to “[...] *combine creative minds from CERN and non-profit organisations in interdisciplinary teams to work on humanitarian technology related benefits to society*” (THE Port). The association was founded in May 2014, the first advisory board meeting was held in July the same year. Only four months later, the very first THE Port Hackathon was held at CERN, from October 31st to November 2nd 2014. A total of 58 participants from 28 different countries with various disciplinary backgrounds dedicated their

skill sets and time to humanitarian challenges and questions; their age span ran from 17 years to 46 years. Among the organisations presenting challenges they meet in the field were the International Committee of the Red Cross (ICRC) and Norwegian People's Aid. Six teams spent the weekend working on different projects. Four of these teams chose to move on with their ideas and are now in various parts of the start-up phase, making a business out of it. Three of them have been researched for this thesis; one of the teams are developing the next generation of body bags for mass casualty situations, one is working on a private information retrieval software, while the third group is working on a portable cosmic ray detector.

Purpose

Identifying similarities between the start-ups emerging from THE Port Hackathon has the potential to assist future hackathon organisers and participants in facilitating start-up creation. A possible side effect is the potential to shed some light on existing theories on start-up companies and business motivation in general.

According to the European Commission, start-ups play an important part in contributing to European job and wealth creation (2002). More than 60 per cent of all employees within a country are employed by a small or medium sized enterprise (Stefanovic, Rankovic and Prokic, 2011). This shows that – especially in a fragile economy – the creation of new businesses is in everyone's best interest. The globalisation nowadays makes it easier than ever to bring people from various professions and countries together, it also makes it easier to keep projects moving across borders after a hackathon or similar events.

In light of missing literature and close proximity to events, the purpose of this thesis is to explore the hackathon phenomenon as a ground for creating start-ups by researching the mentioned aspiring companies and the framework that is THE Port Hackathon. Put more precisely:

Q1: Why can hackathons be characterised as a ground for creating start-ups?

Q2: The teams that chose to move on with their hackathon concepts from THE Port 2014: What do they have in common?

Due to the lack of satisfactory theory, this is an exploratory study benefitting from several related theoretical perspectives. Through thorough interviews and analysis, this thesis aims to unveil what the teams from the 2014 THE Port Hackathon have in common.

Theory

Start-ups

The term *start-up* or *startup company* is said to date back to the infamous dot-com bubble of the late 1990s. Since then, it has become somewhat an umbrella term for young, growing companies, particularly within the technology field. According to Investopedia, “*a startup is a company that is in the first stages of its operations*”. Business Dictionary offers the following definition:

“Early stage in the life cycle of an enterprise where the entrepreneur moves from the idea stage to securing financing, laying down the basis structure of the business, and initiating operations or trading”

When interviewed by Forbes, Neil Blumenthal, co-founder and CEO of Warby Parker, said “*a start-up is a company working to solve a problem where the solution is not obvious and success is not guaranteed*”. In the same article, Adora Cheung, co-founder and CEO of Homejoy claimed that being a start-up is a state of mind;

“[...] it’s when people join your company and are still making the explicit decision to forgo stability in exchange for the promise of tremendous growth and the excitement of making immediate impact”

(Forbes, 2013)

In the academic world, start-ups have been used to label young, growing companies with innovative ideas (Timmons, Spinelli, 2008). Giardino, Unterkalmsteiner, Paternoster, Goschek, and Abrahamsson (2015) did a brief study of start-up definitions in their article, ultimately they defined start-ups as a “*[...] small company exploring new business opportunities, working to solve a problem where the solution isn’t well known and the market is highly volatile*”. They go on to underline high uncertainty and rapid evolution as two of the key characteristics of a start-up. None of these definitions require anyone to be engaged fulltime in the business in order for the company to be called a start-up. This might be a result of evidence suggesting that a significant number of start-up (co-)founders create their new business ventures next to being employed somewhere else, and operate part-time while developing the start-up (Carter, Gartner, Reynolds, 1996; Delmar, Davidsson, 2000; Kolvereid, Isaksen, 2006).

As this paper will show, the teams researched are entities in the very beginning of their business life cycle that are pursuing innovative ideas and exploring business opportunities. They have done critical, extensive development in a short period of time, differ in how far they have come, but they are all start-up companies. Hence, hackathons can be characterised as a ground for creating start-ups.

Hackathons and Opportunity Recognition

The academic literature on hackathons is very limited and equally superficial. During the production of this thesis, no literature has been found explicitly covering the topic of opportunity recognition in hackathons. Venkataraman (1997) states that the scholarly field of entrepreneurship is concerned with: “[...] (2) *why, when and how some are able to discover and exploit these opportunities while others cannot or do not [...]*” (p. 120-121). With hackathons now being a common concept, it is time to research why and how some are able to identify the business potential in the cases they work on.

Hackathon Definitions

Despite their emergence, hackathons have hardly been studied by academia, save a few exceptions. Briscoe and Mulligan (2014) define hackathons as “[...] *an event in which computer programmers and others involved in software development collaborate intensively over a short period of time on software projects*” (p. 1). Some researchers support Briscoe and Mulligan in focusing on the software part of development (e.g., Chowdhury, 2012), while others underline that interdisciplinary teams are an essential feature of hackathons (e.g., Hecht, Jouttenus, Jouttenus, Werner, Khandbahale, Bell, 2014). The limitation of time is a factor in most previous definitions (e.g., Johnson, Robinson, 2014; Zapico, Pargman, Ebner, Eriksson, 2013).

A typical hackathon is arranged over a weekend, with the participants being presented to several ideas on Friday. Usually they can choose which project they want to work on, at other times they are simply ‘placed’ in a group by the organisers. They then distribute their manpower as they wish, before doing final presentations on Sunday, normally around noon. The final presentations are followed by an award ceremony where there is either one grand prize, or several categories that can be won.

For this thesis, a hackathon is defined *as a time-limited event where inter-disciplinary teams are put together to collaborate intensively on a specific idea or challenge, aiming to have a functional prototype by the end of the event*. The definition is applied to THE Port Hackathon.

Opportunity Recognition

“By definition entrepreneurship requires making investments (time, effort, and money) without knowing what the distribution of the returns will be tomorrow” (Venkataraman, 1997, p. 124). Since Shane and Venkataraman published their seminal article *The promise of Entrepreneurship as a field of Research* in 2000, literature on entrepreneurial opportunities and opportunity recognition has exploded. Several reviews have been published; three of these were the starting point of the literature search intended for this thesis. Traditionally, the literature on opportunity recognition or entrepreneurial opportunities evolves around two different views: either opportunities are discovered, they are like hidden jewels waiting to be carved out of the mountain; or they are created, like a sculpture or a sandcastle. Both views presume that the objective of the entrepreneurs is to form and utilize opportunities (Shane, Venkataraman, 2000, Shane, 2003).

Entrepreneurial Opportunity

In their review, Hansen et al. (2011) focus on breaking down the definitions of entrepreneurial opportunity and opportunity-related processes. Short et al. (2010) conclude that entrepreneurial opportunity as a research field still covers a lot of unexplored land, while Davidsson (2015) suggest that, despite Hansen et al.'s contribution to decipher definitions, 'opportunity' is an ambiguous, out-dated term that should be replaced by three constructs: 'External Enabler', 'New Venture Idea', and 'Opportunity Confidence'. His proposed definitions are listed in Table 1 (p. 683).

Table 1 Definitions proposed Davidsson (2015)

External Enabler	New Venture Idea	Opportunity Confidence
A single, distinct, external circumstance, which has the potential of playing an essential role in eliciting and/or enabling a variety of entrepreneurial endeavours by several (potential) actors.	An "imagined future venture"; i.e., an imaginary combination of product/service offering, markets, and means of bringing the offering into existence.	The results of an actor's evaluation of a stimulus (External Enabler or New Venture Idea) as a basis for the creation of new economic activity.

What is clear is that there is no consensus among scholars on what an entrepreneurial opportunity *actually* is, whereas the discussion on how they are identified can broadly be put in two subcategories; discovery theories and creation theories. Hence, these are among the researched dimensions in this thesis.

Discovered or Created?

Discovery theories have received much more attention from the academic community than creation theories (Alvarez, Barney, 2007). Applying a discovery theory view, opportunities already exist separate of the entrepreneurs. Arenius and De Clercq (2005) state the obvious fact that "[...] *before opportunities can be realized, they first need to be discovered*" (p. 252), and remark how most scholars, when researching opportunity recognition, focus on the exploitation of opportunity. Research on high-technology start-ups has shown that within existing research organisations, the actual outcome of the scientific work being done is given little to no thought. However, when the entrepreneurial potential becomes evident, "[...] *a problem-solving orientation sets in, creating the drive and obsession needed to complete its development*" (Corman, Perles and Vancini, 1988, p. 37).

According to Alvarez and Barney (2007), "*creation theory has yet to be articulated as a single coherent theory in the literature*" (p. 15). The general assumption is that entrepreneurial opportunities are dependent on the entrepreneur, created "[...] *by the actions, reactions, and enactment of entrepreneurs exploring ways to produce new products or services*" (Alvarez, Barney, 2007, p. 15).

The Value of Networking

Some might say that discovering or creating an entrepreneurial opportunity is the easy part; the hard part is exploiting it. The essence of John Donne's poem *No Man is an Island* also applies to entrepreneurs, which is why entrepreneurship scholars have chosen to research the networks of business creators, especially within the context of business incubators.

Networks in Business Incubators

A common perception of the term 'business incubator' is that it covers organisations that aim to support and encourage newly founded businesses. Scholars tend to present definitions on an overarching level with different nuances, but there is a certain consensus that three elements have to be present for an organisation to be considered a business incubator: shared office space; professional business support or advisory consultancy; and network access (e.g. European Commission, 2002; Grimaldi, Grandi, 2003; Hackett, Dilts, 2004).

Based on these three elements, one can easily draw similarities between business incubators and hackathons; during a hackathon the teams share an office space, they have access to support mechanisms, and like in a business incubators, network ties will be established between hackathon participants, and between the organiser of the hackathon and the outside world. The network ties are important; some scholars even argue that the social networks of the entrepreneurs may be their most valuable source of knowledge (Arenius, De Clercq, 2005; Johannisson, 1990). Hence, the network support of the hackathon teams is one of the researched dimensions in this thesis.

Networks are important to entrepreneurs because they give access to information and advice, information and advice is based on trust, which makes *trust* an essential ingredient in networks (Hoang, Antoncic, 2003; Tötterman, Sten, 2005; Bollingtoft, Ulhoi, 2012). According to Tötterman and Sten (2005), trust building between tenants in business incubators should be one of the activities in which incubator management support their tenants in order to help them develop their networks. One important step in doing so, is applying norms within the incubator that focuses on generating trust – not competition – between the different tenants firms. Trust is also mentioned by Hoang and Antoncic (2003) as one of the essentials for network building. In their opinion, the level of trust affects the value of the information exchanged between the network actors; the deeper the trust, the more valuable the information.

External and Internal

On an overall level, the distinction between external and internal networks is quite common in entrepreneurship literature, especially when researching opportunity exploitation and/or business incubators (Lyons, 2002; Bollingtoft, Ulhoi, 2005; Tötterman, Sten, 2005; Inkpen, Tsang, 2005; Bergek, Norrman, 2008; Schwartz, Hornych, 2010). The diversification can also be applied to Birley (1985) who distinguishes between entrepreneurs' formal and informal networks, where the former includes local and national agencies, and the latter consists of actors such as family, friends and previous colleagues. She writes: "*an efficient network is one in which [...] his [the entrepreneur's] needs are diagnosed and he is passed round the system until he gathers the necessary information and advice*" (p. 116). According

to her article, the informal networks are efficient and helpful in establishing businesses. These findings were later supported by Brüderl and Preisendörfer (1998).

Entrepreneurial Motivation and Organisational Structure

The majority of studies of entrepreneurial performance underline motivation as a key factor in both the success and understanding of small companies including start-ups (Robichaud, McGraw and Roger, 2001).

Motivation for Business Creation

In a Serbian study, the three most common reasons for entrepreneurs to start their own businesses were identified as increasing personal income; being able to use past experience and training; and having job security (Stefanovic et al., 2011). The authors claim their findings to be identical to the results of a similar survey conducted in Turkey (Benzing, Chu and Kara, 2009). An American study on high-technology entrepreneurs identified three key reasons for them to pursue a business opportunity: dissatisfaction in current job; the identification of a new opportunity or need; and encouragement from external actors to start a company. The latter is more common among entrepreneurs working with high technology than entrepreneurs in other fields (Corman et al., 1988).

Organisational Structure

The same study concluded that the organisational structure, the hierarchy, of a start-up is usually flatter and more informal than in more administrative organisations. Whether or not a steep hierarchy facilitate better group performance is commonly discussed among scholars, a literature review conducted in 2002 concluded that a larger number of studies show that flatter hierarchies lead to better group performance, higher motivation and satisfaction within the group, and better coordination between the members of the group (Anderson, Brown, 2010). To be able to work efficiently together is crucial during a hackathon as the goal is to have a functional prototype by the end of the three days, hence the hierarchy of the team is among the researched dimensions in this thesis.

Role Models

Role models are another aspect associated with entrepreneurial motivation. According to studies (e.g. Gibson, 2004; Nauta and Kohaly, 2001; Bosma, Hessels, Schutjens, van Praag and Verheul, 2011) entrepreneurial role models serve several functions, among them as a source of inspiration and motivation. They can also serve as teachers and supporters.

When researching role models in entrepreneurship, Bosma et al. (2011) found that role models do indeed matter when people choose to actively pursue a business idea, especially among entrepreneurs with higher education. They tend to view their role models as crucially important to their business venture. However, it is not Sara Blakely of Spanx or Microsoft's Bill Gates that inspire them to become entrepreneurs. Instead, they find their role models in people they can identify with, who are similar to them, but who are more experienced and who has influenced them personally. Hence, 'encouragement by role models' is one of the researched dimensions in this thesis.

Researched Dimensions

Based on this, the following dimensions are researched in this thesis:

Table 2 Researched dimensions

Researched Dimensions
Urge to increase personal income
Urge to use past experience and training
Urge to have job security
Unhappy with current employment
Identify an opportunity or a need
Good group performance as a result of a flat hierarchy
Opportunity discovered
Opportunity created
Network support

Methodology

Therefore, in light of these insights, what is being researched is why the participants chose to move on. *What* do they have in common? Identifying their similarities will help organisers of future hackathons to further facilitate and encourage business creation.

Eisenhardt (1989) defines a case study as “*a research strategy, which focuses on understanding the dynamics present within single settings*” (p. 534). What is interesting is *why* the participants choose to move on with the concepts from the hackathon and *what* they have in common. The research questions in this thesis are exploratory which points in the direction of archival analysis, history method or case study strategy. Archival analysis is preferred when the *how* is followed by *many* or *much*, thus it is not a match. The study does not require control of behavioural events, meaning that both a historical and a case study strategy can be applied. However, the study focuses on contemporary events, and thus excludes a historical method. Three subcases are explored within the main case, THE Port Hackathon, thus this thesis is defined as an exploratory single case study (Yin, 2009).

In order to get a clear understanding of the subject, a holistic approach was chosen. Literature on opportunity recognition and literature on hackathons were the starting point for the theory development. After the interviews were conducted it became evident that literature from other fields were needed in order to complement. The author went between the transcribed interviews and academic journals several times in order to get a thorough comprehension of the material. This method is said to expand the researcher’s understanding of both the theory and the empirical phenomena (Dubois and Gadde, 2002; 2014).

Data Collection: Introduction

The first step towards this paper was to establish contact with the organising team, followed by getting in touch with the participants of the hackathon teams still working on their projects. In-depth interviews were conducted with representatives from three of the continuing teams. A representative from the fourth team was supposed to participate in the study, but later withdrew. Interviews were also conducted with two of the founding members of the association THE Port in order to get background information and to hear the history of THE Port. When developing the research design, it was considered to interview representatives for the non-governmental organisations (NGOs) or problem identifiers. As the researched teams are independent, autonomous actors, it was at a later point decided that this would not be necessary.

Data Collection: THE Port 2015

In addition, the author spent a weekend as a coach for one of the teams that participated in THE Port Hackathon 2015. The 2015 hackathon was twice the size of the 2014 edition, but gave a feeling of how the interviewees must have felt during their hackathon participation.

Schensul, Schensul, and LeCompte (1999, referred in Kawulich, 2005), claim that this sort of participant observation can help the researcher to better understand how things are organised and prioritised and how people interrelate. If the hackathon is a show, then the participant observation is the backstage pass. The interviews with the 2014 participants were conducted before the 2015 edition. During the 2015 hackathon, the author experienced elements brought up and described by the 2014 participants such as the willingness and eagerness to work within the hackathon teams. One of the interview subjects expressed surprise over how open people were to ask ‘stupid’ questions;

“It was surprising to me how unafraid people were of looking stupid or saying stupid things”.

The author observed the same thing; the information flow within the teams as well as between the teams was very open and informal. For instance it was rather common for participants to stop by workspaces occupied by other teams just to have a chat about what they were working on.

Both the organising team behind the hackathon and the participants the author interacted with were aware of the research being done. Participant observation is a common research method in various academic disciplines such as social anthropology and ethnography. One of the most common concerns with this methodology is the risk of *going native*. The concern can be explained with the very human perception of an unbridgeable gap between objectivity and subjectivity (Tedlock, 1991).

Another associated vulnerability is the dependency on outside factors such as acceptance from the society that is to be observed. However, the research was in this case cleared with the organisers of the event without any implications.

Data Collection: Interviews

A total of six teams participated in THE Port Hackathon 2014. Due to the limitations in time and work capacity, only the participants who chose to move on with their projects were interviewed; one of the teams is not represented in this study. In addition, the author conducted interviews with the initiators of the hackathon in order to get the background story of THE Port.

The teams that are now working on the projects are rather small, ranging from three to five people. Subjects with geographical closeness were made a priority, as one in telephone interviews risk missing out on visual clues (Garbett, McComak, 2001) and there is a higher potential for the participants to be distracted by things surrounding them (McCoyd, Kerson, 2006). For the two largest teams, two representatives were interviewed; for the smallest team, one representative was interviewed. All of them have been with their projects from the start.

Table 3 Interview guides

Hackathon Participants	Organising Team	Other (NGO, inventor)
Before the hackathon	THE Port Hackathon	Before the hackathon
The team	CERN	The hackathon
The idea		The idea
The hackathon experience		After the hackathon
The concept today		CERN
CERN		

In line with Yin (2009), the interviews were not structured queries, but guided conversations. Three interview guides were created to make sure relevant topics were covered during the interview: one for the organising team; one for the participants; one for the inventors or idea generators. The last one was never used due to limitations in time, resources and relevance as mentioned above. For an overview of the topics, see Table 3.

The category ‘Before the hackathon’ included questions on the representatives’ academic and professional background, their motivation for applying for the hackathon, and whether or not they had gone through any business training. In the entrepreneurial world, it is often stated that an A-team can succeed with a B-idea, but a B-team will never succeed with an A-idea, which is why it was interesting to look into the team dynamics both during and after the hackathon. As for the idea, even though a lot of information could be acquired through THE Port’s website, it was intriguing to hear how the participants themselves described the concept they are working on. This category also included questions on the thoughts the participants immediately had when the idea was first presented to them. This is due to another popular discussion among aspiring entrepreneurs: can passion develop over time, or is it a result of love at first sight? The representatives were then asked about their hackathon experience in order to get a clearer picture on how the participants found the hackathon. ‘The concept today’ category is necessary to understand what the project developed to, and where the team plan to take it next. As this thesis is a part of an administrative student contract at

CERN, questions regarding CERN's involvement were also included in the interview guide. A summary of the findings will be handed over to the management of the Knowledge Transfer group.

All the interviews were conducted at CERN, save one that was done in the city centre of Geneva. The sessions typically started with greetings and informal conversation, followed by the subject being presented with the aim of the study and the different topics of the interview. All the interviews started with the subjects stating their name and allowing for the interview to be recorded, they lasted somewhere between 60 and 90 minutes. Afterwards they were transcribed; each interview ended up at between 15 and 20 pages.

Data Analysis

Interviews

Two separate documents were created: one for the interviews with the organisers, one for the interviews with the participants. While the former was only used for background information and therefore not processed, the latter went through a thorough process of reading and re-reading. Quotes regarding the same questions or topics were placed together in six different Excel sheets: 'Concept'; 'Before'; 'During'; 'After'; 'Support Actors'; and 'Miscellaneous'. These sheets held the categories seen in Table 4.

Table 4 Quote sheet

Concept	Before	During	After	Support actors	Miscellaneous
Concept	Background	Team/ Team dynamics	Team/ Team dynamics	On CERN	Miscellaneous
	Business training	Motivation	Motivation	Relation to CERN	
	Team	Idea/ Concept	Idea/ Concept	On KT	
	Application/ Motivation	Co-lab w/ inventor	Co-lab w/ inventor	CERN and THE Port	
	Idea/ Concept	Entr.ship	Entr.ship	THE Port	
			Support from outside actors		
			The future		

Personal Level

Hackathon participant on wanting to make an impact:

"A lot of the skills that people who work at CERN have, we think of as completely normal. [...] If you every day have lunch with people who speak at least two, if not three, languages, then it becomes difficult to imagine a world where not everybody is like this. [...] If you look at the normal world outside, this is not normal – that people are like this"

As seen in Table 5, out of the five interviewees, four had done hackathons before. The fifth person underlined that he has previously participated in innovation exercises, but never something like a hackathon. Only two of them have industry experience, one of them has done a lot of hackathons as a part of the employer's internal innovation strategy. The same individuals have had formal entrepreneurial or business training, as well as practical experience as entrepreneurs.

The rest have spent their careers within academia and the scientific community, doing hackathons in their spare time. For one of them, starting a business has never been an option, and the involvement with the project is mainly because it is found interesting.

Table 5 Participant backgrounds

	56.1	56.2	X1.1	X1.2	42.1
Technical background, PhD	x	-	x	-	-
Technical background, M.Sc.		x		x	x
Business training	-	x	-	x	-
Currently on limited contract	x	-	x	-	x
Entrepreneurship experience	-	x	-	x	-
Industry experience	-	x	-	x	-
Done hackathons before	x	-	x	x	x
Wanted to start a business	x	x	-	x	x
Urge to make an impact	x	-	x	x	-

The Teams

There are three things all the teams have in common: they practice a flat internal hierarchy, the majority of the product development was done during the hackathon, and high-ranking people from the outside encouraged them to move on with their projects. One of the interviewees described their encourager in the following way:

“He is a bit of a rock star in terms of his intellectual capabilities”

Table 6 Hackathon team

	56	X1	42
Full team from hackathon still involved	X	X	-
Geographically close	-	X	-
Legal entity	X	-	X
Knew each other prior to the hackathon	-	-	-
Encouragement from the outside	X	X	X
Majority of work during the hackathon	X	X	X
Anyone working full-time	-	-	-
Adopted the “hackathon style”	X	X	-
Flat internal hierarchy	X	X	X
Expressed interest from industry	X	X	-

Methodology: Reflection

The author came across THE Port while working as an administrative student for the Knowledge Transfer group (KT) at the European Organization for Nuclear Research (CERN). The Knowledge Transfer group seeks to identify application areas for CERN research and CERN technology outside of the traditional high-energy physics arena, and to maximise the impact of CERN in the societies and industries of its Member States. Supporting initiatives such as THE Port is an important part of this work. When searching for a topic for the master’s thesis, THE Port came up as a suggestion due to its close connection to CERN and an interest from KT’s side to get a better understanding of the hackathon phenomenon.

This paper is built upon interviews with participants from the hackathon teams that chose to move on with their concepts. A total of five participants from three different teams were interviewed, all taken from the same hackathon. The limited amount of data is not enough to draw any general conclusions, instead the paper aims at shedding light on the hackathon phenomenon and contribute and encourage further research.

In hindsight, it would have been interesting to gather data from some of the teams that decided not to move on with their projects as a counterweight. Findings done in this thesis might have been different if another hackathon had been researched, but such implications will be highly speculative.

Case: THE Port Hackathon 2014

The story behind

Organiser on the origin of the hackathon:

"We experienced quite often that we had great ideas and we discussed the entire evening about these ideas, but when the party was over, the idea was over"

With 40 per cent of the almost 200.000 inhabitants being foreigners, Geneva is considered the most international city in the world. This is largely due to the high density of international organisations located in the city – 30.000 of its inhabitants are employed by governmental or international organisations.

The composition of the population affects everyday life. According to one of the organisers from THE Port, a typical dinner party consists of guests where one third work at CERN, one third work for an international organisation such as the United Nations or the Red Cross, while the last third works for an international company or a Swiss bank. Discussing their lives and jobs, the conversation tends to move towards how technology can be used for the greater good, to ease the work day of humanitarian field workers. But when the lights are blown out, the ideas are forgotten and never pursued. Inspired by the San Francisco Bay area, committed enthusiasts initiated what would a few months later become THE Port, a humanitarian hackathon where people from all sides of the table – the technological, the humanitarian and the business world – devote one weekend of their busy lives to *hack* their way to a better world.

THE Port and the Piers

Organiser on why the teams are called piers:

"You are in THE Port. It is very busy - day and night. You feel the international, diverse and bubbly atmosphere. People and projects are coming and going. Some goods transform into better goods, others are waiting in line"

The hackathon and the association behind it is called THE Port, the teams are referred to as piers. THE Port logo shows a light tower because like a light tower, the participating teams aim to shed light and to show the way for humanitarian organisations. The aim is to inspire the organisations by showing them the amount of work motivated, qualified people are able to do within a single weekend, with very limited resources compared to what these huge organisations have access to.

Application Processes

There are two application processes for THE Port; one for the organisations or individuals who want to present a challenge or a suggested solution, another for the participants.

For the idea generators or problem identifiers, the process is rather straight forward. A representative fills out a form online with the problem and/or a suggested solution. Members of THE Port Association process the information provided, together with representatives

from the idea generator or problem identifier, to a one-page proposal containing a short summary of the idea or the problem; four or five sentences on what the objectives are for the hackathon; and a few sentences on the different resources the association has at hand and that can be used for this particular case. The one-pager is then decorated with a handmade sketch in black and white that represents the idea; it can have a maximum of two symbols.

Twice the number of ideas needed go through this process, meaning that when six teams were created in 2014, twelve one-page proposals were made. The proposals are then presented to the advisory board. The members of the advisory board changes every year, but typically it consists of former and current personnel from the international organisations in Geneva, people who work with innovation, and technical experts. Three or four months prior to the hackathon, the advisory board sits down to discuss the proposals that are on the table. They then extend their recommendations to THE Port Association who has the final say in which proposals are accepted.

For the people who want to participate, the process is rather not as linear. First, the applicants have to fill out a form where they explain why they want to participate, what sort of background they have, what experiences they can bring to the table, etc. They also have to enclose a CV. Interesting candidates are asked to record themselves while answering three questions; the answers can be no longer than two minutes. Both in the written form and in the recorded sessions the questions are mainly focused on what the applicants are passionate about and what motivates them.

The CV's of the potential candidates are scanned by at least four different people from four different disciplines such as human resources, technology, and communications. The recorded interviews go through the same process before the participants are selected and divided into their hackathon teams. To THE Port, inter-disciplinarity within the teams is a key to successful solutions.

Preparation time and the hackathon

All the teams get one or more coaches. The coaches are affiliated with CERN or with the idea generator or problem identifier. Six weeks prior to the hackathon, the preparation phase starts. During these weeks, the teams have regular meetings to plan their work at the hackathon. They have to produce a statement of work that explains what their goals and objectives are for the hackathon, as well as a shopping list for the organising team so that all the raw materials needed for the prototype are at the site by the time the hackathon starts. In this preparation time, the team meetings usually happen through the videoconference software Vidyo.

Participants who do not live in the area arrive on the Thursday and they are accommodated at CERN. The hackathon itself is kicked off Friday morning by introductions from the organising team. Then the hackathon teams present their concept to the other participants, along with their plans for the hackathon. Saturday the teams meet up at noon for brief presentations on what each team has accomplished so far. During this session, it is also

possible to ask the other participants for advice or their expertise. The final presentations are held Sunday evening where representatives from the teams display their prototypes. The final presentations are open to the public. Unlike a more traditional hackathon, there are no awards to be won. That is a conscious decision made by the organisers, as they wish to foster collaboration across teams.

A range of resources is made available to the participants in addition to the items they order through the shopping list. The 2014 Hackathon was held at CERN's IdeaSquare, a maker space where the participants can access workshops and labs when needed to. Several people affiliated with the scientific and humanitarian communities spent their weekend at IdeaSquare, ready to answer any questions the participants might have and help them out in any way possible.

The 2014 teams

Table 7 Participating teams

Pier42: 12 hackers Software. Private information retrieval data store.	Pier56: 11 hackers Hardware. Started with a 10\$ inflatable fridge for field operations. The team split in two where the other half pursued the new generation body bags.	Pierx1: 9 hackers Hardware/Software. Portable cosmic ray detector with grid analysis.
Pier83: 12 hackers Hardware/Software Tracking and demarcation system for dogs in rescue and demining.	Pier27: 10 hackers Hardware/Software A conflict zone humanitarian demarcation certificate.	Pier19: 12 hackers Software. Terrain elevation determination for refugee camps.

From the 2014 hackathon, four teams chose to move on with their concepts; in Table 7 the three studied teams are marked in green, and they are further presented in the following subchapters.

Pier42

Concept:

"Pay, and I will guarantee you mathematically that I am not getting any information from you"

The beginning of *Blindstore* dates back to the CERN Webfest, a hackathon held a few months prior to THE Port 2014.

When using traditional search engines, such as Google or Yahoo, one has to accept that the search engine knows what you are asking. However, Blindstore uses particular properties of cryptography, enabling a database to process and answer a question without the database itself getting any information on what was asked or what was the final answer. A mathematician who had read a paper on the subject brought the idea to the Webfest. During the Webfest, the team implemented a prototype written in Python. It was slow, but working, and the team won the Best Technology Prize. After the final presentation, the team was approached by one of the judges who encouraged them to apply for THE Port Hackathon.

In the following weeks, the team kept on going, creating an open chat room where anyone could join. At times, close to 20 people would be online, showing interest in the technology and discussing possible application areas.

Later, five people from the Webfest-team were taken on board as mentors for THE Port Hackathon. Six participants from the outside joined the team to further develop Blindstore. During THE Port 2014, parts of the prototype functionalities were implemented in C++. From five minutes, it now took thirty seconds to retrieve the solution for inquiry from a database of eighty entries. The participants also spent a lot of time brainstorming on possible application areas.

After the THE Port, four people chose to keep going with the project, all from the original Webfest-team. The open chat room is still available, and there is also a mailing list that people can sign up to, in order to stay in the loop. Blindstore is now a registered, Swiss association, meaning that they can function as a legal entity. Due to the nature of the project, only the mathematician is currently working actively with the technology.

Pier56

Concept:

"Essentially, we are vacuum packing the bodies"

None of the participants from Pier56 knew each other prior to the hackathon. They started out with a team of eleven hackers facing the challenge of developing a \$10 inflatable fridge for transporting vaccines. Quite early on in the preparation process, the team found the challenge to be too simple for such a large group of people, so they decided to split in two. One half kept going with the inflatable fridge, the other sat down for a cup of coffee with the International Committee of the Red Cross (ICRC).

Every year, the ICRC Forensic Unit deals with around 50,000 bodies in mass casualty situations. In order to identify a person visually, they have to do so within 48 hours. However, due to circumstances such as lack of infrastructure and electricity, it can take the Forensic Unit 48 hours just to get to the area where they are needed. It was suggested that the cooling unit intended for the inflatable fridge could be used to slow down the decomposition process. The idea was thrown away for technological reasons; cooling vaccines is something completely different from cooling a body. However, the idea of renewing body bags – something that had not been done in at least 30 years, according to the ICRC – took a spark. To essentially vacuum pack the bodies was the next idea that was laid out. This will – in addition to slowing the decomposition process – keep the bag airtight, and leak and smell-proof.

During the hackathon itself, the team did several tests with vacuum packed fish. In parallel, they worked on the design, and eventually they came up with a mock-up of the final bag that was displayed during the final presentations. After the team had presented, Robin Coupland, Medical Adviser to the Red Cross took the stand:

"[...] we sat down with two of our forensics colleagues. And we looked at each other and realised in reality, in terms of body bags, recovery and retrieval of dead bodies has not advanced much in decades. It is actually probably the first time humans have thought of applying new technologies to this issue in a major way. I like to congratulate you because you will make a big difference to a lot of people"

(THE Port, 2014).

Since the hackathon, in regards to the bag itself, the team has spent most of the time on polishing the design of the body bag and experimenting to find the perfect material. They have also formed a Swiss association, meaning that they can operate as a legal entity. A lot of time has been spent on drawing up a contract with the ICRC. Both parties signed a collaboration agreement in September 2014, which would not have happened had it not been for THE Port Hackathon.

Pierx1

Concept:

"I want to take the whole of CERN and I want to put it in a little box that anyone can buy for two hundred dollars"

Like *Blindstore*, *CosmicPi* saw tiny beams of daylight prior to THE Port 2014. In 2013, a prototype of a cosmic ray detector was built at the CERN Webfest. The team was not happy with the technology, so they put the project to rest.

However, a while later the initiator was encouraged to give it another go. Due to technological advancements since the last try, the core team from the Webfest decided to give

it one more shot, and so they applied to THE Port, aiming to create an open source, cheap, portable cosmic ray detector with distributing computing ability.

Like the rest of the teams, the weeks prior to the hackathon were spent planning the weekend. The development of the software and the building of the hardware was done at the hackathon, by the end of the weekend the team had a device that could detect cosmic rays.

CosmicPi is a registered trademark in the United Kingdom, but not yet a registered company as the team is deciding on whether they should found their business in Switzerland or in the United Kingdom.

Analysis

Personal Income

Unlike the cases of the studies conducted in Serbia by Stefanovic et al. (2011) and in Turkey by Benzing et al. (2009), none of the entrepreneurs from THE Port mentioned financial gain as a motivational factor for starting their own business. This might be related to the fact that none of them are dependent on making a living off the project at this time.

Experience and Job Security

The interviewees implicitly mentioned both exploiting past experience and training, and the urge to have job security as motivational factors. This is in line with Corman et al. (1988), Stefanovic et al. (2011), and Benzing et al. (2009), and can be explained by a much-discussed issue within the science community; the extensive use of limited contracts. The contracts typically range from a few weeks to several years. As one of the participants put it:

“If you become a professor, you seem to spend your life doing administrative things, applying for grants...you’re not actually doing science anymore. And if you’re not a professor, you are constantly unemployed or on the verge of being unemployed.”

The participant went on talking about how he in the ideal world will be able to use the results of the work from the start-up company in his science research, and vice versa. Another participant is at the end of his contract with CERN, and sees this time as a ‘make it or break it’ moment, which strengthens the probability of the limited contracts as a motivational factor for business creation:

“If I want to try something else, the right moment is once my current contract finishes.”

The contract status was also a subject with one of the other participants who recently signed an indefinite contract with CERN:

“Taking a permanent contract means that you are a lot less likely to get in a position where you need to start your own business. I think it makes it less likely. Without someone pushing you over the edge, it’s very hard to jump.”

Current Job Situation

None of the participants explicitly mentioned unhappiness in current job as a factor for why they are pursuing their business idea. Three of them are on limited contracts with research or academic institutions; one is an independent consultant, while the last one is – as previously mentioned – on an indefinite contract. That means four out of five are, if not unhappy, at least insecure in their current employment situation which not only encourages them, but forces them to be on the lookout for new opportunities. It is worth mentioning that all the people interviewed, except one, had a professional relation to CERN at the time the interviews were conducted. Either CERN was their employer, or the Organization was their main arena of work. They were all aware of the author’s relation of the Organization at the time, which might have kept them from unveiling any dissatisfaction with their current work environment.

Discovered or Created?

Discovery theories claim that entrepreneurial opportunities already exist; it is up to the entrepreneur him- or herself to identify and further exploit the opportunity. Creation theories are not as thoroughly handled by the research community, but state that opportunities need to be created by the entrepreneur. In the cases from the hackathon, none of the entrepreneurs aimed at creating a business. They went into the hackathon looking to have a good time for a weekend:

“What I expected? That it would be fun. That we would do something, and that most likely it would stop after the weekend”

This interviewee is about to revolutionise a product that has been on a standstill for the past thirty years. The opportunity to do so, existed independently from the hackathon itself, but he was a part of the team that *discovered* the possibility.

For the other two teams, their projects are about creating something. One of them wants to make information retrieval private, the other wants to share the CERN experience with the rest of the world. They have what Davidsson (2015) would refer to as ‘New Venture Ideas’.

Network Support

What academia refers to as internal and external networks, can also be found at THE Port Hackathon (see Figure 1). The hackathon itself hosts the internal network ties between the participants within a team, but also between the different teams, and with the association. THE Port Association is a part of a bigger, external network consisting of the actors that laid

the ground for the hackathon in the first place: the scientific community, and the humanitarian and business sectors in Geneva. Within these two networks, the entrepreneurs have access to all the resources they need to create their prototype, and also the social capital needed to identify business opportunities.

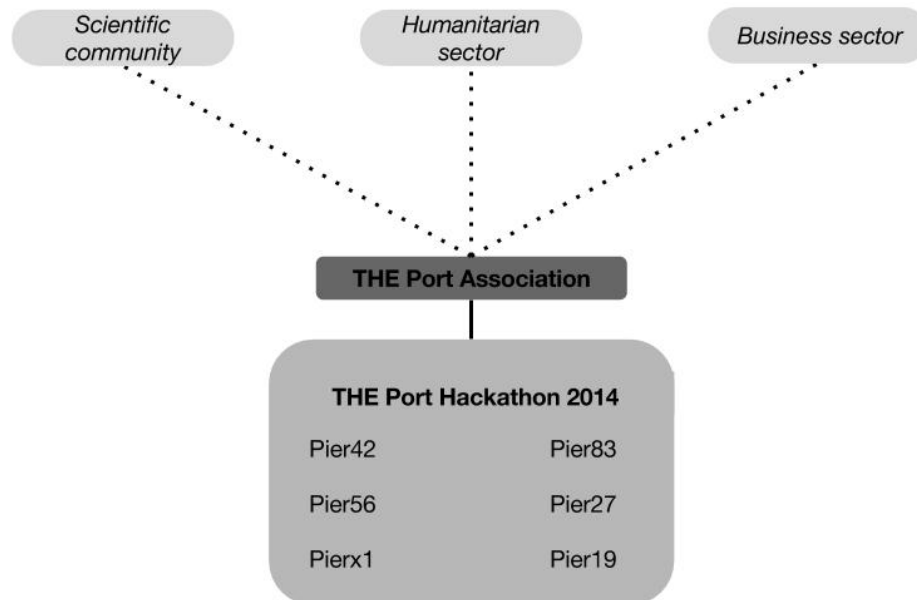


Figure 1 Internal and external network

Similarities with Business Incubators

Unlike a traditional hackathon, there are no prizes awaiting the best teams at the end of THE Port Hackathon. The teams are not competitors, on the contrary – they are encouraged to work together which is underlined by the plenary presentations Friday morning and Saturday at noon. These sessions enables what researchers talk about when they talk about networks and the resources they contain: by disclosing what they are working on, the teams reach out to the other participants, directly or indirectly asking for their input or help. By trusting each other, the ties between the teams become stronger, which increases the value of the information and resources being exchanged. Situations where input from participants in the internal THE Port Hackathon network helped a team, was mentioned by the interviewees from the 2014 edition, and also experienced by the author during the 2015 edition.

Encouragement from Role Models

Interview subjects on external encouragement

Seeing their excitement... They have from their professional experience insight suggesting that we are on the right path, they believe we are on the right track.

It was NNs remark that made it very likely that what we had just developed could actually contribute value outside the hackathon.

He was very keen on the project, so he suggested we look at it again.

He actually was very enthusiastic on us continuing with this. That was quite motivating.

She told us "look guys, you have something big here, you should continue working on it".

All of the teams had someone from the outside encouraging them to move on with their concept. In fact, encouragement from an external actor was the first thing mentioned by all the interviewees when asked why they chose to move on with their ideas. It is more common among high-technology start-ups than non-technology start-ups to start a business based on external encouragement (Corman et al., 1988). Studies have also shown that people with higher education levels tend to view their role models as crucially important to their business venture (Bosma et al., 2011). All of the teams that continued with their projects had someone from the outside telling them that their idea was worth pursuing, and all the participants of this study has higher education levels (see Table 5).

Flat Hierarchy

Interview subjects on business structure

Most of the decisions we try to do by vote [...] we discuss things and then we usually come to an agreement of what is the right way to go and then we do this.

Whenever we sit down to have a meeting it's because everyone chose to do this with their spare time.

It's not my project, it's our project. We all own this.

Everybody is very motivated to see the project successful in the same way, so you don't need one person on top of the organisation.

Research has shown that a flat hierarchical structure, makes group effort more efficient (e.g. Corman et al., 1988; Anderson, Brown, 2010). All the teams practice a flat hierarchy, and also did so during the hackathon. However, during the hackathon the teams had a mentor that would guide them and make sure their work progressed. Put more precisely; even though the teams did not have an appointed leader or a steep hierarchy, they had someone on the outside who steered them in a direction.

For the time being, all the start-ups still practice a flat internal hierarchy. For the two start-ups that are registered as Swiss associations, the team members have official roles required by law. Representatives from both of these teams underline that in practice these roles have no significance. Decisions are made by simple vote, or by the person with the most

experience and expertise on the field. When expanding their business, it might be necessary to structure the hierarchy differently.

These findings are complementary with previous research. They are also interesting, as earlier studies have shown that a flatter hierarchy facilitate better group performance, which is crucial for a successful final presentation at the end of a hackathon.

Rapid Product Development

Interview subjects on product development

I would say 80 per cent of the idea and the design we already had by the end of the hackathon.

We came up with the fundamental design during the hackathon.

In terms of the development work, the majority actually happened in the three days.

All the development and the building was at the hackathon.

Another factor the teams have in common is that they were able to produce a functional prototype of their concept during the hackathon, and the hackathon prototype is still the skeleton of the projects today. Two of the teams found the development they were able to do within the hackathon format so efficient that they still gather over a weekend or a couple of days, solely to focus on the project.

Summed up

Knitting all of this together shows that the limited contracts researchers and scientists work on, pushes them to actively seek out and explore new opportunities. At the hackathon, they found projects that allow them to use their past experience and knowledge in a more long term business setting than their community currently offers. In other words, the uncertainty of the scientific job market led them to the world of business creation.

Through the hackathon, the teams get access to internal and external networks that provide them with resources needed for further business development. The resources enabled the teams to develop and create their prototypes during the three-day-long hackathon. Having seen how much it is possible to get done during such a limited amount of time, the teams still work together in a hackathon-inspired way, meeting for shorter, but intense periods of time to work on their projects.

Last, but not least, the teams all practiced a flat hierarchical structure during the hackathon, and have kept this structure when moving into the business world.

Concluding Discussions

Hackathons started off as pizza-parties for computer nerds, now they are acknowledged as a source of innovation and creativity both within huge companies and as independent events. THE Port Hackathon 2014 brought together people who probably would not have met otherwise and gave them the opportunity to work together on challenges they probably would not have discovered elsewhere.

Q1: Why can hackathons be characterised as a ground for creating start-ups?

‘Start-up’ has become an umbrella term for young companies that are pursuing a business idea. All of the teams researched in this thesis are in the early stages of creating and developing their businesses. They have all done critical, extensive development in a short period of time and can all be characterised as start-up companies. Thus the results from this study suggest that hackathons can be characterised as a ground for creating start-ups.

One of the most interesting findings in this regard, is the similarity between business incubators and hackathons. When defining a business incubator, scholars typically underline three elements: shared office space, professional business support or consultancy, and network access. During a hackathon, the participants share a physical space, they have access to consult experts from several fields, and they have access to both internal and external networks. There are three things really distinguishing a hackathon from a business incubator:

The teams are not businesses. A business incubator offers support to already existing companies, whereas a hackathon gathers people who are interested in spending a weekend doing something fun and interesting.

They are severely more limited in time. While incubation programs can last anything from a few months to several years, a hackathon usually takes place over a weekend.

They do not offer business support. The objective of a hackathon is to have a functional prototype at the end of the event, not business creation. Hence, business support is not offered. However, the participants do have the opportunity to consult with experts from different academic fields.

This suggests that a hackathon is a ground for creating start-ups, while the business incubator is a place for them to grow.

Q2: The teams that chose to move on with their hackathon concepts from THE Port 2014: What do they have in common?

This thesis set out to identify the similarities between the hackathon teams from THE Port 2014 that chose to move on with their concepts and pursue them as business ideas. In line with previous research, this study finds that the entrepreneurs:

They want to use their expertise and insights in a secure job situation. The individual entrepreneurs express an urge to use their past experience and knowledge in a more long term perspective than the research and science community currently

offers. This is in line with previous research that identifies job security and use of existing knowledge as common motivational factors among entrepreneurs. The limited contracts they usually work on, appears to serve as a catalyst for the entrepreneurs to pursue their business ideas.

They have role models. As teams, all the entrepreneurs have at least one external encourager – a role model – that has played, and is still playing, a significant role in the teams' ability to identify and pursue the business idea, as well as inspiring the progress of the start-up.

They have network access. Through THE Port Hackathon, the entrepreneurs have gained access to both internal and external networks. The network actors have provided them with insights and resources they would now have found elsewhere. The psychological effects of taking part in such an event as THE Port Hackathon is not within the scope of this paper, but it is plausible to think that the findings might have been different had the hackathon had a more competitive nature, as is the case with more traditional one.

They have a flat, internal hierarchy. Scholars claim that a flat organisational structure within an organisation will lead to more efficient group performance. The entrepreneurial teams held a flat structure during the hackathon, and are still on that path.

Contrary to previous research, this study also finds that:

The entrepreneurs are not motivated by money. None of the entrepreneurs expressed an urge to increase their personal income. This might be related to the already mentioned limited contracts researchers and scientists are used to work by.

The entrepreneurs are not unhappy with current employment situation. As previously stated, that none of the interviewees mentioned this as a reason for business creation might also be related to their and the author's connection to CERN. However, none of them expressed being unsatisfied in their current job.

Implications and Further Research

The conclusions that can be drawn from this study is that hackathons do have the potential to function as a ground for creating start-ups. They have clear similarities with business incubators, but are still something profoundly different as they bring together people who would not otherwise have met, and introduce them to subjects they would not otherwise have seen or got to know.

In order to promote and encourage business creation, hackathon organisers should expand their external network to include actors that provide business support for the teams after the hackathon is over. One can imagine business incubators, venture capitalists, or technology transfer offices to be relevant types of organisations to get in touch with. While expanding, it is important to not forget the already existing actors in the external network who have the opportunity to play an important role as the business ventures grow.

Another initiative that could foster entrepreneurship among hackathon participants, is for the organisers to encourage the participants to conduct brief market research while *hacking*. If the teams are in contact with relevant industry during the hackathon, it becomes easier for them to tweak and customise their product according to the wishes and requirements of the industry. Should the organisers choose to move in this direction, having participants with a business and/or marketing background becomes increasingly important.

This exploratory single case study has examined why hackathons can be characterised as a ground for start-up creation through evidence from THE Port Hackathon 2014. To strengthen the findings, more extensive research is needed with:

More teams. In order to build a richer set of data and expand existing findings. This should also include teams that do not move on with their projects to verify or dismiss findings within the teams that do move on.

More hackathons. There are several ways to organise a hackathon. A comparative study of different hackathon frameworks and their outcomes may contribute to maximize future ones.

A longer time period. Following the teams over a longer period of time will make researchers able to say something about traits like survival rate, growth time and capital need.

Another potentially interesting approach would be to research the similarities and differences between ‘traditional’ entrepreneurs and hackathon entrepreneurs. Do hackathons encourage and enable entrepreneurs that otherwise would not have pursued a business idea?

Looking to literature on entrepreneurs and their networks, it would also be interesting to do a study on the networks the participants bring into the hackathon. Do people with a business background, hence a network dominated by business contacts, have a higher probability of discovering the entrepreneurial opportunity in a hackathon concept?

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