The Power of Networking

A research on the influence of third actors on establishing and developing business relationships of a technology oriented start-up.

Master thesis MSc. Business Administration

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Master thesis
for finalizing the master (MSc.) Business Administration at the University of Twente.

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Preface

Before you lies my thesis about the influence of a start-up's network on its survival and growth. The completion of this thesis entails the final part of my master Business Administration, with a specialization in the Strategy & Marketing profile at the University of Twente.

During the start of my master study, I was provided with the unique opportunity to start-up an own company, together with two business partners which I already knew and worked with for some years.
Needless to say, the completion of my master thesis was a hectic period: in which making exams and classes were rotated with working in our own business, going to meetings with potential partners, clients or suppliers, attending events and even exhibiting at a fair.
An interesting and very delighting period which I learned not only theoretical skills and knowledge, but had also the unique opportunity to apply these knowledge and skills directly into practice.

Due to my involvement with the business development of our new venture, my interest for this subject was sparked by the course of 'Business Development in a Network Perspective'.
After completing this course, this subject stayed with me and convinced me to approach Ariane von Raesfeld and write my master thesis about this subject.

In particular, I would like to thank Ariane von Raesfeld and Tamara Oukes for their constructive feedback and guidance during the completion of my thesis. Their constructive criticism and feedback was of major importance for me to guide my thesis into the right direction.

Furthermore, a special word of acknowledgment goes to both my business partners; Erik and Jaap, which believed in our potential as a 'driemansschap' and took a leap of faith by starting our new company together. I hope we will continue to carry out our new company as a great success for many years to follow.

Last, a special note goes to my friends and family for motivating and supporting me during this period of completing my master study and my master thesis.

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Abstract

When start-ups start their business, they never possess all necessary knowledge, skills and resources to make their business a success.
All newly established ventures have two aspects in common, namely that they experience a high liability of newness and a high liability of smallness (Stinchcombe, as cited in Baum, Calabrese & Silverman, 2000). Due to these aspects, new ventures experience a high difficulty to survive and establish growth. A widely suggested method to overcome these liabilities of newness and smallness is by building alliances and partnerships with third parties, through the activity of networking (Bøllingtoft & Ulhøi, 2005). Therefore, it is important for start-ups to quickly master the process of initiating business relationships.

Regarding to the way in which business relationships are established, it is noted that business relationships seldom emerge through direct contacts or by cold calling.
Therefore, when parties lack access to each other, third actors can assist and act as 'middlemen' by bringing potential parties together because of their existing relations (Aarikka-Stenroos & Halinen, 2007, p. 2). In this, third actors not only provide access, but also reduce uncertainties between parties by sharing some knowledge about the opposite party (Aarikka-Stenroos & Halinen, 2007).

As such, third actors assist new ventures in their course of networking; by providing access to other parties; that where not familiar to the start-up beforehand, and actually initiating the (first) contact and the relationship itself.

However, there still remains a lack of knowledge and studies on how third actors can and have influenced the process of establishing and developing business relationships of start-ups.
As a result, no best practices are available for start-ups to apply during the process of networking and developing their new business relationships and of how they can engage third actors in this process.

As such, the research objective of this study is to fill the lack of knowledge regarding (best) practices that start-ups can apply when developing and establishing their business relationships, specifically focused onto how to make use of the potential of third actors in this process.

The current study enlightens the case of a Dutch technological start-up and illustrates how this start-up has developed their network over time with the use of third actors.
In this, attention will be given to contribution partners can provide to start-ups and how these partnerships have been initiated, established and maintained.
Furthermore, special focus will be given to the functions and roles performed by third actors in this process, the type relationships present among the business relationships and the position of the start-up in the relationships.

The present case study confirms the fact that third actors certainly influence the process of developing and establishing business relationships by new ventures and that the importance of the contributions provided to start-ups by business relationships can be of indispensable importance.

In the end, an analysis model will be created and provided that start-ups can use in the future to structure their business relationships, guide the involvement of third actors and to enhance the continuity, survival and growth of their new venture.

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e.g.:	Exempli gratia
LoRa:	Long Range Radio
LPWAN:	Low-Power Wide-Area Network
LoRa(WAN):	Long Range Wide-Area Network
B2B:	Business to Business
R&D:	Research & Development
SME:	Small & Medium Enterprise
IoT:	Internet of Things

1. Introduction

1.1. The start-up

Loratec is a high-tech start-up, founded in March 2016, focusing on the development and production of LoRa-based embedded systems[1]. LoRa stands for "Long Range" and a communication technique that is especially developed and suitable for sensor networks (LoRa Alliance, 2015).
More specifically, Loratec develops the hardware[2] and firmware[3] of these LoRa-based applications.

For the purpose of creating a better understanding, this can be illustrated more in detail by looking at the 'data chain'. Taking the data chain into account four activities can be distinguished, namely: 1) gathering data, 2) sending data, 3) receiving data and 4) processing data.
Loratec primarily focuses on the first two activities; gathering data and sensing data. Loratec achieves this by developing the embedded systems ('devices') in which sensors and other hardware are integrated, together with application-specific firmware.
With the integration of sensors, the device actually generates the data, which is then being send to a back end[4] via LoRa.

Loratec has deliberately chosen to focus primarily on these first two "activities of the data chain"; since Loratec already has knowledge and expertise of hardware and firmware, due to previous working experience of the founders of Loratec obtained in another high-tech oriented company. However, in order to be able to offer an end-to-end solution to customers, Loratec is required to extend their partner-network with multiple companies, especially with companies who focus on the last two activities: receiving data (e.g. network providers) and processing data (e.g. software companies).

With the establishment of Loratec, the founders wanted to step in on the major trends of Internet of Things, Big Data and Smart Industry.
These trends have, among others, been driven by the launch of 'low power wide area networks' (LPWAN), such as LoRa(WAN); which are ideally suited for sensors and sensor networks
These characteristics are long communication distances, secure and reliable connection, low power, bi-directional communication, low (or even no) monthly subscription fees and the possibility to set up 'private networks'.

Firstly, due to Loratec's location near the German border in the Netherlands, the market focus of Loratec is on the Netherlands and Germany. Secondly, Loratec focuses its business mostly on the "business to business" market, since Loratec experiences that most market demand for the application of Internet of Things and LoRa develops itself within this market segment. Many companies and other organizations are currently searching for new and innovative ways to perform their (daily) activities and change their business in order to enhance the effectiveness and effectivity of their business processes in order to enhance the continuity. In this, Internet of Things can play an important role, since Internet of Things devices enable to measure, and therefore also monitor, critical process indicators. With this additional information, companies or other organizations can alter their process, by means of these gathered data.

[1] Embedded systems comprises hardware and firmware, that are integrated into devices with the aim of controlling and monitoring the device for a specific application.
[2] Hardware entails the physical parts of the devices: such as microprocessors, Printed Circuit Boards (PCB's), electronic components, power supply, antenna and so on.
[3] Firmware is a type of software that is programmed into the hardware (e.g. in the microprocessor). Firmware provides the control, monitoring and data manipulation of devices.
[4] The back end is the non-visible, data access layer, behind software/computer programs. In this data access layer, the data stored after being received by a gateway. Examples of such 'data access layers' are online databases and so on.

Furthermore, the most applied and appropriate way for Loratec to segment their market into specific verticals is by applying 'benefit segmentation'. Benefit segmentation entails that buyers are grouped by the 'benefits' they expect to gain from a product or service (Kotler, 2013). This method of market segmentation is appropriate for Loratec, since Loratec actually offers the advantages that can be achieved by applying LoRa in all their products which are not necessarily bound by one or two specific verticals. These benefits are actually determined by the characteristics of LoRa, as elaborated on above.
By applying this method of benefit segmentation, Loratec currently sees most market demand arising in the business verticals of (Smart) Industry, (Smart) Logistics, (Smart) Cities and (Smart) Homes (Loratec BV, 2017).

Currently, Loratec is busy with preparing and executing a few pilot projects for potential clients in the B2B-segment. Furthermore, Loratec is working on the development of their LoRa module; which will serve as the 'generic basis' for all future applications.
In these projects, Loratec executes basically all R&D inhouse.

1.2. Managerial Gap

When start-ups start their business, they never possess all necessary knowledge, skills and resources to make their business a success.
All newly established ventures have two aspects in common, namely that they experience a high liability of newness and a high liability of smallness (Stinchcombe, as cited in Baum, Calabrese & Silverman, 2000). Since start-ups are new, they normally lack the size, experience, legitimacy and reputation on how to interact with other companies (Oukes & von Raesfeld, 2016; Hite & Hesterly, 2001).
Due to these aspects, new ventures experience a high difficulty to survive and establish growth. Survival-rates for Dutch companies note that, on average, new ventures have a 40-50 % chance of not surviving within 5 years after starting up (Kamer van Koophandel, 2017, p. 14).

As being a start-up, Loratec also experiences the high liability of newness and high liability of smallness. In order to ensure survival and grow their business, Loratec is continuously searching for methods to overcome these liabilities.

A suggested method to overcome these liabilities of newness and smallness is by building alliances and partnerships with third parties, through the activity of networking (Bøllingtoft & Ulhøi, 2005). Networking is of greatest importance since it "*extends the reach and abilities of the individual to capture resources that are held by others and so improve entrepreneurial effectiveness*" (Anderson et al., 2010, p. 121). Having business relationships enable start-ups to combine resources and become embedded in a network (Aaboen, Holmen & Pedersen, 2017).

It is important for start-ups to quickly master the process of initiating business relationships, since resources tend to be scarce at first. Start-ups may save a lot of valuable time, if they are able to learn from early attempts to initiate business relationships (Aaboen, Holmen & Pedersen, 2017).

In this process of networking a crucial role can be played by so called 'third actors'. These third actors can assist by initiating relationships between partners. The ability for start-ups to perform these initiation itself is usually limited due to several causes, such as power, influence, information and control benefits (Oukes & von Raesfeld, in Aaboen et al., 2017). Or, as to quote Aarikka-Stenroos & Halinen (2007): "*business relations seldom begin through direct contacts or cold calling*" (p. 2).
As such, third actors can introduce start-ups to companies or other persons within their network, and mediate in relationships between start-ups and a new partner (Oukes & von Raesfeld, in Aaboen et

al., 2017). When a third actor is available, the third actor can initiate the relationships between parties and can provide parties some experiential knowledge about the opposite parties by sharing their own experience (Aarikka-Stenroos & Halinen, 2007).
In this way third actors provide start-ups access to resources that otherwise wouldn't be in their reach. The availability of these resources can contribute extensively to the survival and growth of new ventures.
For start-ups, with a limited set of diverse relationships, it is of great importance that they scrutinise how their current relationships could facilitate the initiation of new business relationships (Aaboen, Holmen & Pedersen, in Aaboen et al., 2017).

Considering networking as a good method to enhance the survival rate of start-ups, practical guidelines are needed on how to deal with the process of networking and establishing business relationships.
In this, special attention should be paid on the influence of (potential) third actors; in order to benefit from these in the process of networking and developing business relationships.

1.3. Academic Gap

Starting up a new firm is a tricky business, since firms have to deal with a lot of uncertainties and high liabilities (Stinchcombe, as cited in Baum, Calabrese & Silverman, 2000; Bøllingtoft & Ulhøi, 2005).
As earlier mentioned, new firms in the Netherlands have a chance of not surviving within 5 years after starting up of approximately 40% - 50%. In other words, this entails that approximately half of all founded companies quit their business within the next 5 years after starting-up.

Since new ventures are deemed to play a crucial role in the process of innovation; which is generally acknowledged as central to job creation, economic growth and industrial dynamics (Wennberg & Berglund, 2006, p. 203), it is not only important for the start-ups itself to get to know 'best practices' of how to enhance the survival rate of their businesses, but also more general for governments to improve the economic growth and reduce the unemployment within their countries.
As Hormiga et al. (2010) already denote the high 'death rate' of new ventures indicates the importance of studying those factors because the more information obtained, the more likely this will favour the development of new firms in the first years after establishment.

Acknowledging this importance, already many studies have being conducted on the aspects that influence innovation and firm performance (Konsti-Laakso et al., 2012).
One aspect that is constantly returning, is the influence of networking on innovation, firm performance and start-up survival (Jarillo, 1989; Konsti-Laakso et al., 2012; Pirolo & Presutti, 2010; Watson, 2007).

Following the findings of multiple scholars; which affirm the great importance of networking for enhancing the survival rate of new ventures, several studies have been conducted on how start-ups interact with other parties and how they establish and enlarge their network.
For example, Oukes & von Raesfeld (2016) have investigated interaction episodes of start-ups by means of the interaction modes. The results of Oukes & von Raesfeld (2016) show a high-occurrence of interaction modes which emphasises the interactive nature of start-up's actions, and reveal an evolution of interaction modes over the course of the relationship.
Furthermore, several scholars have also already established that a third actor can be useful in this process of networking, since third actors can reduce uncertainties (Howells, 2006): e.g. by undertaking information scanning and assessing the potential fit between parties.

However, there still remains a lack of knowledge and studies on how start-ups can actually (positively) influence this process of networking and the involvement of third actors.
As a result, still no best practices are drawn up for start-ups to apply during the process of networking and developing their new business.
La Rocca et al. (2017, p. 109) note specifically that even though research on new business venturing is expanding, the phenomenon of starting up business is still in need of a more systematic theory elaboration. The research in question will focus on the potential best practices for start-ups in establishing and enlarging their network. In this, a great emphasis should be laid on how to involve third actors in this process; since third actors are deemed to have a great positive influence on the development of a start-ups network.

1.4. Main Research Question

In order to give focus to this research; with the aim of filling the managerial and academic gap, a research objective is formulated.

The research objective for this study is to look more closely to the influence of third actors in the establishment and development of business relationships.
With these findings, we have sought to find patterns which can be used as guidelines for further research and for new ventures, in the process of founding and establishing their companies.

Therefore, the main research question of this study has been:

"What is the influence of third actors on establishing and developing business relationships of a technology oriented start-up?"

During this research, this main question will be answered by means of several sub questions. These sub-questions will be laid out further in subsection 1.5. below.

1.5. Sub-questions

The following sub-questions will contribute to answering the main research question in a way that they will give an overall image of how the relationships and network of the Loratec have contributed to the growth and survival of a new venture.
As such, the sub-questions are related to the different theories, which will be explained more into detail in chapter 2.

1) *How has the start-up build, developed and extended its network?*

By means of this first sub-question the goal is to create an overall picture of the network of the start-up. As such, this sub-question will give more insight into how the actual network of Loratec looks like; e.g. from which type of partners are included.
In order to illustrate this nicely, a time path will be created of how the network of Loratec has been established since the beginning. In this, emphasis will be given to when and how third actors have played a role in the evolvement of this network.
Next, the identified triads within this network will be the main focus of the remaining part of this research and the following sub-questions.

2) *What contributions have the business relationships delivered to the start-up?*

With this sub-question a narrow focus will be given to what exact contribution each identified triad has delivered to the new venture.

As such, a better understanding can be given of what the relationships have actually provided to Loratec.

In order to distinguish between different types of contributions, the distinction from Oukes & von Raesfeld (2017) will be used; namely by distinguishing the contributions into opportunity, technology, internationalization and financial.

By answering this question a view can be given if the start-up has established a diverse network over time, with multiple forms of contribution; or that the contributions are more or less "one-sided". With examining this question we may be able to find support for the statement of Oukes & von Raesfeld (2017) that "*a start-up does have to select and motivate different types of partners depending on the stage of its venture creation*".

3) *What functions and roles have been performed by third actors during the establishment and development of the business network of the start-up?*

With this sub-question we look specifically into what different roles the third actors have performed in establishing the triads.
Regarding the functions played by third actors, Holmen & Pedersen (2003) and Aarikka-Stenroos & Halinen (2007) note that third actors can contribute extensively to the establishment and development of relationships by performing a mediating function and
For this, we will make use of the theory of Oukes & von Raesfeld (2017), based on the theories of Holmen & Pedersen (2003) and Aarikka-Stenroos & Halinen (2007).

As such, we will look if there can be dominant roles derived from the case study sample; which will possibly hint to which type of roles can be most effective for technology oriented start-ups in the establishment and development of their new business relationships.

4) *What type of relationships can be distinguished within the business relationships of the start-up?*

With these sub-question we discuss the relationship portfolio of the start-up, according to the literature of Ritter et al. (2004).
More precisely, by answering this sub-question we try to get a better understanding of the multiple type of partners involved in the business relationships of the start-up.
Therefore, first we will determine between four types of partnerships, namely relationships with competitors, relationships with customers, relationships with suppliers and relationships with complementors. In combination with the answers provided to sub-question two, we will try to distinguish patterns of which type of relationship have provided the most valuable contributions.

5) *How is the start-up positioned within its business relationships?*

With this last sub-question we again make use of the literature of Ritter et al. (2004).
With this sub-question we try to obtain an understanding of the position of the start-up in its business relationships. By answering this question, we will get to know more about the dependence of the start-up of its relationships.
Therefore we will distinguish between the type of relationship situations (followship, leadership or mutual) of Ritter et al. (2004). Moreover, we will have a look at the importance of the contribution of these relationships and relate them to the position of the start-up within those business relationships. As such, we try to find patterns related to the position of the start-up and the evolvement and development of business relationships of new ventures.

2. Theoretical Model

2.1. Importance of Networking

When new ventures start-up their business, they possess certain knowledge, skills and expertise. With these resources, new ventures believe to have a competitive advantage over other companies; with which they pursue to establish their business within the market and grow their new company. However, no new venture can possess all necessary resources, knowledge and skills to survive and establish growth. More specific, new ventures often experience liabilities of newness and smallness; which, in turn, have the consequence that new ventures have to be creative in solving these shortages, since they most often can't "just buy in" these knowledge, expertise and/or skills.

The Resource Dependency Theory characterizes corporations as an open system, dependent on contingencies in the external environment (Hillman et al., 2009, p. 1404). The Resource Dependency Theory recognizes the influence of external factors on organizational behaviour and focuses on the assumption that, although managers are constrained by the context of their corporation, they can act to reduce environmental uncertainty and dependence (Hillman et al., 2009).

One way to act on this environmental uncertainty and dependence is by getting access to resources through social networks Jarillo, 1989; Konsti-Laakso et al., 2012; Pirolo & Presutti, 2010; Watson, 2007).
Therefore, Jenssen & Koenig (2002) argue that the resource dependency theory and social network approach are closely related. According to Jenssen & Koenig (2002, p. 1040), in the resource dependency theory it is argued that organizations are dependent upon the exchange of resources. The network approach to entrepreneurship is, in turn, based upon the premise that a network provides the entrepreneur with access to necessary resources (Jenssen & Koenig, 2002, p. 1040). According to the network approach to entrepreneurship, entrepreneurs may possess some ideas and skills but, in order to starting up a business, entrepreneurs further need to obtain most resources from outside/the external environment through entrepreneur's social networks (Abou-Moghli & Al-Kasasbeh, 2012, p. 134).

Social networks allow entrepreneurs to assess the value of resources better and to find resources less expensive than they could be obtained on markets and secure resources that would not be available on the market et all (Abou-Moghli & Al-Kasasbeh, 2012, p. 134).
In the course of the process of setting up and developing a new venture, entrepreneurs almost inevitably will face resource needs that cannot be satisfied by their pre-existing network contacts (Semrau & Werner, 2013, p. 506). If entrepreneurs than expand their network and include additional contacts they may increase their chances of getting access to the different resources needed (Semrau & Werner, 2013, p. 506).

Besides solving resource shortages (Jarillo, 1989), social networks contribute to innovation in multiple ways (Hobday, as cited in Marinova & Phillimore, 2003):

- skill accumulation and collective learning between all participants within the network;
- combining and re-combining of skills to overcome bottlenecks;
- reduction of innovation time and costs;
- spreading of risks (Gronum et al., 2012);
- providing entry into the industry;
- high flexibility.

All these advantages contribute to the innovation power of start-ups, which in turn positively influences the performance of firms (Gronum et al., 2012).
Furthermore, advantages such as an increased flexibility lead to a better position for start-ups to respond to uncertainties and changes in an evolving market.
To conclude, these advantages lead to a shorter time-to-market, which enables start-ups to enhance their firms (financial) performance earlier on. This in turn contributes to the viability of start-ups and enhances the credibility of a start-up to become economically sustainable (La Rocca et al., 2017); which, in the end, increases the chances of firm survival.

2.2. Triadic View

Social networks are social structures made up of sets of dyadic ties and other types of social interactions between individuals, organisations and/or companies. As such, multiple business relationships (e.g. with suppliers, customers or other parties) together form the social network of one company.

Business relationships seldom emerge through direct contacts or by cold calling (Aarikka-Stenroos & Halinen, 2007, p. 2). And it simply isn't possible for ventures to know everyone.
Therefore, when parties lack access to each other, they often approach other parties through networks or existing relationships.
By doing this third actors act as 'middlemen' by bringing potential parties together because of their existing relations (Aarikka-Stenroos & Halinen, 2007, p. 2). In this, third actors not only provide access, but also reduce uncertainties between parties by sharing some knowledge about the opposite party (Aarikka-Stenroos & Halinen, 2007).

As such, third actors assist new ventures in their course of networking; by providing access to other parties; that where not familiar to the start-up beforehand, and actually initiating the (first) contact and the relationship itself.

When a third party is involved in initiation of relationships, a three-actor perspective (a triadic view) is needed (Aarikka-Stenroos & Halinen, 2007, p. 3)
Vedel, Holma & Havila (2016) have already conceptualized inter-organizational triads. They note that within an inter-organizational triad, at least three companies are involved. However, triads can differ in many ways.
The position in the initiation is based on 'connectedness'; since the third actor is in the position to connect the dyadic partners (Aarikka-Stenroos & Halinen, 2007).
Following this statement, according to Vedel et al. (2016) being 'connected' not only entails the 'connecting principle', but that it should also be the case that the relationships with actors, in the triad, influence or affect the incorporated parties.

Aarikka-Stenroos & Halinen (2007, p. 3) acknowledge three stages in the initiation of a relationship; 1) experience, 2) sharing the experience and 3) the actual initiation.
In this process a third actor has experience with one or both parties. This can both be direct experience; which is considered to be the most valuable for potential buyers and sellers, but can also be indirect experience (such as referrals and reputation).
Then, the third actor mediates its experience with the buyer and/or seller by supporting them in evaluating or prospecting the usefulness of the other party. Last, when the parties deem each other useful the actual relationship is initiated.

Last, it is important to note that a third actor can be classified in multiple ways (Aarikka-Stenroos, 2007, p. 8). For example, a third actor could be a person or an organisation; but the third actor can

also be a person on behalf of an organisation or a representative of a certain industry of profession. Even an artefact can be considered a third actor.

2.3. Contributions Delivered

Taking the above mentioned potential of third actors into account, the key focus of this research will be on how third actors influence the growth and establishment of new ventures in a respective market.
In order to do this, a review will be given from the point of view of a new venture on how the relationship has contributed, and how this contribution is vital to the growth and establishment of their business.

Oukes & von Raesfeld (2017) apply, based on Mainela et al. (2011) a method of differentiating between "opportunity-centred", "technology-centred" and "internationalization-centred". "Opportunity" is focused on building a start up's business concept. Then "technology" involves connecting the initial ideas for new products to innovative technological solutions. And last "internationalization" consists of positioning a start up in relation to actors in the international, inter-organisational network (Oukes & von Raesfeld, 2017, p. 47).

This way of differentiating between the various contributions has been adopted too in this research, since we recognize these contributions also in the network of the start-up.

For the sake of full connecting to the adopted case, we have adapted the 'internationalization' concept and broadened it to include also the positioning of a start up in relation to actors in the international, inter-organizational network. Therefore, in the remaining part of this research we will refer to this aspect as "(inter)nationalization".
This "(inter)nationalization" type of contribution aligns to the 'tertius iungens' orientation of Obstfeld (2005). The tertius iungens orientation entails a strategic, behavioural orientation focused on connecting people in one's social network by introducing disconnected individuals or facilitating new coordination between already connected individuals (Obstfeld, 2005, p. 102). According to Obstfeld (2005) such activity is central to the combinative activity at the root of innovation (p. 102). Obstfeld (2005) determines four different brokering strategies, of which two strategies specifically relate to the 'tertius iungens'; namely introducing or facilitating pre-existing ties between parties in such a way that the coordinative role of the third actor (the 'tertius iungens') recedes in importance, or, by introducing or facilitating interaction between parties while the third actor maintains an essential coordinative role over time (p. 104).

Furthermore, "financial" will be added in this research; since Loratec has also focused within their partnership on differing funding opportunities; this can for example be the availability of a subsidy or other grant.

2.4. Importance of Contribution

In order to rank the importance of the different contributions provided by the business relationships to the start-ups, we have chosen to rank the importance of each.

When ranking the importance of each contribution, we take the viewing point of the studied start-up. As such, we take into account (monetary) value of the contribution to the start-up, intensity of the relationship, progress that the relationship has brought to the studied start-up and so on.

As such, we distinguish between three different importance levels. Relationships ranked with '1' entail relationships that are deemed indispensable for the start-up. Then, relationships ranked with '2' are deemed as important, but could also be replaced by similar partners or even by their competitors. And last, relationships ranked with '3' contributed with a minor importance and could also been replaced by other parties.

2.5. Functions of Third Actors

In establishing a relationship, the process of relationship initiation goes through three stages: 1) unrecognised; when parties do not know each other, 2) recognised: when there is awareness between the parties about each other's existence and the mutual benefits, and 3) considered; when parties negotiate about the objective, scope and terms of the business relationship (Oukes & von Raesfeld, 2017, p. 43).

In this process of initiating and establishing new relationships, third actors can perform many different roles. Following Holmen & Pedersen (2003), Oukes & von Raesfeld (2017) distinguish between three different functions, that can be executed by third actors.

These functions are:

1) Joining;
2) Relating;
3) Insulating;

2.5.1. Joining

Joining enables direct coordination on some aspects between the firm of interest and the firm's counterparty (Oukes & von Raesfeld, 2017, p. 44).

Being joined is useful in cases where the organizing frameworks of the focal firm and the third party are in alignment and the focal counterpart is not able to concentrate or add to the knowledge transferred. This may, for example, be the case when the two parties being joined already have a direct relationship (Holmen & Pedersen, 2003, p. 416).

2.5.2. Relating

Relating facilitates coordination between the firm and a third party via the counterparty, with both parties having knowledge of each other (Oukes & von Raesfeld, 2017, p. 44).

Being 'related' to a third party may economize on the focal firm's information processing capacity in case the focal counterpart is able to translate, sort, filter, or concentrate the information from the third party in such a way that the focal firm can use the knowledge transmitted more promptly than if it would have had to interact directly with the third actor (Holmen & Pedersen, 2003, p. 44).

2.5.3. Insulating

Insulating permits coordination between the firm and the third party without the parties having any knowledge of each other (Oukes & von Raesfeld, 2017, p. 44).

By insulating the focal firm from a third party, the focal counterpart may economize on the focal firm's information processing capacity. The focal firm only has to consider its direct counterpart (Holmen & Pedersen, 2003, p. 44).

2.6. Third Actor Roles

Second, we distinguish between different promoting roles that can be played by third actors in the initiation of business relationships (Aarikka-Stenroos & Halinen, 2007).

In total, we can distinguish between the following twelve different promoting roles that third actors can adopt (Aarikka-Stenroos & Halinen, 2007):

1. Awareness builder: as an awareness builder, the third actor builds awareness between potential dyadic parties since they need to be aware of each other in order to initiate. As such, awareness can be build with reputation, referrals and reference works (p. 11).
2. Need creator: in the case of 'need creator, the third actor creates a need for another party by a reference or referral (p. 12).
3. Scouter: during the initiation, one first step for companies is to look for potential customers to sell to. The role of the scouter implies that the third actor looks for potential customers for the company to sell to. The information that the scouter uses for this, is collected outside of the organisation (p. 11).
4. Access provider: being an access provider implies that a third actor offers access, creates or helps to create the contact between parties. In the role of being an access provider, a third actor can actively, reactively or passively aid the seller to approach the customer (p. 12).
5. Advocate seller: in the role of advocate seller, the third actor acts as a sender of marketing messages. In this the third actor delivers marketing information about the work, the process and relations, by which it supports the seller (p. 12).
6. Accelerator: after first promising contacts, it can take lengths of time for parties to take the initiation a step further. Therefore, third actors can accelerate the initiation by e.g. organising events or so (p. 12).
7. Matchmaker: third actors that act as matchmakers evaluate the bit between potential partners or aid the partners to evaluate the potential fit by themselves. Matchmakers may deploy multiple activities, such as identifying the most suitable party, building awareness and bringing the parties together. In the business field, matchmaking implies "knowing the people" and "knowing their capabilities" (p. 13).
8. Trust builder: in this case, third actors transfer trust by offering an external 'statement' about the trustworthiness of parties. In relationship development trust is a crucial issue and is related to expert and referent power and reliability of threats and promises (p. 13).
9. Evaluation assistant: as an evaluation assistant, the third actors helps new customers to evaluate quality of professional services offered; since intangible and knowledge intensive service outcomes and processes are difficult to evaluate beforehand.
10. Provider of concrete evidence: this role implies that third actors may tangiblize the intangible, e.g. by past assignments and customers that can act as "examples" of performance and give information about the result of how a need of a buyers is transformed into a solution (p. 15).
11. Expectations builder: as an expectations builder the third actor helps new customers to build expectations. For example, in business service industries it is difficult for customers to figure out the outcome of a service and the service process in advance. The third actor may be crucial aid in building realistic and explicit expectations, that are acceptable for both parties (p. 15).
12. Risk reducer: the role of risk reducer implies that third actors can reduce risks by offering actively or passively risk-reducing information (p. 15).

These various roles can furthermore be categorized into four different key processes, namely:

1. Awareness;
2. Access;
3. Matching;
4. Specifying the deal.

The potential of each of the roles, mentioned on the page before, have been illustrated and categorized along the four key processes and along its relevance for the buyer, seller or even both. This figure can be found below.

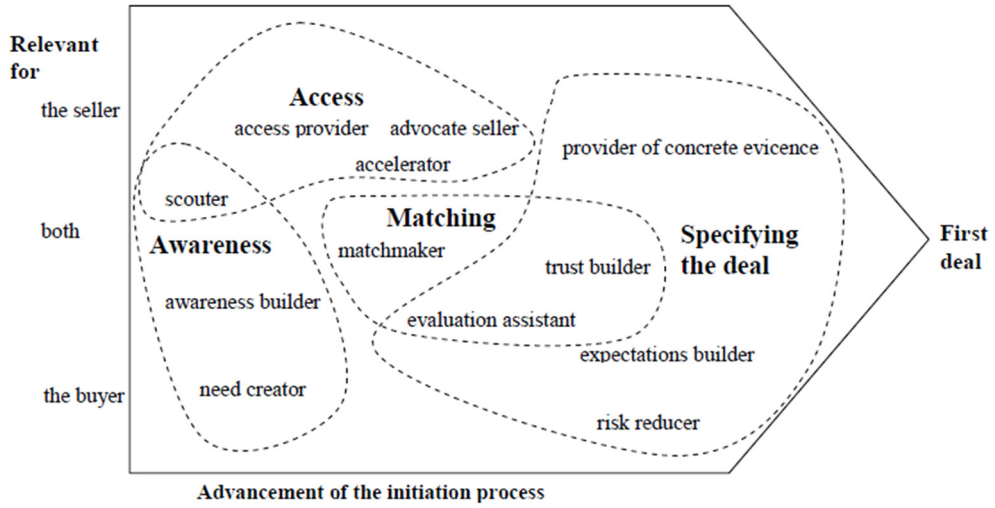

Figure 1: Overview of various roles of third actors in the key processes of business relationship initiation, according to Aarikka-Stenroos & Halinen, 2007.

2.7. Types of Relationships

The exact contribution a relationship has to a firm's ability to produce and deliver depends very much on the specific type of a relationship. How a specific relationship is conceptualized depends on the value net of a firm.

More specifically, Ritter et al. (2004) distinguish between four types of relationships:

1. Relationships with customers;
2. Relationships with suppliers;
3. Relationships with complementors;
4. Relationships with competitors;

Furthermore, besides relationships with other firms, also relationships with e.g. governmental agencies, research and development institutions, educational institutions or industry associations (Ritter et al., 2004, p. 176).

In the end, the range of relationships a firm possesses represent the relationship portfolio of a firm.

2.7.1. Relationships with customers

Developing relationships with customers is viewed as a way by which a firm learns, understands and serves customers' wishes and needs. A way of doing this is by codeveloping new products and services together with the customer (Ritter et al., 2004, p. 176-177).

2.7.2. Relationships with suppliers

Relationships with suppliers can strengthen ventures by developing a competitive advantage. This is for example possible when a firm establish a relationship with a supplier that supplies strategically valuable products or services. If these products or services are hard to imitate or steal, the relationships evolves to be an competitive advantage for firms (Ritter et al., 2004).

2.7.3. Relationships with complementors

Relationships with complementors are relationships with other firms that increase the value of their outputs or functions which, in turn, increase also the value of their own outputs (Ritter et al., 2004, p. 177). When partners are complementary to each other, they increase both the value of the output of the partner as well as the output of themselves.
These relationships can for example also be relationships with innovation partners or governmental agencies (Ritter et al., 2004).

2.7.4. Relationships with competitors

Last, relationships with competitors include cooperative relationships in order to increase a certain factor that both partners gain advantage with; without the typical collusion to control and subvert competition. An example of such a relationship is when competitors cooperate to establish generic product or technology standards (Ritter et al., 2004).

2.8. Position within Relationships

When firms are in relationships, the challenge is to manage the relationships correctly (Ritter et al., 2004). When in a relationship, firms have to cope with the interactions taking place in the relationship, which may not completely be according to a firms wishes. In a relationship, the dependency of partners; which is, in other words, called the 'relationship situation', can differ in three ways (Ritter et al., 2004, p. 178):

- Followship relationship: in this relationship situation a firm is more dependent on the partner, than the partner is on the firm. In other words, this entails that the partner has a higher power over the firm.
- Leadership relationship: in these relationship situations a firm has a higher perceived power over the partner, compared to the partner's power on the firm. In other words, this entails that the partner has a higher perceived dependence on the firm.
- Mutual relationship: in a mutual relationship situation both the firm and the partner have a high power over each other and are highly dependent on each other.

These three types of relationship situations can be illustrated further into detail by means of the figure beneath.

		B's perceived power over A (A's perceived dependence on B)	
		Low	High
A's perceived power over B	Low	(a) No relationship	(c) Followship relationship
B's perceived dependence on A	High	(b) Leadership relationship	(d) Mutual relationship

Figure 2: Types of Relationship Situations, according to Ritter et al. (2004).

However, we feel that the definition of 'type of relationships situations' is very unclear and confusing. Therefore, we have decided to instead talk about the position of the start-up within the relationship with the partner and involved third actor; as in order to illustrate the dependence of the parties involved in a business relationship.

3. Research Methodology

3.1. Research Outline

Combining the above mentioned main research question, sub-questions and the different theories, we can link those to each other in the research outline below.

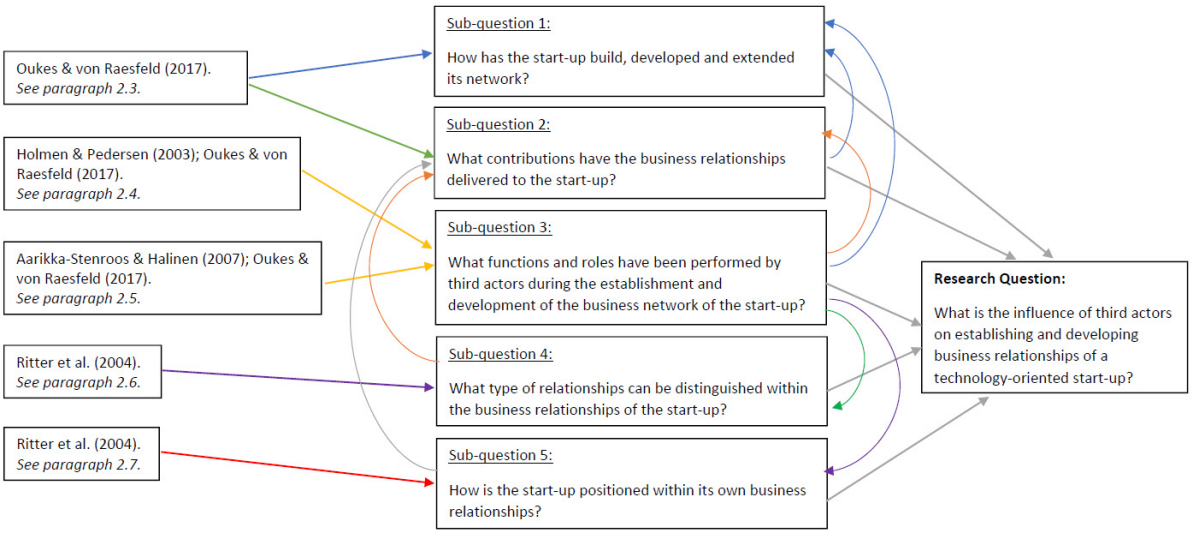

Figure 3: Research Model.

As illustrated above, the first sub question will give a description of the actual network of the start-up and how this network has evolved over time.
Then, with the means of sub-question 2 up and until sub-question 5, the theories will be related to the description of the network, below sub-question 1. As such, in these sub-questions each of those theories will be separately handled and answered.

Furthermore, if we look closer to the column in the middle; with all the sub-questions, we can structure these sub-questions in a casual manner. This is illustrated in the figure below.

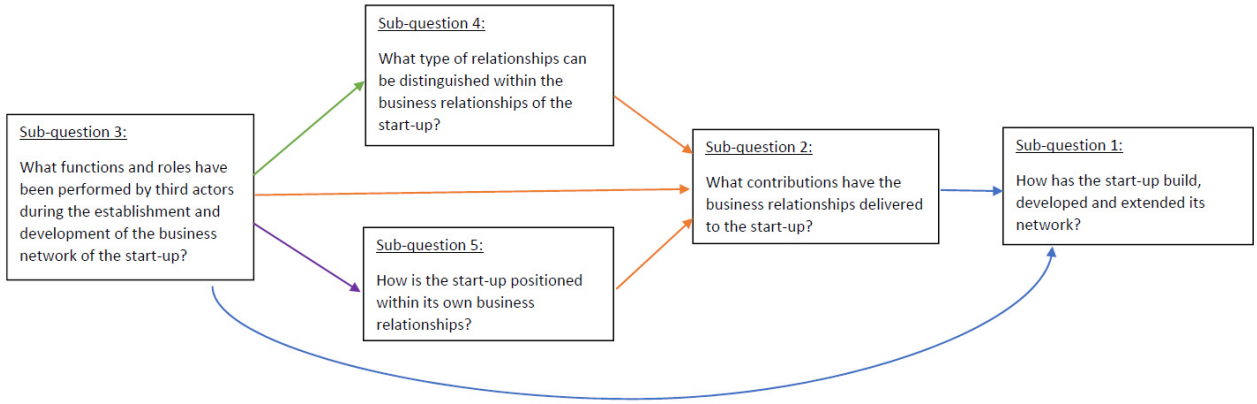

Figure 4: Causal model sub-questions.

In the end, all the answers to the sub-questions will be used to formulate an answer to the main research question and to clarify how third actors have influenced the establishment and development of the business relationships of a technology oriented start-up.

3.2. Research Design

For answering the research questions, a qualitative study has been performed. For this research, a qualitative study is more favourable than a quantitative study since social phenomenon, such as networking and relationship building are being studied; by means of the case of the start-up Loratec.

More specifically, this research has had both a descriptive nature and an exploratory nature.
The descriptive nature of this study comes forward in the fact that a description has been made of the network/relationships of the studied start-ups and how these relationships have evolved over time (Babbie, 2010). We see this descriptive nature of this study especially within sub-questions 1 and 2.

Second, this research also has an exploratory nature (Babbie, 2010); since it has been researched how the start-ups has overcome challenges and which best practices can be derived from the studied case. According to Babbie (2010), exploratory studies are quite useful and valuable in social science research, when the studied is relatively new.
By means of the answers to the first sub-questions, in which an extensive description will be given of the way in which the start-up has developed its network and how the network is composed.
However, the exploratory aspect of this study lies mainly in sub-question 2, 3, 4 and 5: in which we will look more into depth of how the start-up has overcome challenges in the establishment of their business network.

To be exact, a case study research has been performed to tackle the problem definition and corresponding central research question and sub-questions.
The choice has been made to conduct a case study research since we want to understand complex social phenomena (Yin, 2014): in this research, networking skills and abilities of new ventures.
According to Yin (2014) such, case study research is very suitable for answering descriptive and explanatory questions ("how?" and "why?"), in which no control of behavioural events is needed, and in which there is a focus on contemporary events (p. 9).

3.3. Case Selection

In this situation, this case study research includes a single case study, in the form of the case of Loratec BV; a technology start-up, situated in Winterswijk (the Netherlands)[4].

Loratec BV is a new Dutch venture, established in 2016; which focusses on the development and production of embedded systems in the area of embedded systems[5].
As a new venture, Loratec also experiences the liabilities of newness and smallness; with the result of resource shortages and lack of specific knowledge and expertise. In order to solve this problem, networking is deemed as an important solution. However, since Loratec does not know all potential parties/partners beforehand, third actors play an important role in this process of networking.

More specifically, the level of analysis has been on the network (partnerships) of Loratec, and how this network has developed over time. In this we will look at which relationships have been established, what contribution these relationships have delivered, if third actors have played a role in developing the business network and -if this is the case- which functions they have performed.

[5] For more information about Loratec, we refer to paragraph 1.1.

For the sake of the feasibility of this research, as also already explained shortly in paragraph 1.6, a deliberate choice has been made to focus specifically on this new venture due to the wide availability of information and other documents.

This wide availability occurs due to the fact that I (the author of this research) are one of the co-founders and co-owners of this new venture.
Therefore, there has been many data available from even before the actual establishment of the Loratec and, due to personal involvement and participation in multiple partner-meetings and so on, also personal experiences and observations are available to use in this research.
Due to this wide availability of information and all other kinds of documents, an unique opportunity occurred to be able to structure a complete path of how the network of the new venture has developed, and to study different behaviour more closely.

3.4. Operationalization

During this research, we have looked at multiple aspects. These aspects have to be operationalized in order to come to specific research procedures that will result in empirical observations (Babbie, 2010, p. 177).

The aspects that we have studied are as follows:

- Functions performed by third actors ('**Third actor function**');
- Roles performed by third actors ('**Third actor role**');
- Type of contribution provided by the partner ('**Contribution**');
- Importance of the contribution provided to the start-up in question ('**Importance**');
- The specific type of relationship with a partner ('**Type of Relationship**');
- The position of power of the start-up, compared to its partner ('**Relationship Position**');

As such, we have operationalized each of these six items in different measurements.
First, we have subdivided 'third actor function' following the theories of Holmen & Pedersen (2003) and Oukes & von Raesfeld (2017) into 'joining', 'relating' and 'insulating'.

Furthermore, we have subdivided the 'third actor role' into the twelve different roles that are mentioned by Aarikka-Stenroos & Halinen (2007), namely: awareness builder, scouter, need creator, access provider, advocate seller, accelerator, matchmaker, trust builder, evaluation assistant, provider of concrete evidence, expectations builder and risk reducer.

Regarding the variable of 'contribution' we have followed the theories of Oukes & von Raesfeld (2017) and Obstfeld (2005) and distinguished between technology-centered, opportunity-centered, (internationalization)-centered, and added a fourth type of contribution namely financial-centered.

In order to rank the importance of the different contributions provided by the business relationships to the start-ups, we have chosen to rank the importance of each along a 3-level Likert Scale. According to Babbie (2010) Likert's item method is typically used in the creation of simple indexes (p. 218). For the purpose of this research, we have altered the 'typical' Likert scale, ranging from "strongly disagree" to "strongly agree".
As such, we distinguish between different items. Relationships ranked with '1' entail relationships that are deemed indispensable for the start-up. Then, relationships ranked with '2' are deemed as important, but could also be replaced by similar partners or even by their competitors. And last, relationships ranked with '3' contributed with a minor importance and could also been replaced by other parties

Last, for both the 'type of relationship' and the 'relationship position' we have followed the theory of Ritter et al. (2004). Therefore, we have subdivided the type of relationship into 'complementor', 'supplier', 'customer' and 'competitor'. And last, we have distinguished 'relationship position' into 'mutual', 'followship' and 'leadership'.

In order to know and determine in how often each of these attributes have originated within the business relationships of the start-up, we have operationalized each of these attributes in 'quantity'; by counting how many times each attribute has originated in the business relationships of Loratec. Therefore, the specific range of this operationalization can vary from '0'; which means that the attribute has not been found at all, up to the maximum of 24; which entails that the attribute has been found in all business relationships.

3.5. Data Collection Method

As already mentioned, this research compromises a qualitative study; in which by means of a case study research, data has been collected and generated. More precisely, this research entails a single-case study, which is -according to Yin (2014)- appropriate under several circumstances and five single-case rationales: namely having a critical, unusual, common, revelatory, or longitudinal case (p. 51). The present case study can be deemed as both a 'common case' and a 'revelatory case'.

First of all, the case can be characterized as a 'common case' since the goal of the research is to capture and describe everyday situation (Yin, 2014, p. 52) regarding the evolvement of the network of a start-up; which is made possible with the present case.
Second, the case can also be characterized as a 'revelatory' case due to the fact that there is full access to all documents and, most importantly, also the opportunity of participant-observation arises, due to personal involvement in the establishment and evolving of the network of Loratec; which provides a unique advantage over external researchers.

As such, this case study research has involved multiple units: namely the founders of Loratec, all external parties/partners (mostly in the form of one specific contact person), the involved third actors, and last the triades itself (the 'combination' of Loratec, the third actor and the other external party). Therefore, the research design of this case study can also be characterized as an "embedded case study design" (Yin, 2014, p. 55).

Eisenhardt (1989) argues that case studies typically combine multiple data collection methods: such as archives, interviews, questionnaires and observations (p. 534). This will also be the same for the current case study.
Yin (2014) has also adopted this view and even argues that multiple sources of evidence should be applied in order to enhance the construct validity and reliability of a case study research.

Following these insights, multiple sources of information will also be used in this research. These sources entail corporate documents, archival records and participant-observations of Loratec. These remainder information has been gathered in a semi-structured manner, in which on beforehand questions will be drawn up which can be used as a guideline to receive the minimal required information from the two other partners.

In this particular research, one major advantage is that Loratec makes notes of all their meetings with other parties, and stores these within their corporate archive. As such, it is possible to go back in these documents, to get a full understanding of how the triads have been established and evolved over time.

3.6. Data Analysis Method

For analysing the data, we have chosen to take the third actor as the starting point and 'independent variable'. Then, we will look at the partnerships that have come about from the involvement of these third actors. During the analysis we will look more into depth to certain aspects in a structured manner.

Since qualitative data is known for its richness and diversity in data, it is not possible to fully structure the data beforehand.
Because of this, following Swanborn (2010, p. 121), the collected data has been structured afterwards along the different involved theories.

The problem with case studies however, is that they are often weak in their explanatory power (Dubois & Gadde, 2002, p. 555). Due to the fact that case studies are characterized by very situation-specific events, the findings tend to be inappropriate for generalization (Dubois & Gadde, 2002, p. 554). Furthermore, researchers of case studies often have difficulties in actually linking theories to the events that have been recorded. Therefore, in some instances case studies are simply rich descriptions of events.

In order to solve this issue, Dubois & Gadde (2002) propose a method of systematically combining theories and empirically phenomena, named abduction. Therefore, an abductive approach has also been used in this research in order to improve the generalizability of the findings and to include multiple empirical observations and behavioural issues; that have occurred during the development and evolvement of the network of the start-up.

On the contrary of induction and deduction; which view the research process as a linear path, abduction is "a nonlinear, path-dependent process of combining efforts with the ultimate objective of matching theory and reality" (Dubois & Gadde, 2002, p. 556).
According to Dubois & Gadde (2002) matching is about "going back and forth between framework, data sources and analysis" (p. 556).
With abduction, a researcher is constantly going back and forth between empirical observation and theory. This has the advantage that the conclusion of a case study with an abductive approach is much more convincing and accurate, compared to studies with an inductive or deductive approach. Furthermore, an abductive approach allows researchers to include a broader range of historical, attitudinal, and behavioral issues (Dubois & Gadde, 2002).

Furthermore, the four principles of data collection, drawn up by Yin (2014, p. 118-130), will be applied.
These four principles entail:

1) Using multiple sources of evidence;
2) Creating a case study database;
3) Maintaining a chain of evidence;
4) Exercising care when using data from electronic sources;

When applying these four principles correctly, the construct validity and reliability of our case study research will be enhanced (Yin, 2014, p. 118).

4. Results

4.1. How has the start-up build, developed and extended its network?

With this sub-question a rich description will be given of the partnership Loratec has established from January 2016 until September 2017 and how these partnerships have been established.

In order to give a full understanding, an overview has been created of all the established partner-relations of Loratec: as shown below in table 1.
Looking at this overview, we can conclude that Loratec has established 29 partnerships since its foundation in March 2016. This overview can also be found in Appendix 1.

Partner:[6]	SBI-Code:	Size[7]:	Contribution:
P1	2651: Manufacture of instruments and appliances for measuring, testing	Micro	Technology
P2	9499: Activities of other membership organisations n.e.c.	Micro	(Inter)nationalization
P3	8412: Regulation of the activities of providing health care, education	Small	(Inter)nationalization
P4	4690: Non-specialised wholesale trade	Micro	Opportunity
P5	6201: Computer programming activities	Micro	Technology
P6	6209: Other information technology and computer service activities	Micro	Technology
P7	6201: Computer programming activities	Micro	Technology
P8	6201: Computer programming activities	Micro	Technology
P9	7022: Business and other management consultancy activities	Micro	Financial
P10	7320: Market research and public opinion polling	Medium	Financial
P11	4669: Wholesale of other machinery and equipment	Micro	(Inter)nationalization
P12	8412: Regulation of the activities of providing health care, education	Micro	(Inter)nationalization
P13	7112: Engineering activities and related technical consultancy	Micro	Technology
P14	2790: Manufacture of other electrical equipment	Micro	Technology
P15	6201: Computer programming activities	Micro	(Inter)nationalization
P16	9002: Support activities to performing arts	Small	Opportunity
P17	8411: General public administration activities	Large	Opportunity
P18	2620: Manufacture of computers and peripheral equipment	Large	Technology
P19	7490: Other professional, scientific and technical activities n.e.c.	Micro	Technology
P20	8541: Post-secondary non-tertiary education	Large	(Inter)nationalization
P21	7022: Business and other management consultancy activities	Micro	Opportunity
P22	4652: Wholesale of electronic and telecommunications equipment and parts	Small	Technology

[6] In order to assure anonymity of the partners, the partners are illustrated by means of a P (which stands for "partner") and an unique serial numbers.
These serial numbers relate to when the partnership has been established; since the numbers are in the correct chronical order. As such, number 1 illustrates the 'oldest' partnership and number '29' the newest partnership.

[7] For to classify the size of each specific partner of Loratec, we have used the online (financial) database of LexisNexis. As such, we have distinguished between four classifications: micro (very small), small, medium and large.

P23	8541: Post-secondary non-tertiary education	Large	(Inter)nationalization
P24	8541: Post-secondary non-tertiary education	Large	(Inter)nationalization
P25	7112: Engineering activities and related technical consultancy	Micro	Opportunity
P26	6209: Other information technology and computer service activities	Micro	Technology
P27	6190: Other telecommunications activities	Large	Technology
P28	4651: Wholesale of computers, computer peripheral equipment and software	Small	Technology
P29	2651: Manufacture of instruments and appliances for measuring, testing	Medium	Technology

Table 1: Overview of the partners of Loratec.

As such, we have mapped this whole partner network of Loratec in a sociogram by using the UciNet software. This sociogram can be found below, with Loratec visualized in the middle; with the classification 'P0'.
The matrix that has been created in order to retrieve this sociogram from the UciNet software has been placed in Appendix 2.

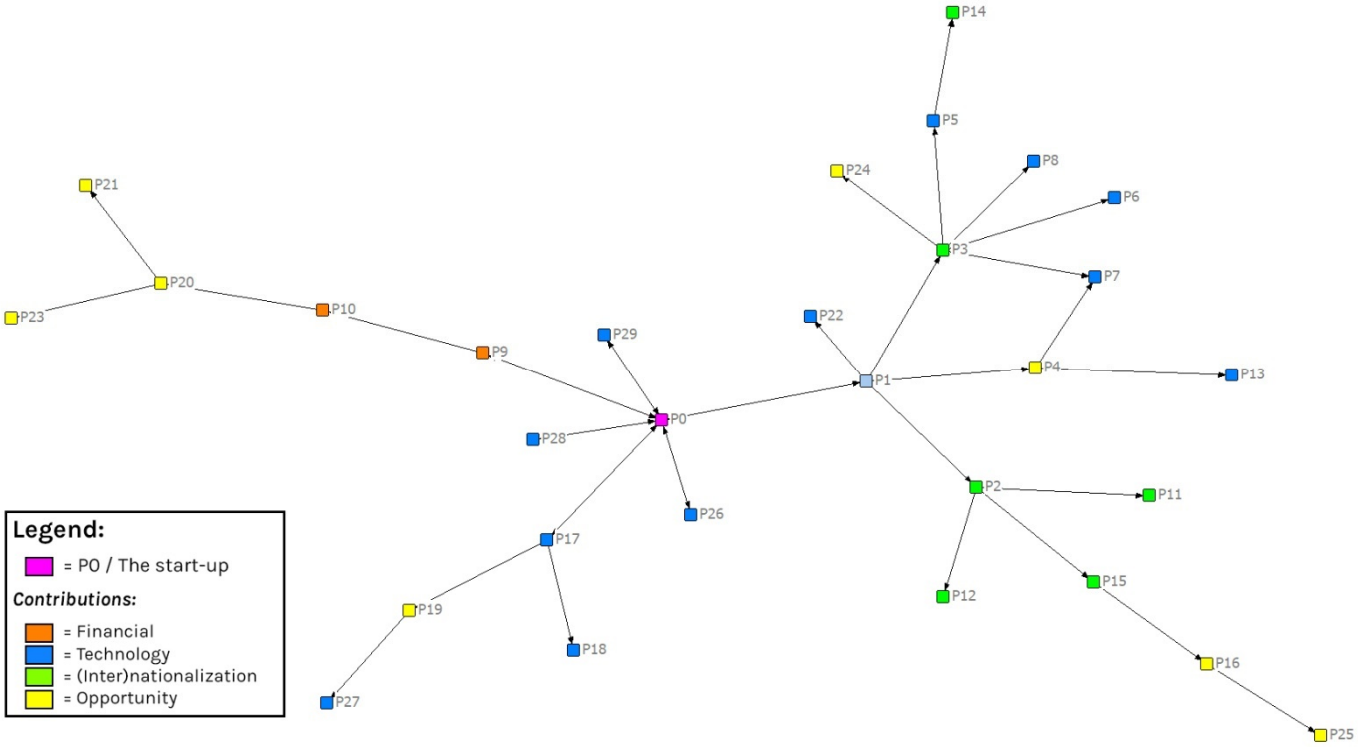

Figure 5: Sociogram of the network of Loratec.

Furthermore, in order to clearly illustrated the course of development of the network of Loratec, an timeline has been created.
In this timeline, the different partnerships are distinguished by their type of primary contribution delivered to Loratec, following Oukes & von Raesfeld (2017). As such, these type of contributions are visualised by means of four different colours. In this, the blue colour represents 'technology-centred', the orange colour represents 'financially-centred', the yellow colour stands for 'opportunity-centered' and last, the green colour represents '(inter)nationalization-centred'.

These timelines (from both the years 2016 and 2017) can be found on the next page.

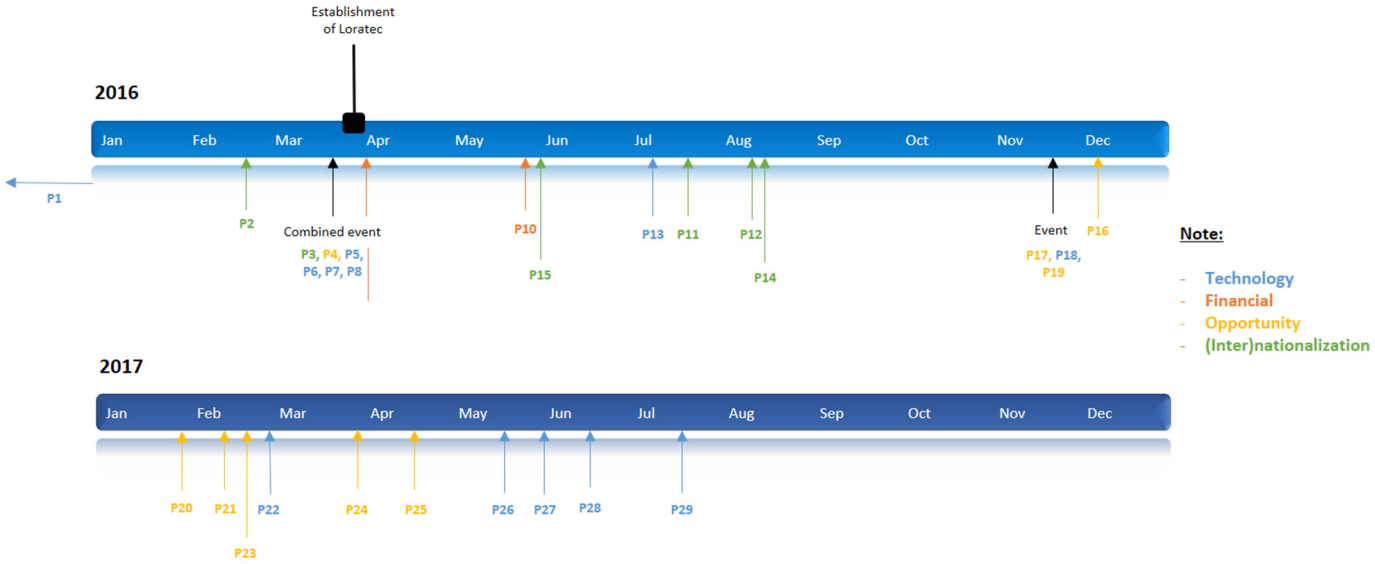

Figure 6: Timeline of the development of the network of Loratec (sorted by type of contribution).

As earlier mentioned, Loratec has been established in March 2016 by three founders. These three founders knew each other beforehand from working together in company P1. Company P1 is a technical company, focussing on the assembly of (micro)mechatronic modules and systems. As such, company P1 has already many years of experience in the high-tech industry and has a lot of knowledge, expertise and resources available.
Since one of the founders of Loratec is also the owner of company P1, company P1 has played (and still plays) a key partner role within the survival and growth of Loratec since its establishment. As such, P1 has provided Loratec with multiple resources.
When looking at the overview of the partnerships of Loratec in table 1 and figure 4, we also see that partner P1 has played an important role in multiple other partnerships; which in turn, became important new partners for Loratec. Examples of those partnerships are partners P2, P3, P4 and P22. In most cases, partner P1 took on a tertius role and introduced Loratec to these other partners; after which Loratec took over the initiative; and the partnerships was further established and developed.

An interesting fact to note is that some of the partnerships, to be exactly partnerships P1 up to and including P8, have been initiated and developed before the official establishment of Loratec. These partnerships were all important in the activities performed in the first months before and after establishing Loratec, since they provided focus in how to perform certain activities and how to establish Loratec.
Furthermore, the partnerships P3 up to and including P8, can also be deemed as a network within the network of Loratec. These partners and Loratec where brought together, during the month before the establishment of Loratec, by partner P3: which Loratec already knew via partner P1. Partner P3 then organized a meeting with multiple partners, with the goal of establishing a local IoT/LoRa-based partner network, with the aim of gathering partners with relating knowledge and expertise, and ultimately performing a pilot project. Within this network, most partners delivered a technical contribution to each other.

From within this network, the major contributor to Loratec was provided by partner P5. This partnership has proven to be one of Loratec's 'indispensable' partnerships; with as well a technology-centred contribution as a (inter)nationalization-centred contribution: since partner P5 did not only contributed by providing technical knowledge and skills, but has also contributed by introducing Loratec to another partners; such as partner P14.

Second, due to high R&D-costs Loratec experiences a high demand for financial resources. In order to solve this need, Loratec performed in-house a specific research to available financial instruments. This research learned Loratec that there were a lot more financial resources available than initially thought. After this research, the next step of Loratec was to contact P9 in order to schedule an appointment and talk about the possibility to join a subsidy-program of P9.
In this process, it is interesting to note that Loratec actually came pretty easy in touch with P9. After only sending an e-mail, with a bit detailed information about Loratec and the product that they were developing, a positive reaction and an appointment-suggestion was received by Loratec.
This however can be related to the way in which partner P9 is organized; as an organization that openly welcomes new (innovative) projects. Furthermore, P9 has also provided Loratec with additional suggestions for parties to contact specific resource needs, such as by matching Loratec to P10. P9 was in this position to do so, since their specific market is relatively small and which leads to the fact that almost all parties know each other.

Next in the process of the development of Loratec's network, Loratec established partnerships with P11 and P12 with the aim to obtain access to a large regional network of entrepreneurs, SMEs and other companies: in order to fill a specific technological needs for resources and knowledge/expertise. This technological need was, in the end, filled by partner P14, after an introduction of P14 by P5 to Loratec. The fact that this partner was introduced to Loratec by P5, and not by P11 or P12; as initially arranged and set up, was outcome which was not deliberately arranged beforehand. This fact gives strength to the assumption that by means of networking and collecting information from other relationships ventures are in a better position to assess the value of partnerships. In this specific case, P5, P11 and P12 all three introduced potentially suited partners to Loratec to serve Loratec's specific technological need, however thanks to the information provided by the third actors Loratec was able to better assess the suggested partners which, in the end, lead to the initiation and development of a business relationship with P14.

After the establishment of partnerships P1 up to and including P14, Loratec specifically searched for an opportunity to test a potential business case in an test-environment that is as close as possible to reality. Therefore Loratec reached out to P15, since they thought P15 to have the network with the highest chances of finding the right partner.
As such, P15 suggested P16 to Loratec: which is an organization that allows new entrepreneurs and young businesses and SMEs to test their products in practice on festivals. By providing this possibility to Loratec, the relationship with P16 has contributed in speeding up the R&D-process of Loratec's products: among other things by providing clear deadlines, fetching a new business opportunity, having the ability to produce reliable test data, obtaining user-centred feedback and revealing technical improvements.

Furthermore, Loratec was also specifically searching for opportunities to establish relationships with partners P26 and P27, due to the fact that these two partners are currently the only two parties to manage networks with nation-wide LoRa-coverage throughout the whole Netherlands.
Although LoRa is open-source: which means that any party is allowed to set up their own LoRa-network, this nation-wide coverage that is very appealing to certain customer segments (e.g. logistics). Therefore, for Loratec in order to be able to offer this functionality to potential customers, Loratec has to obtain partnerships with both P26 and P27.
However, it is interesting to see that the way in which the actual partnerships with P26 and P27 were established were very different from each other. Regarding partner P26 Loratec came relatively easy into contact with the initiator of P26 at a fair; where the presence of Loratec caught the attention of P26. Following on this first contact, Loratec and P26 initiated a further meeting together, in which they discussed their collaboration possibilities together.
On the contrary however, Loratec had to put a lot of effort into establishing the contact with P27. First, Loratec tried to initiate a relationship with P27 by taking own initiative and contacting P27

directly via e-mail and phone. However, these attempts all failed; mostly because Loratec wasn't able to reach the right person and/or department. This can probably be related to the fact that P27 is a large company, with over 10.000 employees. As such, it is much more difficult and also takes much more energy to reach the right person.
Then, Loratec tried another approach: namely by approaching a third partner (P19) which was able to match Loratec to the right person within the organization of P27: afterwards Loratec was able to develop a proper partnership with P27. This process however, took approximately 6 months of effort.
Comparing both partners, P26 actually appears to be more flexible regarding the establishment of new partnerships. This difference is however probably caused by the fact that P26 is a younger and smaller organization than P27; which is a large, corporate organization.

After establishing the partnerships P1 through P16, Loratec then gradually grew into a period in which they were not necessarily searching for specific partners (apart for the partnerships with P26 and P27) in order to serve specific resources shortages or needs.
However, in this period still 11 more partnerships where established; of which even three partnerships evolved to be of indispensable importance.
This shows that sometimes new ventures are even not aware of specific shortages or don't know any specific partners that would be able to solve a specific problem or shortage. Regarding those both partnerships, Loratec was made aware of the existence of the partner by third actors. These third actors knew Loratec, as well as the partner, and made matched both Loratec and the partner company by introducing them to each other. These specific relationships entail partners P18, P26 and P27; of which the relationship with P18 was initiated by P17 and the relationship with P27 by P19.

Looking to all established partnerships until September 2017, we can state that third parties have played a very important role in the evolvement of the partnerships: in 25 of all 29 partnerships third actors played a role. This points to the fact that third actors are very important in the establishment of the networks of new ventures, and in the survival and growth of new businesses.

For the remainder of this research, as already elaborated, the focus will be on the influence of third actors in the establishment and development of the business relationships of the start-up.
Therefore, we have illustrated these findings in table 2 below, taking the third actor as the starting point.

Third Actor:	Size:	SBI:
P1	Micro	2651: Manufacture of instruments and appliances for measuring, testing

	Relationship: P2	Relationship: P3	Relationship: P4	Relationship: P22
Importance:	1	1	1	1
Size:	Micro	Small	Micro	Small
Function Third Actor:	Joining	Joining	Joining	Relating
Role of Third Actor:	Access provider	Access provider	Scouter	Access provider
Type of Relationship:	Complementor	Customer	Customer	Supplier
Relationship Situation:	Mutual	Mutual	Mutual	Leadership
Contribution:	(Inter)nationalization: new partner/contact	(Inter)nationalization: new partner/contact	Opportunity: new business case/customer	Technology: new supplier for components of products

P2	Micro	9499: Activities of other membership organisations n.e.c.

	Relationship: P11	Relationship: P12	Relationship: P15
Importance:	3	3	3
Size:	Micro	Micro	Micro
Function Third Actor:	Relating	Relating	Relating
Role of Third Actor:	Matchmaker	Matchmaker	Access provider
Type of Relationship:	Complementor	Complementor	Complementor
Relationship Situation:	Mutual	Mutual	Mutual
Contribution:	(Inter)nationalization: new partner/contact	(Inter)nationalization: new partner/contact	(Inter)nationalization: new partner/contact

P3	Small	8412: Regulation of the activities of providing health care, education

	Relationship: P5	Relationship: P6	Relationship: P7	Relationship: P8	Relationship: P24
Importance	1	2	3	3	3
Size:	Micro	Micro	Micro	Micro	Large
Function Third Actor:	Relating	Relating	Relating	Relating	Relating
Role of Third Actor:	Matchmaker	Matchmaker	Matchmaker	Matchmaker	Matchmaker
Type of Relationship:	Complementor	Supplier	Supplier	Supplier	Complementor
Relationship Situation:	Mutual	Mutual	Mutual	Mutual	Mutual
Contribution:	Technology: new supplier of (complementary) knowledge/expertise	Technology: network provider/offers additional functionalities	Technology: new supplier of (complementary) knowledge/expertise	Technology: new supplier of (complementary) knowledge/expertise	(Inter)nationalization: offers range of new German business contacts/partners

				Relationship: P7	Relationship: P13
P4	Micro	4690: Non-specialised wholesale trade	*Importance:*	3	2
			Size:	Micro	Micro
			Function Third Actor:	Relating	Relating
			Role of Third Actor:	Accelerator	Access Provider
			Type of Relationship:	Supplier	Supplier
			Relationship Situation:	Mutual	Mutual
			Contribution:	Technology: new supplier of (complementary) knowledge/expertise	Technology: new supplier of (complementary) knowledge/expertise

				Relationship: P14
P5	Micro	6201: Computer programming activities	*Importance:*	2
			Size:	Micro
			Function Third Actor:	Insulating
			Role of Third Actor:	Risk reducer
			Type of Relationship:	Supplier
			Relationship Situation:	Followship
			Contribution:	Technology: new supplier of (complementary) knowledge/expertise

				Relationship: P10
P9	Micro	7022: Business and other management consultancy activities	*Importance:*	1
			Size:	Medium
			Function Third Actor:	Relating
			Role of Third Actor:	Need creator
			Type of Relationship:	Complementor
			Relationship Situation:	Followship
			Contribution:	Financial: access to external financing/grants

				Relationship: P20
P10	Medium	7320: Market research and public opinion polling	*Importance:*	3
			Size:	Large
			Function Third Actor:	Joining
			Role of Third Actor:	Matchmaker
			Type of Relationship:	Complementor
			Relationship Situation:	Mutual
			Contribution:	(Inter)nationalization: offers range of new German business contacts/partners

				Relationship: P16
P15	Micro	6201: Computer programming activities	*Importance:*	1
			Size:	Small
			Function Third Actor:	Joining
			Role of Third Actor:	Need creator
			Type of Relationship:	Complementor
			Relationship Situation:	Followship
			Contribution:	Opportunity: offers way to test proof of concepts

				Relationship: P25
P16	Small	9002: Support activities to performing arts	*Importance:*	2
			Size:	Micro
			Function Third Actor:	Insulating
			Role of Third Actor:	Scouter
			Type of Relationship:	Customer
			Relationship Situation:	Mutual
			Contribution:	Opportunity: offers access to new business case/market segment

				Relationship: P18	Relationship: P19
P17	Large	8411: General public administration activities	*Importance:*	1	2
			Size:	Large	Micro
			Function Third Actor:	Joining	Joining
			Role of Third Actor:	Access Provider	Access Provider
			Type of Relationship:	Complementor	Complementor
			Relationship Situation:	Followship	Followship
			Contribution:	Technology: new supplier of (complementary) knowledge/expertise	Technology: new supplier of (complementary) knowledge/expertise

				Relationship: P27
P19	Micro	7490: Other professional, scientific and technical activities n.e.c.	*Importance:*	1
			Size:	Large
			Function Third Actor:	Joining
			Role of Third Actor:	Accelerator
			Type of Relationship:	Supplier
			Relationship Situation:	Followship
			Contribution:	Technology: network provider

				Relationship: P21	Relationship: P23
P20	Large	8541: Post-secondary non-tertiary education	*Importance:*	2	3
			Size:	Micro	Large
			Function Third Actor:	Relating	Relating
			Role of Third Actor:	Trust builder	Evaluation assistant
			Type of Relationship:	Supplier	Complementor
			Relationship Situation:	Leadership	Mutual
			Contribution:	Opportunity: assistance in building business case, specific expertise in German market	(Inter)nationalization: new partner/contact

Table 2: Overview of influence of third actors in the business relationships of the start-up.

Looking at table 2, a few findings stand out to us. First of all, we see that among the business relationships of the start-up, twelve different third actors can be distinguished.
Of these twelve third actors, it stands out that nine third actors have a size determined as 'micro' or 'small'. Following this insight, we can conclude that most of the third actors of the start-up are of a small size. This however, can probably be explained by the fact that the start-up itself is also a small company and that the technology in question is still very new and in development. Therefore it is probably much more easy to come into contact with small third actors and companies.

Furthermore, it is also interesting to note that of the twelve third actors, only six third actors have played a role in the initiation of two or more business relationships. And another interesting insight, related to this, is the fact that of these six third actors, the first three played a role in the early beginning of the development of the network of the start-up.
As one can see, the six other remaining third actors have only played a role in one business relationships.

4.2. Which contributions have the business relationships delivered to the start-up?

First, we have looked at the different type of contributions that each partner has delivered to the start-up. With the provided information, we have created a quick overview of ranked along the four types of contributions as mentioned in paragraph 2.3.

Type of Contribution:	# times counted:
Technology:	11x
Financial:	1x
Opportunity:	3x
(Inter)nationalization:	8x

Table 3: Overview of types of contributions provided by the business relationships of the start-up.

Looking at the overview, we first notice that 'technology' is the type of contribution that has been delivered the most by the business relationships of the start-up.
For comparing purposes, this entails that over the in total 24 business relationships in which a third actor has played a role, almost half of these business relationships have delivered a certain contribution related to technology.
Taking into account the more detailed description of the actual contribution of each business relationship, we see that these technological contributions all entail complementary knowledge

and/or resources. Moreover, these contributions have strengthened the technological products by enabling Loratec to translate ideas into fully working 'end-to-end' solutions.

Furthermore, we see that also a majority of the contributions of the business relationships of Loratec have provided Loratec with '(inter)nationalization'. Again looking at the more detailed descriptions, we see that often these business relationships have provided Loratec with access to new business relationships or by linking Loratec to a specific party: which in turn, can contribute by providing complementary knowledge or resources.

Moreover, we see that the contributions in the form of 'opportunity' have only been offered in 3 business relationship and that 'financial' contribution has solely been offered by 1 business relationship.

Type of Contribution:	**Importance of Contribution[8]:**		
	1:	2:	3:
Technology:	4x	4x	3x
Financial:	1x	0x	0x
Opportunity:	2x	2x	0x
(Inter)nationalization:	2x	0x	6x
TOTAL:	**9x**	**6x**	**9x**

Table 4: Types of contribution, ranked by importance for the start-up.

Looking at the ranking of importance of the contributions of each business relationship, we see a more balanced image of the portfolio. The distribution between the number of relationships ranked 'indispensable' and the number of relationships ranked 'important, but replaceable' are both 9 times counted.

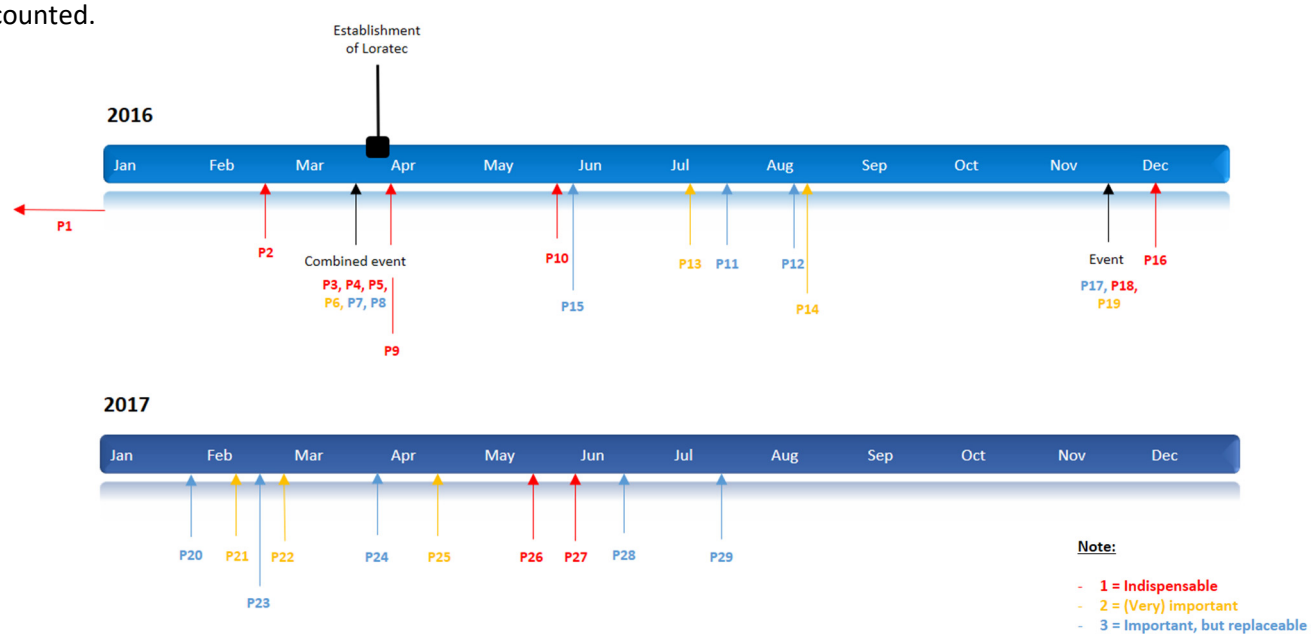

Figure 7: Timeline of the development of the network of the start-up (by sorted by ranking of importance).

Besides that, when we look at the timeline of how the network of the start-up has grown over time, it attracts attention that the majority of the relationships which are categorized as "indispensable" have been established in the period of two months before founding the start-up and the two months

[8] This ranking resembles the importance of the contribution of the specific partner to the start-up. As such, 1 = indispensable, 2 = (very) important, 3 = important, but replaceable.

after founding the start-up. This finding gives the idea that the most important relationships of start-ups will be founded in the short period before and after actually founding a new venture.

By combining table 3 and table 4, we take the analysis one step further into detail: with the aim of trying to find interesting patterns within the business relationships of the start-up.

The first pattern that stands out is that, of the in total 11 relationships that have provided a technological contribution only 4 of these relationship are deemed 'indispensable'. And we see this pattern even stronger with the relationships that have contributed by "(inter)nationalization": the majority of these relationships (6 out of 8 of these type of relationships) are categorized as "important, but replaceable".
This raises the question how necessary it is for the start-up to put a lot of time in establishing and developing relationships with an (inter)nationalization type of contribution, due to the findings that suggest that these type of relationships are not the most important and valuable for the start-up.

On the contrary, of only relationship that has contributed financially, this relationship is deemed as "indispensable" for the start-up. Therefore, the suggestion would be that more effort and time would be put in establishing and developing these financially-contributed relationships than in other types of relationships.

In the end, these findings suggest that start-ups should be aware of the type of relationships that contribute the most to their businesses. When start-ups are aware of this, they can divide their time and effort put in developing and establishing relationships more efficiently.

4.3. What functions and roles have been performed by third actors during the establishment and development of the business network of the start-up?

As earlier elaborated on, third actors can play many different functions and roles in the establishment and development of business relationship between parties. For further theoretical elaboration about these functions and roles, we redirect to paragraphs 2.5 and 2.6.

To give an overview of the functions and roles that have been played by the third actors in the business relationships of the start-up, we have summarized this in the table below.

Third Actor:		**P2**	**P3**	**P4**	**P22**
P1	*Function 3rd Actor:*	Joining	Joining	Joining	Relating
	Role of 3rd Actor:	Access provider	Access provider	Scouter	Access provider

Third Actor:		**P11**	**P12**	**P15**
P2	*Function 3rd Actor:*	Relating	Relating	Relating
	Role of 3rd Actor:	Matchmaker	Matchmaker	Access provider

Third Actor:		**P5**	**P6**	**P7**	**P8**	**P24**
P3	*Function 3rd Actor:*	Relating	Relating	Relating	Relating	Relating
	Role of 3rd Actor:	Matchmaker	Matchmaker	Matchmaker	Matchmaker	Matchmaker

Third Actor:		**P7**	**P13**
P4	*Function 3rd Actor:*	Relating	Relating
	Role of 3rd Actor:	Accelerator	Access provider

Third Actor:		**P14**
P5	*Function 3rd Actor:*	Insulating
	Role of 3rd Actor:	Risk reducer

Third Actor:		P10		
P9	*Function 3rd Actor:*	Relating		
	Role of 3rd Actor:	Need creator		
Third Actor:		**P20**		
P10	*Function 3rd Actor:*	Joining		
	Role of 3rd Actor:	Matchmaker		
Third Actor:		**P16**		
P15	*Function 3rd Actor:*	Joining		
	Role of 3rd Actor:	Need creator		
Third Actor:		**P25**		
P16	*Function 3rd Actor:*	Insulating		
	Role of 3rd Actor:	Scouter		
Third Actor:		**P18**	**P19**	
P17	*Function 3rd Actor:*	Joining	Joining	
	Role of 3rd Actor:	Access provider	Access provider	
Third Actor:		**P27**		
P19	*Function 3rd Actor:*	Joining		
	Role of 3rd Actor:	Accelerator		
Third Actor:		**P21**	**P23**	
P20	*Function 3rd Actor:*	Relating	Relating	
	Role of 3rd Actor:	Trust builder	Evaluation assistant	

Table 5: Overview of functions and roles performed by the third actors in the establishment and development of the business relationships of the start-up.

Functions performed:	# times counted:
Joining:	8x
Insulating:	2x
Relating:	14x

Table 6: Overview of the number of times a function has been performed.

First of all, we will have a look at the functions that have been performed by the third actors. Following Holmen & Pedersen (2003) and Oukes & von Raesfeld (2017) we can distinguish between three functions performed; namely joining, insulating and relating.

Looking at table 6, we see that by far the function of relating has been performed the most by the third actors in the establishment and development of business relationships by the start-up.
This gives a first insight that the function of relating performed by third actors is most useful for start-ups, to further develop their business network.
However, in order to be able to say truly something about the value of the different functions played by third actors, we should also look at the importance of the contributions for the specific start-up.

Functions performed:	**Importance of Contribution:**			**TOTAL:**
	1:	2:	3:	
Joining:	6x	1x	1x	**8x**
Relating:	3x	2x	9x	**14x**
Insulating:	0x	2x	0x	**2x**

Table 7: Functions performed by the involved third actors related to the importance of the business relationships contributions.

In order to say more about the actual value of the functions performed by the third actors for the start-up, we look more closely to table 7. In table 7 we have looked at the different functions performed by third actors in the business relationships and combined this by looking at the ranking of importance of each business relationship to the start-up.

Looking at this more closely, we get another image than initially provided by only looking at the frequency of functions performed by third actors. Whereas, initially the idea was that the function of relating was the most valuable function to the start-up, table 7 shifts this to the finding that relationships started through the function of 'joining' in the end have had the most value for the start-up; since this function performed has led to the contributions with the highest ranked importance.
Furthermore, we see that the function of insulating only appeared two times among the 24 business relationships of the start-up. As such, one can conclude that the function of insulating was the least important function for the start-up during the establishment and development of their business network.

Function performed:	**Type of Contribution:**				**TOTAL:**
	Technology:	Financial:	Opportunity:	(Inter)nationalization:	
Joining:	3x	0x	2x	3x	**8x**
Relating:	7x	1x	1x	5x	**14x**
Insulating:	1x	0x	1x	0x	**2x**

Table 8: Functions performed by the third actors involved, related to the type of contribution provided by the business relationships.

Additionally, we have tried to link the function performed by third actors to the type of contribution provided by the business relationships; to see if we can find some patterns and potential leads. However, looking at the findings between these two variables, we find no big pattern in our data. As such, we see that the functions performed have led to multiple type of contributions. On the contrary however, the findings in table 8 indicate that the function of relating probably leads to technology or (inter)nationalization-typed contributions.

Functions performed:	**Relationship Type:**				**TOTAL:**
	Complementor:	Supplier:	Customer:	Competitor:	
Joining:	5x	1x	2x	0x	**8x**
Relating:	7x	7x	0x	0x	**14x**
Insulating:	0x	1x	1x	0x	**2x**

Table 9: Overview of relationship between the functions performed by third actors and the relationship types distinguished.

Then, we have looked into the potential relationship between the functions performed and the specific relationship type of each business relationship. As such, we can derive that the function of 'joining' most probably in leads to partnerships with complementors and that, furthermore, the function of 'relating' will most probably lead to relationships with complementors or suppliers. However, there is no function that have led to only one specific relationship type, so no further conclusions or clues can be derived from that.

Functions performed:	Relationship Position:			TOTAL:
	Mutual:	Followship:	Leadership:	
Joining:	4x	4x	0x	**8x**
Relating:	11x	1x	2x	**14x**
Insulating:	1x	1x	0x	**2x**

Table 10: Overview of the relationship between the functions performed by third actors and the relationship positions determined.

At last, regarding the functions performed by third actors, we have looked at the potential relationship between the functions performed and the relationship situation that has arisen among the business relationships of Loratec.
In table #, we clearly see a strong relationship between the function of 'relating' and a 'mutual' relationship position. As such, we can conclude that when parties are looking for a mutual relationships, most likely the function of relating will lead to that. Regarding the other functions performed and relationship positions derived, we unfortunately see no clear causal relationships rise.

Subsequently, we will delve even further into the involvement of third actors in the process of developing and establishing business relationships of new ventures by looking specifically at the roles that have been performed by the third actors in doing so. Following Aarikka-Stenroos & Halinen (2007) we will distinguish between twelve different roles.
An overview of the number of times these specific roles have been uncovered in the network of the start-up is being provided below.

Roles performed:	Total times counted:
Awareness Builder:	0x
Need Creator:	2x
Scouter:	2x
Access Provider:	7x
Advocate Seller:	0x
Accelerator:	2x
Matchmaker:	8x
Trust Builder:	1x
Evaluation Assistant:	1x
Provider of Concrete Evidence:	0x
Expectations Builder:	0x
Risk Reducer:	1x

Table 11: Overview of total times certain roles have been performed by third actors in the network of the studied start-up.

Looking at the overview above, we see that the role of 'matchmaker' outnumbers all other roles, however closely followed by the role of 'access provider'. Together, these two roles have been performed in 15 of the 24 business relationships.
Taking the model of Aarikka-Stenroos & Halinen (2007, p. 17) into account, access provider focuses more on relevance for the seller, whereas matchmaker focusses on relevance for both the seller and the buyer. In other words, access provider has had more relevance for the start-up in question, where in turn matchmaker has had both relevance for the start-up and the other party.
Besides that, the model of Aarikka-Stenroos & Halinen (2007, p. 17) also shows that access provider comes earlier in the initiation process than matchmaker; however, both lie closely together.

Moreover, we also see that 4 of the 12 potential roles that can be performed by third actors are not present among the studied business relationships.

One finding, related to this, that does attract some attention is the fact that only once a role from the category of 'specifying the deal' has been performed by a third actor in the initiation of relationships. This shows that almost all roles played by the third actors were not performed in the moment that the relationship initiation was in its most advance stage.

Then, to say more about which role has provided the most important contribution we will have a closer look at which role performed has led to the contributions with the highest ranking.

Roles performed:	**Importance of Contribution:**			**TOTAL:**
	1:	2:	3:	
Awareness Builder:	0x	0x	0x	**0x**
Need Creator:	2x	0x	0x	**2x**
Scouter:	1x	1x	0x	**2x**
Access Provider:	4x	2x	1x	**7x**
Advocate Seller:	0x	0x	0x	**0x**
Accelerator:	1x	0x	1x	**2x**
Matchmaker:	1x	1x	6x	**8x**
Trust Builder:	0x	1x	0x	**1x**
Evaluation Assistant:	0x	0x	1x	**1x**
Provider of Concrete Evidence:	0x	0x	0x	**0x**
Expectations Builder:	0x	0x	0x	**0x**
Risk Reducer:	0x	1x	0x	**1x**

Table 12: Overview of roles performed by third actors with the highest contribution.

Looking at table 12 we see that, overall, the role of access provider by third actors has led to the contributions with the highest ranking.
However, even more interesting to see is that of the role which has performed the most ('matchmaker') only one of these relationships is also appointed as 'indispensable'. This finding indicates that although a role seems very important at first sight, by the number of times a role has been performed, this is not necessarily true when considering the importance for a new venture.

Roles performed:	**Type of Contribution:**				**TOTAL:**
	Technology	Opportunity:	(Inter)nationalization:	Financial:	
Awareness Builder:	0x	0x	0x	0x	**0x**
Need Creator:	0x	1x	0x	1x	**2x**
Scouter:	0x	2x	0x	0x	**2x**
Access Provider:	4x	0x	3x	0x	**7x**
Advocate Seller:	0x	0x	0x	0x	**0x**
Accelerator:	2x	0x	0x	0x	**2x**
Matchmaker:	4x	0x	4x	0x	**8x**
Trust Builder:	0x	1x	0x	0x	**1x**
Evaluation Assistant:	0x	0x	1x	0x	**1x**
Provider of Concrete Evidence:	0x	0x	0x	0x	**0x**
Expectations Builder:	0x	0x	0x	0x	**0x**
Risk Reducer:	1x	0x	0x	0x	**1x**

Table 13: Overview of the relation between the roles performed by third actors and the type of contribution provided.

Studying the relationship between the roles performed and the type of contributions provided we see that not one specific role has led to only one specific type of contribution.

However, what we do see is that the roles of 'access provider' and 'matchmaker' have mostly led to technology-oriented type of contributions. Furthermore, we also see a similar relation between the roles of 'access provider' and matchmaker with (inter)nationalization-oriented type of contributions. On the contrary, however, no such clear relation can be found for the opportunity-oriented type of contributions and the financial-oriented type of contributions.

Roles performed:	**Relationship Type:**				**TOTAL:**
	Complementor:	Supplier:	Customer:	Competitor:	
Awareness Builder:	0x	0x	0x	0x	**0x**
Need Creator:	2x	0x	0x	0x	**2x**
Scouter:	0x	0x	2x	0x	**2x**
Access Provider:	4x	2x	1x	0x	**7x**
Advocate Seller:	0x	0x	0x	0x	**0x**
Accelerator:	0x	2x	0x	0x	**2x**
Matchmaker:	5x	3x	0x	0x	**8x**
Trust Builder:	0x	1x	0x	0x	**1x**
Evaluation Assistant:	1x	0x	0x	0x	**1x**
Provider of Concrete Evidence:	0x	0x	0x	0x	**0x**
Expectations Builder:	0x	0x	0x	0x	**0x**
Risk Reducer:	0x	1x	0x	0x	**1x**

Table 14: Overview of relationship between roles performed by third actors and the relationship types found.

Also, we have looked at the roles performed by third actors and their relation to the relationship types. Looking at the results, we especially see that the roles of 'access provider' and 'matchmaker' have led to 'complementor' type of relationships. However regarding the other relationships types, we unfortunately see no clear patterns of which further conclusions can be derived.

Roles performed:	**Relationship Position:**			**TOTAL:**
	Mutual:	Followship:	Leadership:	
Awareness Builder:	0x	0x	0x	**0x**
Need Creator:	0x	2x	0x	**2x**
Scouter:	2x	0x	0x	**2x**
Access Provider:	4x	2x	1x	**7x**
Advocate Seller:	0x	0x	0x	**0x**
Accelerator:	1x	1x	0x	**2x**
Matchmaker:	8x	0x	0x	**8x**
Trust Builder:	0x	0x	1x	**1x**
Evaluation Assistant:	1x	0x	0x	**1x**
Provider of Concrete Evidence:	0x	0x	0x	**0x**
Expectations Builder:	0x	0x	0x	**0x**
Risk Reducer:	0x	1x	0x	**1x**

Table 15: Overview of relationship between roles performed by third actors and the relationship positions determined.

At last, we have also reviewed the relationship between the roles performed and the relationship positions. In these findings, the first thing that stands out is the fact that 'matchmaker' has led to most relationships with a 'mutual' relationship position.
Furthermore, regarding the relationship positions of 'followship' and 'leadership' we unfortunately see no clear causal relationship between the roles performed and the relationship position.

4.4. What type of relationships can be distinguished within the business relationships of the start-up?

Within the network of Loratec we can, following the typology of Ritter, Wilkinson and Johnstron (2004), distinguish four types of relationships with partners:

1) Relationships with customers;
2) Relationships with suppliers;
3) Relationships with complementors;
4) Relationships with competitors.

For more elaboration on these types of relationships, we refer to paragraph 2.6.
Looking at the network of the start-up we have summarized the type of relationships distinguished in table 11, on the next page.

Type of Relationships:	**# times counted:**
Complementor:	12x
Customer:	3x
Supplier:	9x
Competitors:	0x

Table 16: Overview of the types of relationships present among the business relationships of the start-up.

Taking table 11 into account, we see that the 'complementor' type of relationship has occurred most often among the business relationships of the start-up. Furthermore, we see that there are also relatively a lot of relationships with suppliers. Next to this, we see that three relationships are classified as 'customers'.

Last, but nonetheless important, it stands out that among the business relationships studied, none of these partners are deemed as 'competitors'. This finding can however be possibly explained due to the fact that the start-up is active in a relative new market with new technologies. Placing this along the product life cycle, one could say that the market is still in its introduction phase. Therefore, it could be that there are currently almost no competitors in the market.

Type of Relationship:	**Type of Contribution:**			
	Technology:	Financial:	Opportunity:	(Inter)nationalization:
Complementor:	3x	1x	1x	7x
Customer:	0x	0x	2x	1x
Supplier:	8x	0x	1x	1x
Competitors:	0x	0x	0x	0x

Table 17: Overview of the type of relationships related to the specific type of contribution.

Taking one step further, we have a look at the different type of relations to the different types of contributions provided.
Looking at the 'complementor' type of relationships, we see among the business relationships of the start-up that they have provided multiple types of contributions. Most of these 'complementor' relationships have contributed in the form of (inter)nationalization.
Furthermore, we find that relationships typified as 'supplier' have contributed most by technology. And also we see that the relationships that are typified as 'customers' have contributed by opportunity. These two findings are as expected, since it these the type of contribution 'opportunity'

relates most to 'customers' and the type of contribution of 'technology' relates most to be provided by suppliers.

Type of Relationship:	Importance of Contribution:			TOTAL:
	1:	2:	3:	
Complementor	5x	1x	6x	**12x**
Customer:	2x	1x	0x	**3x**
Supplier:	2x	4x	3x	**9x**
Competitors:	0x	0x	0x	**0x**

Table 18: Overview of the type of relationships with the highest contribution.

Last, to have a better clue which types of relationships have contributed most to the start-up, we have looked at the relation of the type of relationship to the ranking of importance of the contribution.

As such, we see that the 'complementor' type of relationship has provided the most important contributions to the start-up. However, we also see that among the 'complementor' type of relationships also the most relationships which are deemed "important, but replaceable".

4.5. How is the start-up positioned within its business relationships?

Last, to get an idea of the interdependency of the start-up related to its business relationships, we have looked at the position of the start-up in each of its business relationships.
As such, we have summarized this in table 14 below.

Position within the business relationship:	# times counted:
Mutual:	16x
Followship:	6x
Leadership:	2x

Table 19: Overview of the start-ups positions compared to each of its relationship partners.

Having a look at the position in each of the business relationships acknowledge, we see that the start-up is in most of its cases in a mutual position; which entails that neither the start-up, nor the other party has a high dominance over the other.
This is favourable for the start-up since in these situations they experience no high dependency of their business relationships.
However, still the start-up has 2 business relationships in which they are in the position of 'followship', in which they are dependent of their partner. Last, among the business relationships of the start-up there are three relationships in which the start-up is the dominant party and the partner is dependent on the contribution provided by the start-up.

Position:	Importance of Contribution:		
	1:	2:	3:
Mutual:	4x	3x	9x
Followship:	4x	2x	0x
Leadership:	1x	1x	0x

Table 20: The start-ups position in the business relationships ranked by the importance of their contributions.

Regarding the position of the start-up in its business relationships and the importance of the contributions of these relationships to the start-up, we would have expected that the 'followship' relationship have a high importance for the start-up.
The findings in the table above confirm this expectation, as we see that from the followship relations 4 out of the 5 in total are deemed as the highest ranking of contribution.
However, the opposite expectation doesn't apply for the 'leadership' relationships. Of the 2 leadership relations, 1 of them is deemed as the highest ranking of contribution. Due to the high dependence of the start-up in these two relationships with their high ranking of importance, the start-up should be very careful in managing and maintaining these relationships; since these relationships have a high impact on the start-up.

Position:	**Type of Contribution:**			
	Technology:	Financial:	Opportunity:	(Inter)nationalization:
Mutual:	6x	0x	2x	8x
Followship:	4x	1x	1x	0x
Leadership:	1x	0x	1x	0x

Table 21: Position of the start-up within the business relationship related to the type of contribution provided.

Last, we have matched the position within the business relationships to the type of contribution provided to the start-up.
Looking at the results in table 16 we see that among the mutual positioned relationships most type of contributions include 'technology' and '(inter)nationalization'.
Among the relationships with the 'followship' positions, we see that the only financial contributed relationship is included. Furthermore, we also have one opportunity-centered relationship and three technology-centered relationships.
Last, in the relationships in which the start-up has the position of 'leadership' we see that two technology-centered relationships among them. This however can probably be explained by the fact that the start-up is technology oriented and provides technology-oriented solutions to parties.

5. Conclusion

5.1. Theoretical Implications

In chapter 1, the main research question was formulated. For the purposes of readability this main research question will be repeated here:

"What is the influence of third actors on establishing and developing business relationships of a technology oriented start-up?"

This main research question was being examined by means of an actual start-up; namely start-up Loratec, situated in Winterswijk (the Netherlands).

For answering the main research question and the corresponding sub-questions, we have used the theories of Oukes & von Raesfeld (2017), Aarikka-Stenroos & Halinen (2007), Holmen & Pedersen (2003), Ritter et al. (2004) and Obstfeld (2005).
Following the insights of those scholars, we will reflect our findings and look in what way our findings correspond or differ to their previous results.

First of all, based on the timelines drawn up of how the relationships have been established and developed over time, one can suggest that a specific pattern was adapted to attract partners. This pattern could be by first focusing mostly on technology-centred partners, then focusing mostly on (inter)nationalization-centred partners and last, focusing mostly on opportunity-centred partners. However, this appears to be a purely coincidence, with no deliberate intentions beforehand. But, this finding in itself also can point to the fact that start-ups, unintentionally, follow a specific pattern in initiating and developing relationships.

In their research, Oukes & von Raesfeld (2017) found start-ups relied heavily on partners which functioned as a 'tertius iungens'; as also established by Obstfeld (2005).
In the findings of our research, we see that there are relatively a lot of partners involved that have contributed by "(inter)nationalization. Therefore, in this sense our findings coincide with the findings of Oukes & von Raesfeld (2017). However, the "(inter)nationalization" type of contribution was not the type of contribution that was most present among the studied business relationships of the start-up, this was instead the "technology"-centered type of contribution. One explanation for this can lie in the fact that the studied start-up itself is a technology-oriented start-up; and therefore they -naturally- tend to establish more partnerships with complementary technology-oriented partners.

Furthermore, in our findings we have closely looked at the functions and roles played by third actors in the initiation and development of the business relationships of the start-ups.

Regarding to the studied functions, we see that the function of 'relating' has been performed most often among the business relationships of the start-up; followed by 'joining' and last, 'insulating'. However, when we link the functions performed within each business relationship to the contribution provided by each business relationship, we get a slightly other impression than at first sight. In that case, we see that not the function of 'relating' but the function of 'joining' has delivered the most valuable relationships to the start-up.
Holmen & Pedersen (2003) specifically note that firm's strategizing is closely related to the mediating functions performed by the firm's counterparts. As a result of this, it is important that firms pay attention to their counterparts' mediating functions (p. 418).

Besides that, regarding the roles performed by third actors, Aarikka-Stenroos & Halinen (2007) note that in particular evaluating the trustworthiness is an important aspect for clients. As such, parties should be able to actively present their capabilities and existing relationships through third parties, e.g. by references, testimonials or word-of-mouth (p. 18).
However, as opposed to Aarikka-Stenroos & Halinen (2007), we find in our study that especially those roles focused on building trustworthiness and evaluation the value of the potential outcome, such as the roles of Trust Builder, Evaluation Assistant, Provider of Concrete Evidence, Expectations Builder and Risk Reducer, are not often found among the studied business relationships.
This finding also appoints to the fact that not necessarily always the order of awareness building, access, partner matching and specifying the deal; as proposed by Aarikka-Stenroos & Halinen (2007) will be followed in the initiation and development of each partnership.
Considering our own results, the findings of our study demonstrate that the roles of matchmaker and access provider have been of great importance.
However, due to the fact that Aarikka-Stenroos & Halinen (2007) distinguish between 12 different roles, it is hard to really find great patterns among the studied business relationships of our case. Furthermore, the fact that many of these 12 roles are very much alike also hinders the process of finding patterns. To obtain a more clear image, an idea would be to reduce the amount of roles; e.g. from 12 roles to 6 roles, or even 4 roles; if possible. For example, it would be much more easy to have only four roles; each of them related to one phase of the initiation process: namely awareness, access, matchmaking and specifying the deal.

Also, as earlier already shortly discussed, regarding to those roles performed it is interesting to see that the role of 'specifying the deal' has only been performed once among the relationships studied. This points to two different aspects: first of all, this shows that third actors mostly play a role in the beginning of the initiation and development of relationships. And second, this is also an interesting finding, since these role is especially such a function that can assist in evaluating and mediating the value that comes out of a potential relationship.

According to Ritter et al. (2004) the business value net identifies four different types of firms, which affect the firm's ability to produce and deliver value to intermediates or final customers (p. 176). Looking at our own findings, we see that the most business relationships are relationships with complementors. However, probably much more interesting is the fact that among the studied business relationships no relationships with competitors were found. This however can perhaps be explained by the fact that the studied start-up is active in a very new and still evolving market.

At last, we have looked at the position of the studied start-up in each of the studied business relationships. As such, we have followed the path of Ritter et al. (2004) and made a distinction between three positions: mutual, leadership and followship. For firms, a mutual or followship position is most preferable, since then the firm is not that much dependent on the other firm for the continuity of their business.
Looking at our findings, we see that most relationships of the studied start-up are determined as a 'mutual' relationship: in which no of the involved parties has a dominant position over the other.

Looking at how the business development of the studied start-up has evolved over the studied period, one could certainly say that the business relationships have played a major -if not indispensable- importance for the start-up. Without the established business relationship, the start-up would not have been able to develop their business in the way they did and it would probably have taken much longer to have execute all the developments that have been executed in the same period of time. Also, without these business relationships the question would also be if the start-up would have been able to obtain the same results/developments as they have obtained now, since they then would lack diverse knowledge, expertise and resources.

5.2. Managerial Implications

In the end, based on the findings and implications of this study one can certainly argue that the presence of third actors certainly influences the establishment and development of business relationships of a start-up.
Also, more broadly, the present case study also confirms that indeed networking is a good way to overcome liabilities of smallness and newness; by working together with many business relationships such as suppliers, complementors or customers.

The aim of this research was to aim of fill the managerial and academic gap and to construct practical guidelines on how to deal with the process of networking and establishing business relationships, especially by involving third actors in the process.

Following the theoretical implications of this research and the findings of the study we especially see that in depth analysis of their business relationships is a must for start-ups: since on the first hand some findings seem very clear, but when more in depth analysis is applied these findings can change or look differently.

These findings also align to the earlier conclusion of Holmen & Pedersen (2003) that all firms can benefit from analysing and trying to change its network horizon (p. 418)

However, since it can be very difficult for start-ups themselves to create a suitable model for structuring their business relationships and the multiple aspects related to that.
Therefore we have constructed an analysis model, based on the theories of Aarikka-Stenroos & Halinen (2007), Holmen & Pedersen (2003), Oukes & von Raesfeld (2017) and Ritter et al. (2004), which can be applied and filled in by start-ups when analysing their network and business relationships.

For applying this model, start-ups need to take their own perspective as the viewing point. Then, they should begin by creating a simple overview of all their business relationships and wonder if and (if yes) what partner has influenced that relationship as a third actor. An example of a table for creating such an overview is included on the next page.

Partner:	**Has an third actor been involved?**	**Third Actor:**
Company A	Yes/No	If yes, name 3rd actor.
Company B	…	…
Company …	…	…

Table 22: Example of creating an overview of all business relationships.

After the start-up has created this overview, one should then more in depth consider the different aspects of each specific business relationship. For this, we have created the following analysis model, that can be found on the following page.

Third Actor:		***Company A:***	***Company B:***	***Company …:***
Company …	Importance:			
	Contribution:			
	Function 3rd actor:			
	Role 3rd actor:			
	Type of Relationship:			
	Position:			

Table 23: Analysis model for each third actor and linked business relationships.

The analysis model above, can then be repeated for each third actor with its linked business relationships. In the end, this will give start-ups an comprehensive overview, which can be applied to structure their relationship establishment and development more efficiently.

In the end, this should lead to improved structuring of the business relationships of the start-ups and enhance the continuity, survival and growth of new ventures.

6. Discussion

Last, in this section the relevance, limitations and directions for further research will be discussed.

This research has both academic relevance, as well as managerial relevance.
At this moment, there still remains a lack of knowledge and studies on how start-ups can actually (positively) influence this process of networking and the involvement of third actors. As a result, no best practices are drawn up for start-ups to apply during the process of networking and developing their new business. Because of that, currently 40 to 50% of the venture started close their business again within 5 years after starting up; this entails a failure rate of almost 1 out of 2 new business.

In the execution of this research the choice has been made to study the triads within the network of Loratec.
This choice, besides the theoretical relevance, has been deliberately made due to the full availability of Loratec's corporate and formal documents and the possible opportunity to perform additional observations and interviews. This access originates from the opportunity that I (the author of this research) are one of the co-founders and co-owners of Loratec. As such, I have been involved from the beginning of the start-up of Loratec and have closely watched and participated in the establishment of the network and the partnerships of Loratec.

This deliberate choice has the advantage that a lot of data can be retrieved in order to perform this research in a correct way.

However, despite the academic and managerial relevance this study has also a few limitations; which will likewise guide the directions for further research.

In this study the focus has being laid on the case of one particular Dutch start-up; operating in the IT-market.
This has the consequence that the findings of this study cannot be generalized without a warning for each start-up in all kinds of market segments. Start-ups are established in many different sectors and each start-up has a unique business model; with a unique requirement for specific resources. In order to have truly generalizable recommendations for all kinds of new ventures, a larger research has to be performed with case studies included from multiple start-ups originating from different market segments.
Second, due to the fact that only the case of a Dutch start-ups is illustrated, the question remains if the findings from this study are also relevant and applicable for start-ups from other countries or continents.

Nevertheless, this study has particularly focused on business relationships that have emerged due to the involvement of third actors.. As a result of this, in the end, 24 business relationships were studied and analysed which have provide a pretty decent overview of the influence of third actors on the establishment and development of business relationships of a start-up.
Therefore, the results of this study still provide generalizable findings for technological-oriented start-ups situated in the Netherlands and can be taken into account by founders or employees of those type of start-ups; which are confronted with the question and difficulty of how to manage their business relationships and effort put in better.

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Appendices

Appendix 1: Summary of the network of Loratec

#:	SBI (EN):	Size:	Main Contribution:	Ranking:	Third Actor:	Function Third Actor:	Role Third Actor:	Relationship Type:	Relationship Situation:
P1	2651: Manufacture of instruments and appliances for measuring, testing	Micro	Technology	1	NA	NA	NA	Supplier	Followship Relationship
P2	9499: Activities of other membership organisations n.e.c.	Micro	(Inter)nationalization	1	P1	Joining	Access provider	Complementor	Mutual Relationship
P3	8412: Regulation of the activities of providing health care, education	Small	(Inter)nationalization	1	P1	Joining	Access provider	Customer	Mutual Relationship
P4	4690: Non-specialised wholesale trade	Micro	Opportunity	1	P1	Joining	Scouter	Customer	Mutual Relationship
P5	6201: Computer programming activities	Micro	Technology	1	P3	Relating	Matchmaker	Complementor	Mutual Relationship
P6	6209: Other information technology and computer service activities	Micro	Technology	2	P3	Relating	Matchmaker	Supplier	Mutual Relationship
P7	6201: Computer programming activities	Micro	Technology	3	P3 & P4	Relating	Accelerator	Supplier	Mutual Relationship
P8	6201: Computer programming activities	Micro	Technology	3	P3	Relating	Matchmaker	Supplier	Mutual Relationship
P9	7022: Business and other management consultancy activities	Micro	Financial	1	NA	NA	NA	Complementor	Followship Relationship
P10	7320: Market research and public opinion polling	Medium	Financial	1	P9	Relating	Need creator	Complementor	Followship Relationship
P11	4669: Wholesale of other machinery and equipment	Micro	(Inter)nationalization	3	P2	Relating	Matchmaker	Complementor	Mutual Relationship
P12	8412: Regulation of the activities of providing health care, education,	Micro	(Inter)nationalization	3	P2	Relating	Matchmaker	Complementor	Mutual Relationship
P13	7112: Engineering activities and related technical consultancy	Micro	Technology	2	P1 & P4	Relating	Access Provider	Supplier	Mutual Relationship
P14	2790: Manufacture of other electrical equipment	Micro	Technology	2	P5	Insulating	Risk Reducer	Supplier	Leadership Relationship
P15	6201: Computer programming activities	Micro	(Inter)nationalization	3	P2	Relating	Access Provider	Complementor	Mutual Relationship
P16	9002: Support activities to performing arts	Small	Opportunity	1	P15	Joining	Need creator	Complementor	Followship Relationship
P17	8411: General public administration activities	Large	Opportunity	3	NA	NA	NA	Complementor	Followship Relationship
P18	2620: Manufacture of computers and peripheral equipment	Large	Technology	1	P17	Joining	Access Provider	Complementor	Followship Relationship
P19	7490: Other professional, scientific and technical activities n.e.c.	Micro	Technology	2	P17	Joining	Accelerator	Complementor	Followship Relationship
P20	8541: Post-secondary non-tertiary education	Large	(Inter)nationalization	3	P10	Joining	Matchmaker	Complementor	Mutual Relationship
P21	7022: Business and other management consultancy activities	Micro	Opportunity	2	P20	Relating	Trust builder	Supplier	Leadership Relationship
P22	4652: Wholesale of electronic and telecommunications equipment and parts	Small	Technology	2	P1	Relating	Access Provider	Supplier	Leadership Relationship
P23	8541: Post-secondary non-tertiary education	Large	(Inter)nationalization	3	P20	Relating	Evaluation assistent	Complementor	Mutual Relationship
P24	8541: Post-secondary non-tertiary education	Large	(Inter)nationalization	3	P3	Relating	Matchmaker	Complementor	Mutual Relationship
P25	7112: Engineering activities and related technical consultancy	Micro	Opportunity	2	P16	Insulating	Scouter	Customer	Mutual Relationship
P26	6209: Other information technology and computer service activities	Micro	Technology	1	NA	NA	NA	Complementor	Followship Relationship
P27	6190: Other telecommunications activities	Large	Technology	1	P19	Joining	Accelerator	Supplier	Followship Relationship
P28	4651: Wholesale of computers, computer peripheral equipment and software	Small	Technology	3	NA	NA	NA	Supplier	Mutual Relationship
P29	2651: Manufacture of instruments and appliances for measuring, testing	Medium	Technology	3	NA	NA	NA	Supplier	Followship Relationship

Appendix 2: Matrix network Loratec

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
		P0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P2	P24	P25	P26	P27	P28	P29
1	P0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	1
2	P1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3	P2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	P3	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
5	P4	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	P5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	P6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	P7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	P8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	P9	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	P10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
12	P11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	P12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	P13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	P14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	P15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
17	P16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
18	P17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
19	P18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	P19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
21	P20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
22	P21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	P22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	P23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	P24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	P25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	P26	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	P27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	P28	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	P29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0