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**SCHOOL OF BUSINESS, ECONOMICS AND LAW**

Master Degree Project in Knowledge-based Entrepreneurship

# **Opportunity Identification from a Prior Knowledge Perspective**

The influences of prior knowledge in practice

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## **ABSTRACT**

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This thesis looks at opportunity identification from a prior knowledge perspective. Prior research suggests that prior knowledge influences an individual's ability to identify opportunities. The main purpose of this multiple case, qualitative study is to find evidence, in practice, for the influence of prior knowledge in opportunity identification. In doing this, the research aims to find areas of prior knowledge that aid the identification of opportunities.

**Key Words:** Venture creation, Entrepreneur, Opportunity, Identification, Recognition, Discovery, Prior Knowledge, Absorptive Capacity, and Information

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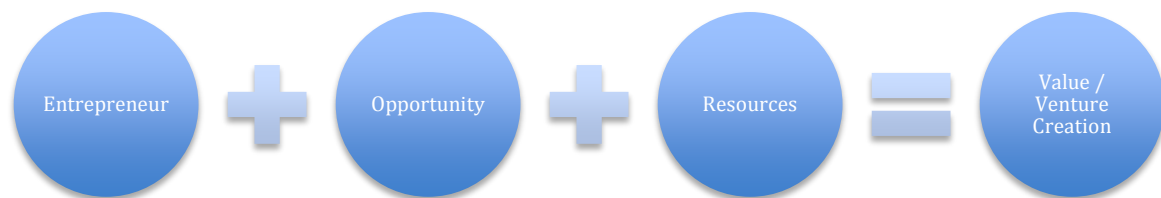
## INTRODUCTION

*This chapter will provide the background for writing the thesis, including a description of the research issue and justification of the research in relation to its contribution to the entrepreneurial field. In addition this chapter will present a theoretical starting point and concept clarifications for the research area. Finally I will present the aims of the thesis, and the research question before clarifying the delimitations of the thesis and the thesis' disposition.*

Opportunities are central to venture creation. It is suggested that an individual's ability to identify an opportunity is influenced by their prior knowledge. (Venkataraman, 1997) It stands to reason that a developing better understanding of how individuals identify opportunities will contribute valuable knowledge to the entrepreneurial research field and to society's ability to create ventures.

## Background

At its most elemental level the process of entrepreneurship involves; an entrepreneur, an opportunity and resources. (Singh P. , 2001) (Timmons & Spinelli, 2009) (Shane, 2003) (Murphy, 2011) (Sarasvathy, 2001)



*Model 1: A Basic Model of Entrepreneurship*

Entrepreneurship research has long since attempted to identify entrepreneurial characteristics; with research focusing on who the entrepreneur is, what an entrepreneur does and how an entrepreneur uses resources (Venkataraman, 1997). This research has sought to highlight the differences between entrepreneurs and non-entrepreneurs. The research attributes defining characteristics to the personalities of entrepreneurs, characteristics such as; high tolerance of risk, an ability to innovate, motivation to achieve, self-drive and creativity, along with the willingness to exploit an opportunity, leadership qualities and an ability to communicate (Timmons & Spinelli, 2009). In terms of what an entrepreneur does, research has focused on entrepreneur's habits and behaviours, more specifically how they respond to challenges and how they manage resources (Timmons & Spinelli, 2009).

Prior research into entrepreneurial opportunities can be divided into; the characteristics of opportunities, and the entrepreneur's ability to identify opportunities. Characteristics of the origins and nature of opportunities, whether they are created or discovered, what causes them and where they are from, has created several standpoints of entrepreneurial opportunities, from which further research has developed. (See for example; Schumpeter, 1934; Kirzner, 1985; Alvarez & Barney, 2007)

Prior research into an entrepreneur's ability to identify opportunities suggests that two broad categories influence the probability that particular individuals will identify particular opportunities; firstly the possession of prior knowledge needed to identify an opportunity,

and secondly the cognitive processes needed to value it. (Shane & Venkataraman, 2000) The research into the subject of prior knowledge and cognitive processes has often been conducted comparatively, in terms of why one individual can recognise an opportunity when another can't, and tends to be conducted from an opportunity perspective; as such central to the research is the question, "when presented with a potential standardised opportunity, why do entrepreneurs respond differently in their recognition and exploitation of it?" (See for example; Shane, 2000) In the existing research models, the opportunity has been presented to the individuals, as opposed to the individuals discovering the opportunity themselves. What is missing from the existing research is the study of prior knowledge in an organic opportunity identification process.

## **Research Issue**

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As opportunities do not appear in a pre-packaged form, the process of opportunity identification is far from trivial. (Shane, 2000) Prior research suggests that different people will discover different opportunities because they possess different prior knowledge. (Venkataraman, 1997) This research of prior knowledge, within the entrepreneurial opportunity is largely theoretical. As such there is potential for developing the research by addressing the concept of prior knowledge, as presented in the literature, in practice. This research moves away from a comparative research model and attempts to focus on the individual and the role of the individual's prior knowledge in the opportunities they identify.

## **Justification of the Research**

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One thing is clear; opportunities are central to entrepreneurial venture creation. Entrepreneurs exploit opportunities to create economic wealth. (Schumpeter, 1934) Thus, a better understanding of the role prior knowledge plays in how individuals identify opportunities could indicate ways in which an individual can better improve their chances of identifying an opportunity. An increased ability to identify opportunities could lead to a higher rate of venture creation and thus, societal development.

Central to improving the chance of an individual identifying an opportunity is finding which types of prior knowledge are important in opportunity identification, and where those types of prior knowledge originate. In order to do this it is important to understand how prior knowledge influences opportunity identification.

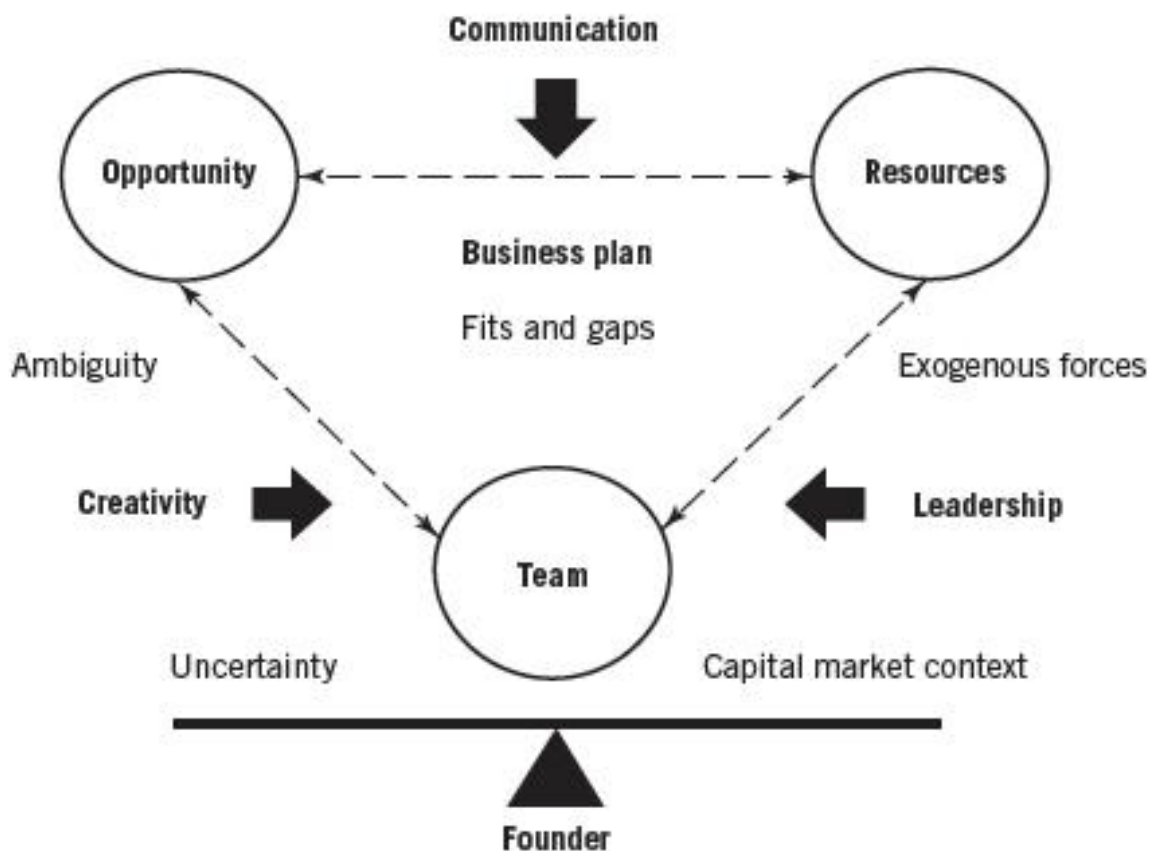
Knowing which prior knowledge is important to opportunity identification and the origins of this knowledge could enable individuals to expose themselves to knowledge more relevant to opportunity identification; in order to increase their chances of opportunity identification. Furthermore, a practical understanding of how prior knowledge influences opportunity identification could enable a more informed and active application of prior knowledge in a possible opportunity identification situation. Therefore, a better understanding of the practical application of prior knowledge occur could help us, as individuals, have more control over our opportunity identification.

## Theoretical Starting Point

*Several presumptions regarding entrepreneurship and the entrepreneurial process must be presented in order to develop a basis of entrepreneurship from which the research can move forward.*

As this research is positioned between the entrepreneur and the opportunity, it is important to clarify the juxtaposition of the two. In order to do that we must first consider entrepreneurship itself: entrepreneurship is an activity that involves the discovery, evaluation and exploitation of opportunities, to introduce new goods and services, way of organising markets and raw materials through organising efforts that previously had not existed. (Shane, 2000) (Shane, 2003)

This activity of entrepreneurship involves the combination of several elements. The research assumes an entrepreneurial process that incorporates three specific areas; entrepreneur, opportunity and resources. The Timmons and Spinelli (2009) model of The Entrepreneurial Process will be used as a starting point for entrepreneurship and considered as a baseline for entrepreneurial venture creation. The process suggests there must be equilibrium between the opportunity, resources and team, should any factor fall out of sync the process becomes imbalanced. This process also signifies the founder – the entrepreneur – as central to the entrepreneurial process. It is the founder who recognises the opportunity, leads the team and manages the resources. Each of these elements is considered vital to entrepreneurial venture creation.



*Model 2: The Entrepreneurial Process, (Timmons & Spinelli, 2009)*



## Concept Clarifications

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*To minimise the risk of misunderstandings a clarification of certain terms will be presented in this section.*

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### **Entrepreneur**

I will apply Shane & Venkataraman's (2000) definition of an entrepreneurial individual, "individuals who discover, evaluate and exploit opportunities". In this sense, it becomes imperative to consider what is a valid entrepreneurial opportunity, to truly consider who is an entrepreneur.

### **Entrepreneurial Opportunity**

Singh (2000) states that, "an entrepreneurial opportunity should be defined as a feasible, profit-seeking, potential venture that provides an innovative new product or service to the market, or improves in an existing product or service in a less than saturated market". As discussed by Singh this definition is intentionally broad, it allows for a several types of opportunities. Feasible is considered to mean physically possible and the use of profit seeking enables the definition to apply post hoc to opportunities which have not yet made, or are considered to have failed to make, a profit.

In this sense a venture does not necessarily have to mean forming a new firm, but does require the creation of a new way of exploiting an opportunity - a new means-ends framework. The new means-ends framework leads the entrepreneur to come up with a way to organise the exploitation of the opportunity they have identified. Imperative to the definition is that the means-ends framework must be considered to be somewhat innovative. This does not have to be innovation to the extent of creative destruction (Schumpeter, 1934). "The entrepreneurial process can involve innovation which is much milder, such as entering a new market." (Shane, A General Theory of Entrepreneurship. The Individual Opportunity Nexus., 2003) As such the opportunities discussed within this thesis are not discussed from the point of innovative destruction but simply, a somewhat new idea or new market.

## Objective

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The objective of this research is to study the process by which individuals identify opportunities from a prior knowledge perspective. I look historically at the opportunity identification of entrepreneurs in order to extract evidence of prior knowledge in the identification of an opportunity. In doing this, the research aims to find areas of prior knowledge that aid in the identification of opportunities. In order to come up with these areas of prior knowledge, it is necessary to look into the way in which an individual's prior knowledge influences the process of opportunity identification. By probing this concept at the individual level, I seek to enrich our understanding of how individuals recognise opportunities from new information and as such how prior knowledge influences venture creation.

## Research Question

With the above introduction and objective I arrive at the following research questions:

*How does prior knowledge influence opportunity identification in practice?*

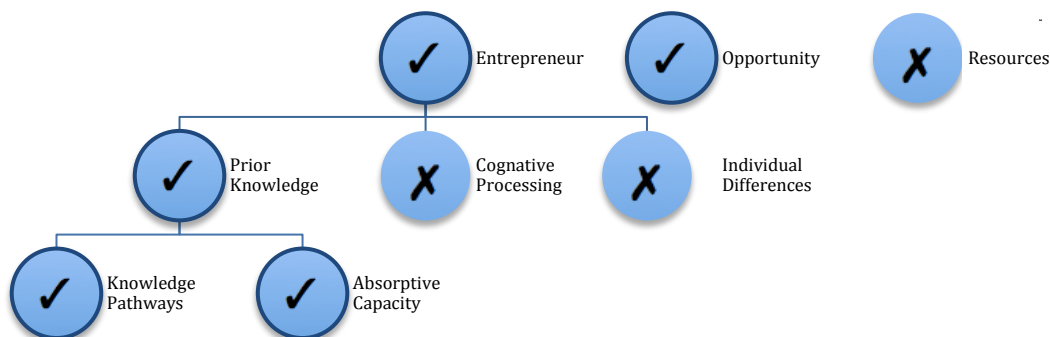
This question will first be considered as part of the literature review. I will then answer the question by examining entrepreneur's use of prior knowledge in the opportunity identification process of their ventures. In order to reveal a deeper understanding of prior knowledge in the opportunity identification process, I will look to identify evidence for absorptive capacity and the influence this has had on the entrepreneur's ability to identify opportunities in new information.

It is important to offer the following sub questions in order to gain a new understanding of prior knowledge in opportunity identification; as such the thesis aims to answer:

*Which areas of knowledge influence opportunity identification?  
Where does this knowledge come?*

## Delimitations

The research is set between the individual and the opportunity. As such resources will not be discussed in the research. The role of prior knowledge in the individual's opportunity process is central to the research; however this will be limited to the opportunities that have been exploited as ventures. In this sense, opportunity identification is used to insinuate venture creation. I can't with any certainty look at the missed or unrecognised opportunities. Cognitive processing is considered to be related to prior knowledge and while an individual's cognitive processing is interesting from a prior knowledge perspective it is not central to the research, within the thesis the concept of cognitive processing is largely standardise within absorptive capacity, this is largely due the similarity of the two concepts and the limitations foreseen in objectively analysing concepts such as intelligence, creativity, perceptive ability and an individual's consideration of risk; which are most related to cognitive processing. Similarly individual differences are not incorporated within the study.



Model 3: Visual representation of the delimitation of the research area.

## Disposition

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This study will be presented as follows. First, the Literature Review will be presented containing an overview of the relevant theories and frameworks. Beginning broadly with theory related to opportunity, the Literature Review will narrow into more detailed theory fundamental to the research. An understanding of cognitive processing is given in order to provide a foundation for the concepts behind prior knowledge and absorptive capacity. Following its presentation the Literature Review will be analysed, frameworks developed and key assumption and conclusions drawn.

Next, the Methodology will be presented and reflected upon. At this point I will focus on how the research will be conducted and the justification for proceeding in such a way.

The Empirical Data will be presented. This section is dedicated to presenting the data gathered during the interviews; it will focus on highlighting the prior knowledge, new knowledge and opportunity process of each of the entrepreneurs.

In the Analysis, frameworks will be utilised in order to analyse the empirical findings. A discussion will follow, examining how each of the entrepreneurs used prior knowledge in their identification of their opportunity and where this prior knowledge originated. In general this chapter will set the foundation for answering the research questions and concluding the research.

The Conclusion will bring together the analysis and discuss the findings of the research. It will provide a recommendation regarding which areas of prior knowledge have been seen to aid the opportunity process and it will explore the implications of the study on future research.

# LITERATURE REVIEW

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*In order to develop a well-rounded framework from which to progress into a more detailed discussion of prior knowledge it is necessary to first present a basis for the entrepreneurial opportunity identification. In this section I will present relevant literature that creates a foundation for the study.*

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## Introduction to Literature Review

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There are several questions which this literature review aims to bring some clarity to: Firstly, what is an opportunity, where do they come from and what assumptions are made about opportunities in the thesis?

In order to address these questions I will briefly discuss Alvarez & Barney's (2007) work on opportunities, which leads to the views of Schumpeter (1934), and Kirzner (1997), regarding the origins of opportunities. Schumpeter and Kirzner's views are considered to be somewhat opposing views. I will highlight the concepts of opportunity and opportunity origins that the thesis aligns with.

Secondly, how do individuals identify opportunities?

This question will be clarified with the presentation of Baron's (1991) Pattern Recognition Model of Entrepreneurial Opportunity. Baron's Model is well cited in the literature, it is a combination of several theories. Baron's framework highlights three concepts considered within the literature to be central to opportunity recognition. These concepts set a basis for the role of prior knowledge in the opportunity identification process, which leads to the third question.

What is prior knowledge, how does it affect opportunity identification and in what ways can prior knowledge be categorised?

The concept of prior knowledge first requires an understanding regarding knowledge and the differences between knowledge and information. I will expand on the concept of knowledge by referencing Mokyr (2002) and state the assumptions made within the thesis regarding a differentiation between prior knowledge and new information. The concept of prior knowledge will be developed in reference to a study by Shane (2000), who conducted an experiment related to individuals' prior knowledge in the opportunity identification of a new technology. This study will confirm that prior knowledge affects an individual's ability to identify an opportunity. From this I will discuss the way in which the study was able to conclude this affect. Shane suggests three categories of prior knowledge that will be presented in order to help categorise prior knowledge during the research, I will explain how these categories are adapted to better fit the concepts within the thesis. These categories are considered to provide a useful frame from which to decode prior knowledge and new information during the research's analysis, specifically in relation to the research question: *Which areas of prior knowledge influence opportunity recognition?* Following this deepened understanding of prior knowledge, is it possible to develop an outline for where knowledge and information comes from, which leads to the fourth question:

Where does prior knowledge and information comes from?

At this point it is important to remember that prior knowledge was once new information, and in that sense the literature used to answer this question will be taken from Shane's (2000) *A General Theory of Entrepreneurship – The Individual Opportunity Nexus*, which presents how an individual's access to information influences their ability to identify opportunities. I will present a short discussion of Shane's (2000) work on access to information, including its adaptation to the thesis and conclude with possible additional sources of new information. This section leads to a basis of what might be found in the research, the question is incorporated within the research's objective in order to draw clearer conclusions related to which areas of prior knowledge influence opportunity identification.

Fifthly, how does prior knowledge help an individual to recognise opportunities?

This question aims to bridge the gap in our understanding between knowing prior knowledge and implementing it to identify an opportunity. The information presented here will be central to the research's interpretation of prior knowledge's influence on opportunity recognition; *how does prior knowledge influence opportunity recognition?* In order to answer this question I will again cite Shane (2003), who has drawn on several, well-established, researcher's work to further his framework of the relation between individuals and opportunities. This will lead to the concept of absorptive capacity, which provokes the final questions in the literature review:

How can absorptive capacity be defined and what presumption does the thesis make about absorptive capacity?

In order to formulate the concept of absorptive capacity, as applied in this thesis, I will refer to Cohen & Levinthal's (1990) research on the subject, which is widely considered as the origin of absorptive capacity research. Following this I will present a short interlude into the psychological elements of absorptive capacity, which will highlight the presumptions regarding the generation of absorptive capacity from prior knowledge and also highlight the justification of the application of absorptive capacity at an individual level.

Lastly, the concept of absorptive capacity implies feedback loops in prior knowledge and new information, I will present an overview of the presumptions made here and discuss the concept of knowledge pathways. I will then present the three frameworks drawn from the literature that will be implemented in the study, and the proposition of the thesis.

## 1.1 What is an opportunity?

The definition of opportunity used within this thesis is, “a feasible, profit-seeking, potential venture that provides an innovative new product or service to the market, improves in an existing product or service in a less than saturated market”, (Singh 2000) To clarify the concept of opportunity identification further, it is considered as two parts: discovery and recognition.

*Opportunity Discovery* - This terminology refers to the opportunity pre analysis, the initial point when an entrepreneur entertains an idea to form a venture based on a perceived opportunity, it could likewise be considered as an idea.

*Opportunity Recognition* - This terminology refers to the opportunity post analysis, the point in which an opportunity is considered by the entrepreneur to be an *entrepreneurial opportunity* and as such is a feasible, profit-seeking, potential venture. Similarly the distinction is drawn in the definition by Baron (2006) where opportunity recognition is, “the cognitive process (or processes) through which individuals conclude that they have identified an opportunity.”

In this sense, opportunities are considered to be first *discovered* as an idea or concept, then *recognised* to be a true possible venture. The Singh (2000) definition of opportunity allows for the differentiation of a recognised opportunity and an idea (or opportunity discovery), where the idea is considered as a potential opportunity, which is that the idea should be evaluated in order to become a recognised opportunity. I.e. If an idea is not feasible, it can't be an opportunity; if it has no potential for venture creation it can't be considered an opportunity. While theoretically an idea may pass through, for example, a market or customer analysis before being recognised as an opportunity, in practice it is accepted that this process is much more iterative and that discovery and recognition may occur in parallel to one another or simultaneously. Often the process of opportunity identification is referred to only as opportunity discovery. I believe making this distinction is helpful, especially when considering the thesis will touch upon the relatedness of prior knowledge to both the discovery and recognition of opportunities, thus the combination of discovery and recognition is considered to be opportunity identification.

## 1.2 Where do opportunities come from?

The concept of opportunity discovery is built on the assumption that opportunities exist independently and are waiting to be exploited. As opposed to opportunity creation, which assumes opportunities are created by the actions of the entrepreneurs. (Alvarez & Barney, 2007) Research abiding by the opportunity discovery theory assigns the task of opportunity identification to the potential entrepreneur. It is the role of the entrepreneur to identify and be willing and able to exploit the opportunities. (Baron R. , 2006)(Kirzner, 1997)

In discovery theory, opportunities are believed to arise from exogenous shocks (Schumpeter, 1934) and information asymmetries (Kirzner, 1997) in the market. The exogenous shock of the Schumpeterian view describes how, “changes in technology, politics, society, regulation, and other factors generate new information about how resources might be used differently. This information changes the price for resources, thereby allowing economic actors who have early access to information to create products or services and sell them at an entrepreneurial profit.” (Schumpeter, 1934) (Shane & Eckhardt, 2003) (Shane & Venkataraman, 2000) The information asymmetry view of Kirzner (1997) describes that, “individuals form beliefs – in the absence of price - in response to information they possess,

because these beliefs are influenced by a wide variety of ceaselessly changing factors they are never 100% accurate. As a result, market actors make mistakes in their decisions, creating shortages and surpluses of recourse”. Individuals who are alert to these mistakes can exploit them as opportunities. (Kirzner, 1997)

Based on Kirzner’s (1997) theory, opportunities exist because different people possess different information. Incomplete information means people must guess one another’s beliefs, which causes errors and misallocations of resources. Given that information asymmetry is needed for entrepreneurial opportunities to exist, everyone in society must not be equally likely to recognise all opportunities. Rather, only a fraction of a population is able to recognise any given opportunity at any particular point in time. (Kirzner 1997)

### **1.3 What assumptions are made about opportunities in the thesis?**

This thesis is based the premise that opportunities exist and are waiting to be discovered. In this sense, the entrepreneur’s ability to identify an opportunity depends on their ability to comprehend new information from the external environment; this aligns well Kirzner’s (1997) view of opportunity origin.

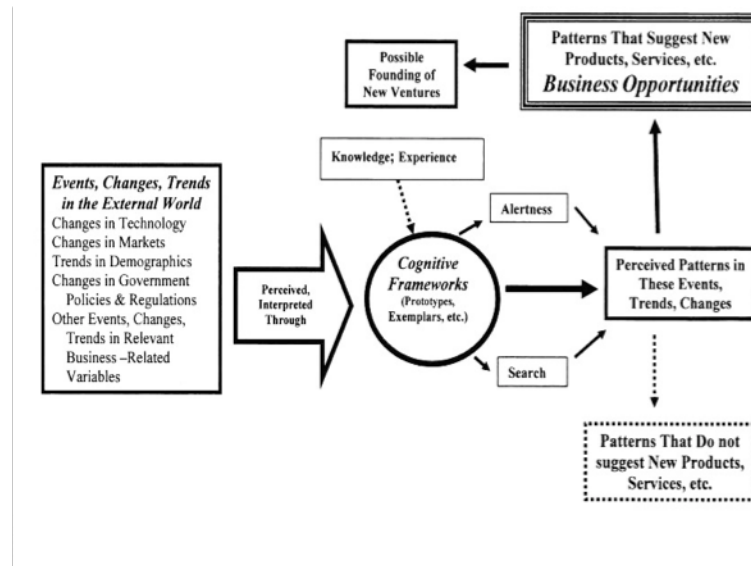
Related to this, I do not consider there to be a clear set of entrepreneurial characteristics that define an entrepreneur. While there may be desirable attributes, which make an individual, better or worse suited to being an entrepreneur. I do not subscribe to the view that all entrepreneurs have the same, or even particularly similar, characteristics. Central to this belief, when assuming opportunities exist, it is highly unlikely that a specific characteristic enables an individual to be able to recognise them (all the opportunities) when an individual without this characteristic can’t. Thus, I suspect that once the surface is scratched on the broad variety of ‘entrepreneurial characteristics’, there are more detailed idiosyncratic differences that enable one individual to recognise an opportunity when the other can’t. Thus, when an individual does not have the characteristics (for lack of a better word) to recognise one opportunity, it doesn’t mean they are not an entrepreneur, or a potential entrepreneur, but simply that that was not their entrepreneurial opportunity. A different opportunity – better suited to their characteristics - may prove them to be entrepreneurial. Thus, “it is improbable that entrepreneurship can be explained solely by reference to a characteristic of certain people independent of the situations in which they find themselves”, (Venkataraman, 1997). As such, when it is discussed that some individuals and not others engage in entrepreneurial behaviour, we are actually describing the ability of an individual to respond to a specific opportunity or situational cues of opportunities, not a defining characteristic that differentiates some individuals from others across all situations. (Venkataraman, 1997)

### **2.1 How do individuals identify opportunities?**

Baron’s (1991) Pattern Recognition theory draws from prior research to propose that entrepreneurs use active search (Shane, 2003), entrepreneurial alertness (Kirzner, 1985) and prior knowledge (Shane, 2000) in order to identify opportunities in the environment. Baron’s concept of pattern recognition is defined as, “the processes through which specific persons perceive complex and seemingly unrelated events as constituting identifiable patterns...the patterns they perceive then become the basis for identifying new business opportunities”. The concept of active search refers to the deliberate search for possible opportunities, via new information. Entrepreneurial alertness is defined as, “alertness to changed conditions or to overlooked possibilities”, (Kirzner, 1985) and refers to the receptiveness of an individual to opportunities. Prior knowledge, by Baron’s definition, represents the information gained through past experiences; “a rich and varied life experience (especially through varied

business and work experience) can be a major plus for entrepreneurs in terms of recognising opportunities.” Prior knowledge, especially knowledge of specific markets or industries is believed to play an important role in the recognition of opportunities. (Baron, 2006)

Baron proposes that opportunity recognition is a cognitive process that involves recognition of complex patterns, central to the concept is the following, “individuals notice various events in the external world and then utilise cognitive frameworks they have developed though experience to determine whether these events are related in any way – whether they form a discernable pattern”. This is reflective of the interconnectedness between prior knowledge and new information in the opportunity process.



Model 4: Baron (1991) Pattern recognition in Opportunity Recognition.

Baron presents two cognitive frameworks for pattern recognition in emergent opportunities: Prototypes and Exemplar. The Prototype model suggests that individuals use prototypes for recognising patterns. In this sense, prototypes are “idealised representations of the most typical member of a category (a class of object or events that seem to belong together)”. Thus, new encounters with objects and events are categorised based on the individuals existing prototypes. The Exemplar model suggests that individuals use specific knowledge as opposed to idealised prototypes. In this model a new object or event would be compared to specific examples (exemplars) of relevant concepts already stored in memory.

Prototypes and Exemplars differ in that Exemplars do not require a singular idealised prototype concept but rather compare new concepts to several examples of the concept already in their memory. The exemplar model fits well with opportunity recognition as Shane’s (2000) findings suggest entrepreneurs look for opportunities in areas where they are already knowledgeable and have many exemplars.

From Baron’s model the thesis incorporate the following presumptions regarding an individual’s opportunity identification: individuals generate cognitive frameworks from their prior knowledge (and experiences), these frameworks provide the individual an ability to comprehend new information, from active search and/or alertness. What becomes clear from Baron’s pattern recognition frameworks is the link between an individual’s prior knowledge and the ability to comprehend new information. The ability to generate cognitive frameworks lies with the prior knowledge an individual possesses. As these cognitive frameworks are central to active search and an individual’s alertness, an individual’s prior knowledge influences their search and alertness. Entrepreneurs use prior knowledge to create exemplar or prototypes to which new information can be evaluated against, or a pattern recognised.



### 3.1 What is prior knowledge?

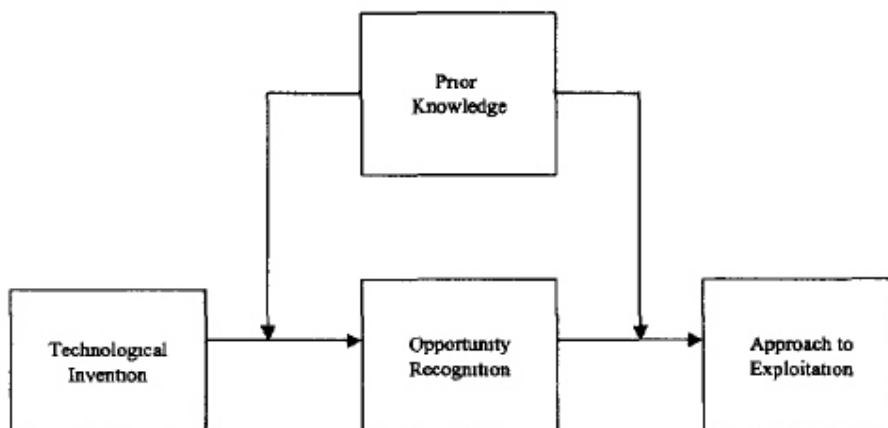
To expand upon Baron's (1991) definition of prior knowledge, where prior knowledge represents the information gained through past experience, I will further describe the concept of knowledge:

Knowledge can be considered in two parts; propositional and prescriptive. (Mokyr, 2002) Propositional knowledge is the knowledge of facts, science and natural law. At an individual level this knowledge can be considered somewhat subjective; if a person believes what they know to be true, it can be considered a part of their propositional knowledge, even if the knowledge's validity could be questioned. Prescriptive knowledge, which is sometimes referred to as procedural knowledge, describes knowledge related to how something is done, the skill needed, in this sense it is the application of theory. The two types of knowledge are intrinsically interlinked; new prescriptive knowledge is created when propositional knowledge is better understood. I.e. a better understanding the underlying facts, science or natural law creates further knowledge of how something works or indicates the skills needed to make it work. (See Appendix I for visual representation of prescriptive and propositional knowledge as adapted from Mokyr (2002)) Using this as a basis for the understanding; the thesis will incorporate a view of prior knowledge where; an individual's prior knowledge can be considered to be the combined matter of all the propositional and prescriptive knowledge contained in the individual's mind (I.e. everything an individual knows). (Adapted from Mokyr, 2002)

In order to preserve clarity between prior knowledge and possible knowledge, I refer to information that is not yet known to the individual as new information. Where prior knowledge is considered to have been new information that was comprehended by the individual. I.e. new information that makes no sense to the individual can't become part of the individual's prior knowledge. New information that is understood by the individual becomes prior knowledge. Thus two terms are used; prior knowledge and new information. Though the moment at which information becomes knowledge is admittedly not clear cut, this differentiation must be made for the comprehension of the thesis.

### 3.2 How does prior knowledge affect opportunity recognition?

Shane (2000) studied the concept of prior knowledge within opportunity discovery. In his study he looked at how several individuals would implement a given technology within a venture. He concluded that differences in prior knowledge influence an individual's ability to discover opportunities, to exploit new technology; he also found that this prior knowledge influenced the individual's approach to exploitation of the opportunity.



Shane's findings indicated that when presented with a given technology, the participant's prior knowledge influenced how they each applied that knowledge within a venture. Each participant developed a unique application of the technology and stated that they linked the technology to something they already knew about, (Ie. they knew of a problem and realised the technology could be implemented as a solution) because of this Shane was able to conclude that:

- Individuals are not equally likely to recognise a given entrepreneurial opportunity.
- People can and will discover opportunities without actively searching for them.
- Individuals recognise opportunities based on information they possess.

Shane's (2000) conclusions are in line with the theory of Kirzner (1997). Shane (2000) suggests that individuals do not discover opportunities through search, but through recognition of the value of new information, which they receive through other means. It is believed that the discovery process (without search) explains why entrepreneurship is not solely a function of individual differences (characteristics) or a willingness to take action. (Kirzner, 1997) Shane concluded that some individuals are more likely than others to discover opportunities because they have access to more or different information. While the information access may be highly technical or scientific, it need not be. It could be information about local demand or underutilised resources. (Casson, 1982)

Shane's study provides confirmation to the understanding of prior knowledge in the opportunity process. The ability of some individuals to recognise new opportunities without search – where other don't – indicates that an individual's prior knowledge influences the individual's ability to comprehend new information. Ie. An individual's prescriptive knowledge of where to apply a technology, was created when propositional knowledge of how the technology would work in a particular setting, was better understood...due to an individual's prior knowledge. To clarify, an individual make connections between the new information (the technology) to their prior knowledge (propositional/prescriptive). This enables the individual to identify usages for that new information. As the individuals differed in their prior knowledge the outcomes of where to apply the technology differed, thus the ventures created with the technology differed. Shane's (2000) research carries a strong argument to suggest that prior knowledge significantly impacts the recognition of opportunities.

### **3.3 In what ways can prior knowledge be categorised?**

Shane (2000) presents three specific areas of prior knowledge that he found to influence the individual's opportunity discovery.

- People's prior knowledge about markets will influence their discovery of which markets to enter to exploit a new technology.

New information about a technology might be complementary with prior knowledge about how particular markets operate, leading the identification of the entrepreneurial opportunity to require prior information about those markets. Important knowledge about markets might include information about supplier relationships, sales techniques, or capital equipment requirements that differ across markets. This prior information can enable an individual to discover an opportunity – a market - in which to use a new technology. (Shane, 2000)

- People's prior knowledge about how to serve markets will influence their discovery of how to use a new technology to serve a market.

New information about a technology might be complementary with prior knowledge about ways to serve markets. An individual's ability to recognise an opportunity may be influenced by how the new technology could be used to create a new product or service. A new technology might change a production process, allow the creation of a new product, provide a new method of distribution, permit new materials to be used, generate new sources of supply, or make possible new ways of organising. (Schumpeter, 1934) Recognising these different dimensions is difficult if the individual has no prior knowledge of how they relate. (Shane, 2000)

- People's prior knowledge of problems will influence their discovery of products and services to exploit a new technology.

New information about a technology might be complementary with prior knowledge about a problem. In this sense, the recognition of the opportunity requires prior knowledge of a customer need. Individuals who do not have the prior knowledge of the customer need do not recognise the solutions to those needs when the solutions come along. (Shane, 2000)

These three areas of prior knowledge provide a framework from which to categorise knowledge, it is necessary to adapt the categories to allow for *new information* that is not based on new technology, in this sense I have adapted this framework to consider new technologies, simply as *new information*. An example of this would be: the adaptation of prior knowledge about how to serve markets will influence their identification of how to use *new information* to serve a market. This better enables a discussion of individuals using new information to create a solution to serve a market, as opposed to being bound to using the terminology *new technology* to serve a market.

As these categories provide a basis from which prior knowledge can be coded and categorised, they should aid in the analysis of the research when evaluating: *Which areas of prior knowledge influence opportunity recognition?*

#### **4.0 Where does new information and prior knowledge comes from?**

In order to delve deeper into the concept of prior knowledge it is important to gain an understanding of where prior knowledge may come from, this deeper understanding should indicate what might be found when researching the sub objective: *Where does this prior knowledge come from in practice?*

The framework presented is taken from Shane's (2003) Individual Opportunity Nexus Framework. The framework is designed as a framework to explain how individuals discover opportunities; I will develop it to help frame the origins of new information, which create idiosyncratic differences in individual's prior knowledge. Thus, where Shane used the framework to show how individuals differ in their access to information, this access to information also changes our prior knowledge and our new information. This is how the framework will be implemented within this thesis.

Shane develops three mechanisms that increase the likelihood of an individual gaining access to information; life experience, including an individual's jobs and the variation in their experience; social network, which incorporates the access to new information gained through other individuals and; search process, which refers to deliberately looking for new information.

## **Life Experience**

Job function – A person’s job function influences their likelihood of opportunity discovery within their field of work. Additionally access to information about opportunities can vary depending on the person’s job function.

- Job functions with privileged access to information are believed to facilitate the identification of opportunities.
- Research and developmental roles are also highly regarded in terms of opportunity recognition due to the role of research and development as sources of opportunities.
- Marketing is considered a key job function for access to customer preferences.

Variation in experience - A wide variety of life experiences suggests a higher ability to find ‘the missing piece’ of a puzzle in order to recognise an opportunity.

- Past research suggests the higher number of job changes a person has the more likely they are to discover an opportunity.
- This variation is also believed to be applicable to experience in geographical areas, ie. the more places a person has lived the more variation in experience, and the greater likelihood of discovering opportunities.

## **Social Networks**

Social ties – Access to information is also gained through others.

- Information needed to discover an opportunity is believed to be access best via a varied network of individuals.
- Strong and diverse ties are believed to be beneficial to information searching and opportunity identification.

## **Search Process**

Information Search – ”Individuals are more likely to find information that is useful to the discovery process through deliberate search than through random behaviour”. Superior information processing ability, search techniques, or scanning behaviour makes some individuals more able or willing to discover opportunities than others. (Shane, 2003)

- Searching relevant private information is considered a central aspect of an optimal strategic information search.

While it is sometimes difficult to pinpoint the origin of an individual’s knowledge what becomes clear from Shane’s Access to Information framework is that a broader cache of experiences can lead to a more established prior knowledge. Central to this concept within opportunity identification is the ability of an individual to access new information that is *valuable*, in this sense, access to information which is private or privileged, is considered to be more valuable to the opportunity identification process than information which is easily accessible.

In order to further develop this framework it is important to consider Shane’s (2000) conclusion, that individuals are able to discover opportunities without search. In this sense it must be stated that new information can be gained serendipitously, (Murphy, 2011) in that the individual may not be looking for an opportunity or for new information when they come across it. Further to this new information can come from a vast variety of areas that would fall under the heading life experiences, but which are not presented by Shane. One which is interesting to discuss is the concept of education, which could be considered either active search or serendipitously. The choice to apply to higher education may be viewed as an

active search for knowledge, in that the individual applies to gain new information in a specific subject area, (ie. active search for new information within language, computing, mathematics, science) but also somewhat serendipitous in that the decision to enter education on a whole may not be the pursuit of specific new information especially in compulsory education, to clarify if an individual wanted to actively search for new information in mathematics, it may not be the most obvious decision to enter higher education in this field but perhaps to independently study a more specific area of mathematics, searching for new information in books, on the internet etc.

This question – where does information and knowledge come from - is rather endless, within the thesis it is incorporated within the research question in order to draw clearer conclusions about where prior knowledge and new information, which are valuable to opportunity identification, come from in practice.

## **5.0 How does prior knowledge help an individual to recognise opportunities?**

In order to finalise the development of the literature review, regarding prior knowledge. I will now look more carefully at the connection between prior knowledge and opportunity recognition. In this section what is interesting is how prior knowledge enables an individual to comprehend new information, which then leads to opportunity discovery, recognition and venture creation. The information presented here will be central in the research's interpretation of prior knowledge's influence on opportunity recognition; *how does prior knowledge influence opportunity recognition?*

Researchers argue that individuals are more likely to discover opportunities if they have a better ability than others to recognise an opportunity in the new information they receive. (Shane 2003) As we have seen previously in the literature review, Shane (2003) states that an individual's ability to recognise opportunities in the information they receive is effected by the prior knowledge they possess. "Prior knowledge provides an *absorptive capacity* that facilitates the acquisition of additional information about markets, technologies and production processes, which enhances the ability to formulate new means-ends frameworks in response to new information", (Shane, 2003) The knowledge a person possesses is believe to influence the individuals tendency to discover opportunities in two ways:

- Prior knowledge frames new information, thereby enhancing the ability to interpret it in a useful way.

This theory is relatable to Baron's (1991) Pattern Recognition Model, where the frames would be represented by the cognitive frameworks (exemplar, prototypes etc.) The individual's ability to interpret the information in a useful way would be the individual's absorptive capacity to comprehend the information.

- Prior knowledge influences the ability to see solutions when the individual encounters problems that need to be solved.

Thus, prior knowledge influences an individual's ability to interpret the information and thus to see the problem, that needs to be solved, within the new information. In this sense an individual's ability to comprehend information is the absorptive capacity to see the problem that is represented in the new information. As opposed to seeing only new information and not being able to spot the problem represented within it.

Shane (2003) presents further understanding of how prior knowledge influences the identification of opportunities. It is worth noting that within the thesis the concept of cognitive processing is largely standardised within absorptive capacity, this is largely due to the similarity of the two concepts and the limitations foreseen in objectively analysing concepts such as intelligence, creativity, perceptive ability and an individual's consideration of risk; which are most clearly related to cognitive processing. None the less it is interesting to take into account the concept of cognitive processing at a surface level in order to balance the concept of absorptive capacity.

Regarding cognitive processing Shane (2003) states that because discovery requires individuals to formulate new means-ends frameworks in response to information that they receive, an individual's cognitive processing of the information can cause differences (between individuals) in ways that the information is processed. While this is sometimes referred to as Kirzner's (1997) alertness to opportunity, Shane develops four categories from which he discusses the cognitive processes related to the recognition of opportunities:

*Intelligence* - because the entrepreneur must gather and process information to identify an opportunity a person's general intelligence is believed to influence the ability to recognise opportunities inherent in the information with which they are confronted.

*Perceptive ability* - literature suggests that an ability to predict and perceive possible futures can help an individual recognise opportunities. This concept is also related to the gut feeling or intuition felt when considering a possible opportunity.

*Creativity* - establishing a new means-ends relationship is believed to require creative ability and imagination, this is due to the necessity for this new relationship involving the identifying and structuring of novel solutions.

*Not seeing risk* - as entrepreneurship involves the consideration of an opportunity in response to information, many authors argue that the individuals who see potential as opposed to risk in an opportunity are more likely to discover opportunities.

As absorptive capacity is generated from prior knowledge, and prior knowledge influences an individual's cognitive processing there differentiation of absorptive capacity and cognitive processing becomes unclear in the literature. To refer back to Baron's (1992) Pattern recognition Model, which proposes opportunity recognition via cognitive frameworks, the cognitive frameworks represent much more closely an absorptive capacity than cognitive processing (when cognitive processing is considered as intelligence, perception, creativity and not seeking risk) as absorptive capacity is central to comprehending new information as are the cognitive frameworks. Cognitive processing alone does not ensure an individual is able to comprehend the information, but an absorptive capacity would much more likely ensure the new information is comprehended. I.e. Intelligence does not without exception, mean an individual comprehends new information, but an absorptive capacity in a given subject area created via prior knowledge (or an intelligence in that subject) would better portray the comprehension of the new information. It is important to note also that Shane (2003) presents Cognitive Processing as a subset of Absorptive Capacity, which suggests what while his research explores this area further; he also makes an assumption of cognitive processing as an incorporation of absorptive capacity.

## 6.1 How can absorptive capacity be defined?

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Cohen & Levinthal (1990) define absorptive capacity as the ability to value, assimilate and exploit new knowledge:

*Value* - absorptive capacity may enable better understanding and evaluation of the importance of new information.

*Assimilate* - (accumulated prior knowledge) absorptive capacity increases the ability to absorb new knowledge.

*Exploit* - absorptive capacity incorporates the ability to apply new information to commercial ends.

The ability to exploit new information is a critical component of opportunity identification, and that ability to evaluate and utilise outside knowledge is largely a function of the level of prior related knowledge. At an elemental level this prior knowledge includes basic skills, or even a shared language but may also include knowledge of the most recent scientific or technological development in a given subject. Thus prior knowledge confers an ability to recognise the value of new information, assimilate it and apply it to commercial ends, collectively these abilities constitute absorptive capacity. (Cohen & Levinthal, 1990)

There are several factors related to absorptive capacity which are highlighted in the literature: Firstly, prior knowledge provides a robust basis for absorptive capacity and stimulates creativity by enabling an individual to associate – and create linkages between – prior knowledge and new information. (Cohen & Levinthal, 1990) Secondly, new information may be too distant from an individual's existing knowledge base to be either appreciated or assessed. Thus, individuals can be locked out to new information (technology), if they do not have the existing prior knowledge from which to accurately value the new information. (Cohen and Levinthal 1990)

In this sense, it can be argued that effective knowledge assimilation requires the ability to decode the information (Mokyr, 2002), using existing prior knowledge. Thus, due to the nature of prior knowledge, there is a trade-off between diversity and commonality of knowledge. Becoming too specialised could hurt the diversity of future absorption, but will increase the ability to become more specialised. Similarly, learning by doing may increase expertise in one area and reduce experimentation and alternative ideas (Cohen and Levinthal 1990). In this sense knowing where to look for information is crucial to knowledge assimilation, building a strong network of internal and external relationships increases awareness of other's capabilities and knowledge (Cohen and Levinthal 1990).

Furthermore, a high absorptive capacity implies the ability to exploit new information regardless independent of past performance. (Cohen & Levinthal, 1990) Thus, the development of absorptive capacity in itself would be beneficial to the entrepreneurial individual, the more an individual develops their prior knowledge the better they are able to value and assimilate new knowledge.

## 6.2 What presumptions are made about absorptive capacity?

Cohen & Levinthal (1990) research is based on absorptive capacity at the firm level, in an R&D environment. Within this thesis absorptive capacity is applied to reflect an individual level in the context of opportunity identification. Justification for this lies within the original research by Cohen & Levinthal (1990) who highlight that, individual level absorptive capacity is an important antecedent to firm level absorptive capacity, there is no firm level absorptive capacity without individual level absorptive capacity. Therefore the learning behaviour of individuals and the choices they make in respect to training, education, knowledge sharing etc. are important to the absorptive capacity of the firm. Volberda, Foss & Lyles (2010) reiterate this by highlighting that absorptive capacity is a multi-level construct and should be studied at the individual, unit, firm and inter-firm level of analysis. Thus it is clear that absorptive capacity is believed to occur on an individual level and that studying absorptive capacity at this level is not without justification. Further to this, Lane, Koka & Pathak (2006) suggest that the use of absorptive capacity in terms relevant to the R&D context is a limiting assumption of the literature. They believe, this narrow focus has limited the generalisation of the studies insights. This limited focus is believed to have originated from Cohen & Levinthal's (1989 & 1990) studies having an R&D focus, and as such few researchers have examined the role of absorptive capacity in other types of business related knowledge.

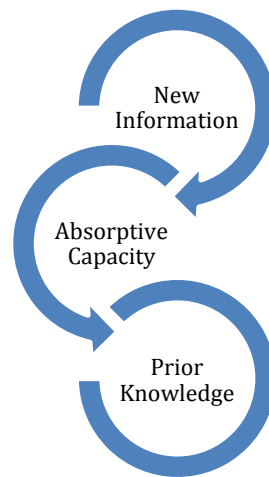
What has been overlooked thus far is precisely how prior knowledge generates absorptive capacity. As this generation of absorptive capacity concept tends to fall away from the business research domain, and is more closely associated with psychology, it is simply assumed to be an accurate concept. There are however several points which can be presented from the literature which suggest that this assumption – that prior knowledge generates absorptive capacity - is justified.

- Research on memory development suggests that accumulated prior knowledge increases both the ability to put new knowledge into memory – assimilate new information - and the ability to recall and use it. (Cohen & Levinthal 1990)
- Research suggests that memory development is self-reinforcing in that the more objects, patterns and concepts that are stored in memory, the more readily new information about these constructs is acquired and the more agile the individual is in using them in new settings. (Bower & Hilgard 1981) (Cohen & Levinthal 1990)
- Several psychologists suggest that prior knowledge enhances learning because memory - or the storage of knowledge - is developed by associative learning in which events are recorded into memory by establishing linkages with pre-existing concepts. Thus, it is suggested that the breadth of categories into which prior knowledge is organised, the differentiation of those categories, and the linkages across them permit individuals to make sense of and, in turn, acquire new knowledge. (Bower & Hilgard 1981) (Cohen & Levinthal 1990)
- The notion that prior knowledge facilitates the learning of new related knowledge can be extended to include the case in which the knowledge itself may be a set of learning skills. There may be a transfer of learning skills across bodies of knowledge that are organised and expressed in similar ways. As a consequence, experience or performance on one learning task may influence and improve performance on some subsequent learning task (Ellis, 1965). For example, “students who have thoroughly mastered the principles of algebra find it easier to grasp advanced work in mathematics such as calculus”, (Ellis, 1965). (Cohen & Levinthal 1990)



## 7.1 Feedback loops in prior knowledge, absorptive capacity, and new information.

The research by Cohen & Levinthal (1990) implies a feedback loop, between prior knowledge, new information and absorptive capacity. The process becomes iterative when one realises that in order to absorb new knowledge, and increase their prior knowledge and absorptive capacity the individual must have existing prior knowledge and absorptive capacity. In the same way, alertness to new opportunities would not uncover new opportunities if the individual has no cognitive structures from which to compare the new information. Thus new information is judged against cognitive structures but also has the potential to become new knowledge, thus forming new absorptive capacity. As Shane highlights, “prior knowledge provides an absorptive capacity that facilitates the acquisition of additional information about markets, technologies and production processes”.



*Model 6: An interpretation of prior knowledge, absorptive capacity, new information feedback loop. (Adapted from the implications of Cohen & Levinthal, 1990)*

## 7.2 Knowledge Pathways

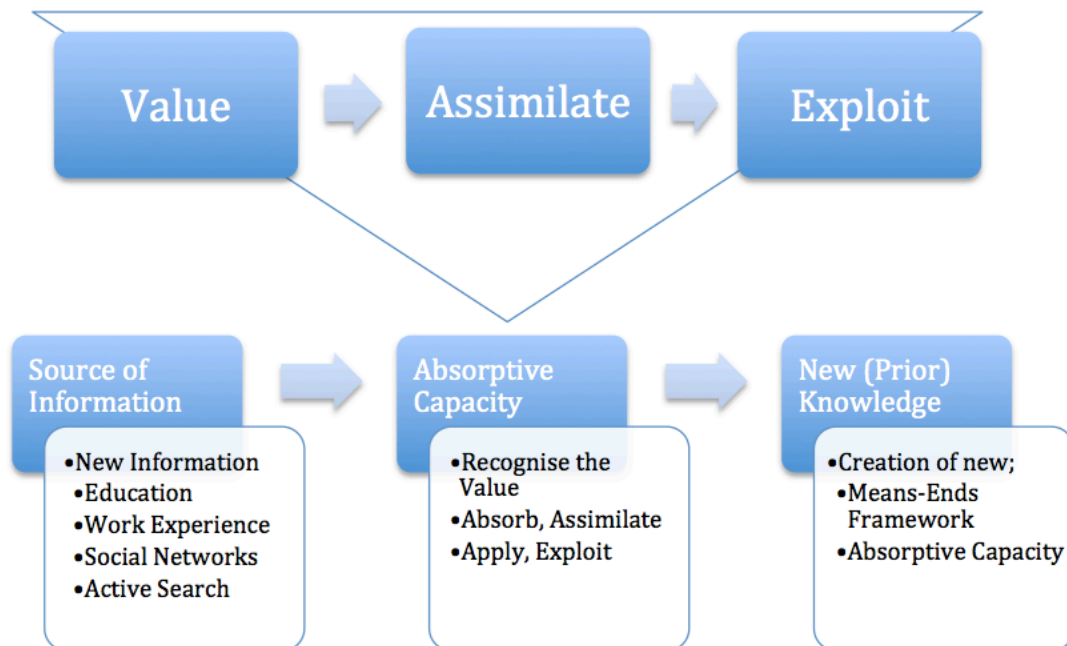
Shane and Venkataraman (2000) outline the concept of knowledge pathways, which they describe as information corridors. The cumulateness of absorptive capacity and its effect on future knowledge absorption suggest knowledge pathways both in that an individual can become locked in or locked out of potential information. I make the assumption that an individual may become locked in when they assimilate new knowledge based on their prior knowledge (and their ability to assimilate knowledge), creating specialisations. Parallel to this an individual's lowered ability to assimilate knowledge in some areas can create lock outs from potential knowledge bases. This would also be true if an individual stopped 'following' a particular field of information (a new technology, for example), where the field develops quickly it may be difficult for that individual to assimilate and apply new information in that field (at least not quickly enough to exploit the information within an entrepreneurial venture).

## 8. Concluding Remarks & Frameworks

In this section I will present three frameworks, drawn from the literature review, which I will implement during the analysis. The first of these frameworks is the Prior Knowledge – Absorptive Capacity Process, which is presented as model, incorporating concepts related to absorptive capacity, prior knowledge and new information comprehension. The second framework presents the categories of knowledge and the third framework provides an outline for sources of knowledge.

### Prior Knowledge – Absorptive Capacity Process

The literature review provides a theoretical understanding of *how prior knowledge influence opportunity recognition*; in that related prior knowledge should create an absorptive capacity for new information. By combining concepts from the literature, it is possible to create a model for the *Prior Knowledge – Absorptive Capacity Process (PK-AC process)*, as depicted in the model below:



*Model 7: Visual Interpretation of the Prior Knowledge – Absorptive Capacity Process  
(Developed from the concepts of Cohen & Levinthal (1990) and Shane (2003))*

This model aims to simultaneously highlight and simplify the complexity of the PK-AC process; central to this complexity is the prior knowledge, absorptive capacity, new information feedback loop, which indicates that new information is comprehended due to absorptive capacity, and creates new absorptive capacity (via becoming prior knowledge).

The model suggests a process flow for new information, which occurs due to absorptive capacity; where new information is first considered valuable, then assimilated and finally exploited. The creation of new (prior) knowledge (ie. the addition of a piece of new information to an individual's knowledge store) is considered to be indicated by the creation of a new means-ends framework or evidence for development in an individual's absorptive capacity. What is needed now is evidence for this PK-AC Process in practice. The PK-AC Process will be used a framework for the analysis, it represents the basis of our understanding for the thesis. The PK-AC Process is specifically related to the research question, *how does prior knowledge influence opportunity identification in practice?*

## Categories of Knowledge

By highlighting which areas of prior knowledge are related to the valuing, assimilation and exploitation of the new information we should be able to answer the research question: *Which areas of knowledge influence opportunity identification?* In order to better structure the analysis I will apply three categories of knowledge within the thesis:

Categorisation of Knowledge	Absorptive Capacity of New Information
<b>Markets</b> Knowledge of Markets. How a particular market operates. Supplier relationships, etc.	Which markets to enter to exploit new information. Which is considered as knowing Markets and how to go about entering it.
<b>solutions</b> Knowledge of how to serve markets which is considered as knowledge of a solution or way to create a solution. How the new information could be used to create a new product or service.	How to use new information to serve a market. In this sense, solution is considered as using new information to create a solution to a perceived need of problem.
<b>problems</b> Knowledge of a problem or need. How the new information could identify a problem or need.	Discovery of products and services to exploit the new information. In this sense, the identification of the opportunity requires prior knowledge of a customer need, which is linked to new information about a customer solution.

Table 1: Categories of Knowledge (Adapted: Shane (2003))

These three categories relate to opportunity recognition in that an individual's knowledge, which leads them to recognising an opportunity could fall into one of them. In this sense, an individual could have knowledge about any of the three categories, which is then linked to new information, (which could be related to any of the three categories). Further to this an individual who is able to gain knowledge about a problem, a solution and a market could be considered to have the best combination of knowledge to create a venture. Likewise, an individual who has knowledge about a specific problem in a specific market (with knowledge of how that market operates) is considered more likely to be able to gain knowledge of a solution (or be able to link knowledge of a solution to that problem in that market) than someone who did not have the problem and market knowledge to begin with.

## Sources of Information

In order to better address the question of: *where does this knowledge come from in practice?* I have developed four areas that can be regarded as sources of knowledge. These are shown within the PK-AC Process Model. These sources are influenced by my interpretation of Shane's (2003) Access to Information and developed to incorporate additional concepts. See Table 2 for an outline of the four sources of information, which are applied to the research; these sources of information refer to the source of new information or the original source of prior knowledge (bearing in mind that the thesis considers prior knowledge to have once been new information.)

### **Education**

Information gained during formal education, ie from University studies. It is important to note at this point that I make an assumption regarding the respondent's education, in that I presume an education in a subject does provide the respondent with access to information of the subject and that the individual does develop prior knowledge from their education. Ie. I assume the respondents have learnt from their education. Similarly I refer to an individual's education in broad terms, such as 'computing' and 'finance' which could in practice refer to many more specific subject areas; this is a limitation of the study as it would not be feasible, with time and resource constraints, to look in depth at each individual's education. In this sense this section maybe somewhat biased by the individual's interpretation of their subject and what they have learnt during their education.

### **Work Experience**

Information gained from experiences and networks related to an employment or work experience fall into this category. As research and development and marketing were considered in the research to be especially valuable sources of information, attention will be paid to these sources as potential sources of information within the study.

#### **Variation of Experiences - Number of Jobs**

An exact number of jobs is considered a difficult concept to capture, requiring a more specific definition of 'job' (ie. positions, companies, roles, tasks etc.) Logically, the theory of Shane (2003) in this concept makes sense; higher number of jobs increases the access to information. It does however bring into question the following; if a higher number of jobs refers to a wide variety of job roles and tasks, is an individual's access to a wide variety information better than to have a deep understanding of a narrower variety of information, presumably accessed by fewer job roles. This highlights concepts discussed in relation to path dependency.

In this sense only a broad understanding of this concept will be studied in the thesis. I will consider the concept to refer predominantly to the number of careers an individual has had, but there is no clear way to measure this – as it is still not clearly definable – I consider it simply as a limitation to the study.

#### **Variation of Experiences - Geographical Experience**

Similarly, the geographical experience brought about from work experience is also difficult to define...would Shane (2003) mean only experiences related to work or also to travel in general, and how should this be conceptualised? Would an individual have to live in several countries, or simply visit? Is this due to cultural experiences, in which case, would emersion in sub cultures within an individual's home county influence this? And like wise, is the value gained from work experience in a country much different from one's own more or less valuable to the concept of access to information?

### **Social Networks**

Information gained from family and friends, outside of a work or employment setting falls into this category. To some extent this source incorporates life experience, as opposed to work experience.

### **Active Search Process**

Information gained from searching falls into this category, this focuses on deliberate search.

*Table 2: Sources of Information (Adapted: Shane 2003)*

## 9. Propositions

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Based on the three frameworks the thesis makes the presumption that the PK-AC Process, as modelled in figure 7, provides an accurate representation regarding the influence of prior knowledge on opportunity identification. In line with the aims of the thesis, this presumption is based on the theoretical understanding of the concepts and their interaction with each other and as such the primary proposition of the thesis is that evidence of the PK-AC Process, (built from theoretical concepts) can be seen in practice. Furthermore, the thesis makes the proposition that knowledge pathways influence the sources of information an individual can access.

## METHODOLOGY

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*This chapter will focus on presenting how I will conduct the study and the justifications for the strategy and design being used. I also will present the selection of respondents. In this chapter I will also discuss the controls and quality of the study.*

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### Research Strategy

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The research has been conducted using a deductive approach. The top down approach enables a linear research strategy. This strategy has enabled the incorporation of theory developed via the literature search, which has highlighted several theoretical expectations and a central proposition, this allows for theory building research (Eisenhardt, 1987). The empirical data collection (via qualitative interviews) and data analysis will be conducted in order to analyse the in practice evidence for these expectations. The research strategy incorporates a revision of the theory, in this sense I have revisited the initial expectations drawn from the literature search and developed them with my own findings. (Bryman & Bell, 2007) There is a need to specify that the deductive approach is adapted from Bryman & Bell's (2007) in that I work with expectations gathered from the literature review, and look for evidence of them in practice, as oppose to the traditional hypotheses that can be measure. Thus, no attempt is made to measure the concept has been made, only to observe a possible process. In this sense I follow more closely the concepts of hypothesis building presented by Eisenhardt (1989), where first the theoretical constructs are defined, then evidence is gathered in practice; where a comparison between data and constructs enables the accumulation of evidence, later used to build further theoretical constructs. As highlighted by Eisenhardt (1989), this process is much more judgemental than traditional hypothesis testing in that without a quantitative hypothesis, the research data, and hypothesis can't be evaluated using statistical tests. (Eisenhardt, 1989)

The entrepreneurial opportunity process, the concepts of prior knowledge and absorptive capacity, cover a wide (albeit fragmented) expanse of literature. As my intention is to delve deeper into these concept, and not simply confirm or back up previous findings, I chose a deductive strategy. Underlining this choice was the ability to use the existing literature and theoretical considerations as a jumping off point, which I am able to develop expectations of what might be found in the data. Had I chosen an inductive approach it was possible that I would only reaffirm previous researcher's findings and thus bring no further depth to the topic.

As the objective of the study is to extract evidence of prior knowledge in the recognition of an opportunity and involves several complex concepts (prior knowledge, absorptive capacity, opportunity identification), each with further complex dimensions, it was logical to conduct a qualitative research study. (Bryman & Bell, 2011) A qualitative study provides rich empirical data, which is imperative when looking at such a complex human process, as the data must be analysed in order to derive evidence of the process (Sofaer, 1999), as opposed to simply the quantitative measure of the process being presented in the data. One specific reason for using a qualitative study method is that it enables the researcher to avoid (or rather circumnavigate) self-evaluation from the respondents (which may occur in quantitative studies, (Bryman & Bell, 2011)), as qualitative data collection can encompass detailed examples and storytelling from the respondents, which can then be evaluated – in terms of indicators of concepts - by the researcher alone. Thus, using a qualitative study increased the quality of the analysis and the conclusion. (Bryman & Bell, 2011)

## **Research Design**

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The research design is multiple case studies, where the research focuses on each separate case at an individual level. The interviews incorporate elements of longitudinal research in that the interviews are retrospective and that the case is concerned with the development of a situation over time. (Bryman & Bell, 2007)

Furthermore, it is worth noting that the research design encompasses elements of comparative research in that the results from each case are analysed both as compiled data and as individual data sets which are compared to one another. As the data analysis requires the identification of patterns over time, I have presented the data within a longitudinal framework (Bryman & Bell, 2007) (I.e. An example of data, which has been collected, is presented in the fashion of a chronological story. This enables a clearer presentation of the data.)

## **Analysis**

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The literature review is used as a basis from which to help identify evidence for instances of the use of prior knowledge and absorptive capacity within individuals opportunity identification. The literature review, specifically the three frameworks presented in the concluding remarks, will be used to code the interview data. Specifically the codes will aim to highlight; prior knowledge, new information, evidence of absorptive capacity, active search and the sources of information. The occurrences of these codes then be highlighted and evaluated. This will be conducted in line with research concepts from Bryman & Bell (2007).

## **Empirical Data**

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### **Secondary Data**

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A literature search has been conducted which enabled a holistic understanding of the concepts incorporated in the study and the relationships between each concept. The information gathered in this literature review focused on high quality articles; which were judged informally via; the regard for the author within their field of research, the number of citations for the article and the quality of the publication or publisher. Where articles published by highly ranked journals, or universities were considered preferable to articles published online in open source media.

### **Primary Data**

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Empirical data will be collected via semi-structured interviews with individual entrepreneurs. Semi structured interviews will allow for development into specific areas of interest and, again, allow for the respondent to provide detailed examples from their opportunity identification process (their venture creation process). There were seven respondents; one interview has been conducted per respondent. A framework of standardised questions has been asked to all respondents; these questions are open and prompt for specific examples so as to avoid receiving pre-analysed responses (See appendix II for the question framework). The respondents were asked questions in order to develop an empirically rich timeline of events in the respondent's life and opportunity identification. This style of interviews is reflective of an oral history review – in that the respondents are asked to recall events from their past and reflect on them.

### **Controls of Primary Data Collection**

The interviews have been conducted face-to-face; which aids in the communication and ease at which the respondent and researcher are able to talk. The interviews are also recorded and transcribed which improves the quality when decoding and analysing the data. (Bryman & Bell, 2007) All respondents were offered anonymity within the report, though each respondent chose to disclose their information.

Each respondent was contacted by interview with a brief overview of the subject and a few questions (see appendix III for the introduction email) the respondents were presented these questions in advance as it was felt that the questions involved in the interview might have required some pre consideration by the respondents. Thus it was felt that in order to get the most detailed answers the respondents should be able to see a short selection of questions in advance, to get a feel for the interview. While the respondents were told about the subject area of prior knowledge in venture creation, care was taken not to indicate the extent to which this prior knowledge would be looked at, or the definition of prior knowledge. This consideration was taken in order to reduce the expectations during the interview, in order to gain a more natural, less biased response from the respondents. Furthermore, as the interviews were conducted in English, and the native language of the respondents was not English, it was important that the respondents were able to think in advance about the terminology they would be using. As all the respondents had a high level of English this was not considered to damage the quality of the data but it could be seen as a slight limitation to the study. As with all qualitative data, it is subject to the vocabulary of the interview.

The question framework was an aid to control the semi structured nature of the questions and the open nature of the questions (as opposed to highly leading or closed questions), reduce interviewer biased and provide an element of repetition in the questions. The framework ensured that each respondent was asked the same questions, in addition to the unplanned questions, which were used to prompt for examples or a more detailed explanation from the respondents. The questions also enforced a reduction of interviewer biased, in an open interview the interviewer must maintain objective and not for example, ask leading questions, the preparation of a question framework reduced the effects of any biased. Further, the awareness of the researcher biased concepts meant that I was able to be consciously aware not to ask biased questions. Further to this, I had no real stake in the outcome, as a result either way would have been considered complimentary to the research. The repetition, which is seen within the questions, was implemented in an attempt to be able to cross reference statements by the respondents, and to gather more detailed descriptions as the interview progressed. (See appendix IV for an overview of the interviews)



## Selection of Respondents

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In order to select a sample I applied the qualitative method of purposive sampling to a convenience sample (Ritchie & Lewis, 2003); the reason behind this was the time and resource constraints combined with a determination to apply profiling criteria to the respondents. As such the respondents are limited by the convenience sample; in which they are all part of the same network, they are also all based in Gothenburg. This geographical location also falls into selection criteria of the purposive sampling of the respondents. In purposive sampling respondents are chosen purposively for the ability to provide detailed understanding, as such the respondents must meet selection criteria, of characteristics, which are considered to be salient to the research (Ritchie & Lewis, 2003). The characteristics used for sampling are:

- The respondent must meet the definition of an entrepreneur as stated in the thesis – which ensures the respondents meet the definition of entrepreneur as discussed in the thesis.
- Have discovered and started a venture within the last ten years – this aims to ensure that the entrepreneur has a recollection of the opportunity identification.
- The entrepreneur must have discovered the initial opportunity – this ensures the entrepreneur went through the opportunity identification process in an organic way, as is the purpose of the study.
- The venture must show the concept of a new means-ends framework, and meet the definition of an entrepreneurial opportunity – this ensures conformity in the ventures, and ensures the opportunity and venture meet the concepts being discussed in the thesis.
- The entrepreneur and the venture must be based in Gothenburg – this brings an element of standardisation regarding the generalisation of the study.
- The entrepreneur must have a higher education – this brings an element of standardisation regarding the generalisation of the study, it also makes it easier to identify prior knowledge within the study.

Following these criteria, a purposive sample should be as varied as possible, in this sense I have incorporated a variety of industries and individuals (differing in their prior knowledge) in the sample (See appendix V for the sample's adherence to the criteria).

## Controls

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*As discussed by Ritchie & Lewis, (2003) there are several terminologies used to discuss qualitative research, the application and adaptation of these terminologies from quantitative research is discussed at length in the literature. (Bryman & Bell, 2007) (Ritchie & Lewis, 2003) In this thesis I will use a combined version (Ritchie & Lewis, 2003), which enables the discussion of controls and quality to be presented in a logical way.*

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### **Generalisation**

*The potential for drawing inferences from a single study to a wider population, context or social theory (transferability, external validity) (Ritchie & Lewis, 2003).*

The limited sample size, due to time and resource constraints, is not truly representative, this affects generalisation of the study. It is difficult to make a wide generalisation; I believe it is more appropriate to aim for a high quality sample (purposive sample). The total sample was fifteen, of which five did not respond or declined. Three of the remaining ten respondents were not incorporated in the study; as they did not, after further research, fit the sample criteria. The confirmation checking of the sample, post data collection, is in line with the use of a purposive sample. I believe that this attention to the sample used increases the quality of the sample and thus the data collected, but it does not enable a better generalisation. The sample is potentially generalisable to others who fit the selection criteria; this is assumed due to the likenesses found (in the way prior knowledge was used to develop ventures) between respondents within the analysis. The similarity in each respondent's data suggests the sample generalisation could be conceivable, though a more representative sample would have to be considered before making a claim of generalisation. In addition to this, the sample is currently only representative in relation to the selection criteria. There is no evidence – incorporated into the study - which suggests that that sample would, for example, represent entrepreneurs outside of the Gothenburg area, although this could be assumed to be correct in areas where, for example aspects such as culture, acceptance of entrepreneurship, affluence, access to education population size were similar to the Gothenburg population. What is worth noting is that the incorporation of a geographic location in the sample criteria is believed, to some extent, to control these social variables, otherwise they are incorporated within the study in terms of the respondents' backgrounds.

### **Reliability**

*The reliability of the research finding, in regards to the studies repetition (conformability, dependability) (Ritchie & Lewis, 2003).*

In terms of reliability the results are considered somewhat repeatable. The semi structured interview questions would indicate that the respondents' responses, and what the responses highlight, are based on the open questions asked by the researcher. In this sense, if the researcher changed, it can be assumed that the open questions may differ and the responses change. However, as the concept being examined would still be the same, and the structured question could still be applied as a framework for questioning, it is likely the study is able to provide a high reliability.

## **Validity**

*The extent to which the study is accurately reflects the concepts it aims to study (credibility and plausibility) (Ritchie & Lewis, 2003).*

It is difficult to prove causality when analysing such subjective data, furthermore the concept is not truly observable – in that no researcher can see absorptive capacity and the use of prior knowledge – the study can only draw assumptions that the evidence suggests absorptive capacity and the use of prior knowledge have occurred in the opportunity identification. In order to narrow the topic several assumptions have been made, these could be considered as uncontrolled variables which may affect the study. For example, the incorporation of cognitive processing within absorptive capacity, while justifiable within the thesis, highlights a limitation of the study. As such, the validity of the research is not considered to be very high. The use of frameworks, which provide guidelines for the concepts (prior knowledge and absorptive capacity), increases both the validity and the reliability of the study.

## EMPIRICAL FINDINGS

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*This chapter starts with an overview of the respondents (the individuals who were interviewed), the opportunity they identified and their ventures. (For a formatted example of the respondent's data see appendix IV) (For an example of the decoded data see appendix IIV) Following this I will present the analysis of the data at an individual level, a visual representation of the prior knowledge and new information leading up to the venture creation, including the source of the knowledge is presented for each individual. This section is based on the adapted knowledge categories presented in the literature review and the understanding of the prior knowledge - absorptive capacity process as presented in the literature review. This section aims to highlight possible evidence for the role of the prior knowledge - absorptive capacity process within venture creation.*

*Secondly, I will draw from the first section of the analysis to highlight the critical knowledge each individual used in order to create their venture. I will present the data, from each individual, corresponding with the discussion, in a combined table.*

*Thirdly, I will discuss the combined sources of knowledge each individual's data indicates; in this section I will refer to the literature review section, 4. Where new information and prior knowledge comes from?*

*Throughout the analysis I will use the frameworks developed from the literature review: The PK-AB Process, Categories of Knowledge and Sources of Information. To recap, the Categories of Knowledge are; markets (which market to serve); solutions, (how to serve the market, how to create a solution) and; problems (a customer problem or need). The Sources of Information are: education; work experience; social networks and search process.*

## Overview Of Respondents

The below table shows the seven respondents, their ventures, the opportunity they identified and a little information about each venture.

<b>Anna Maria</b>	<b>Gertrud Communication AB</b>
Opportunity: To operate as a language consultant in Gothenburg.	
“Gertrud communication is a language consultancy that streamlines and assure the quality of your text handling. The aim is to reduce your spending, strengthen your brand and ensure that your communication can’t be misunderstood”. (Translated from; Gertrud, 2014)	
<b>Deniz</b>	<b>Touch Tech AB</b>
Opportunity: To create and sell high tech, interactive, multi touch devices.	
TouchTech develop “innovative multi-touch and gesture-based hardware”. They provide “concept and User Interface design, software development and support services and offer customised interactive concept/software development or premium off-the-shelf software products”. ( <b>TouchTech, 2014</b> )	
<b>Joakim</b>	<b>Inventive Board AB</b>
Opportunity: To create an idea management software system for SMEs.	
“The Inventive Board application is a cloud based tool for idea management; it combines a systematic, challenge focused approach, with community collaboration, communication and standardised decision making. The IB offers a structured process towards working with innovation; this structure is provided through either the application only or the application as part of a consultancy package”. (InventiveBoard, 2013) ( <b>InventiveBoard, 2014</b> )	
<b>Johan</b>	<b>Air to Air AB</b>
Opportunity: To develop and sell components for heat exchangers.	
“Air to Air Sweden provides components for products such as ERVs, HRVs or condenser units”. “The Hydra Core product is offered to four market segments: C-Hydra Core – a condenser block with high efficiency and low weight. D-Hydra Core – a dehumidifier based on one or two fluid streams. X-Hydra Core – a small and compact HRV for heat exchange”. (Air2Air, 2014)	
<b>Jon</b>	<b>MYMO AB</b>
Opportunity: To create a cloud based, sharing and management system for photos and documents.	
“Mymo is a user friendly cloud service that saves, organises and produces statistics based on the information you upload. Mymo saves you valuable time. It gives you full control and safe access to your data wherever and whenever”. (MYMO, 2014)	
<b>Nils</b>	<b>New Minds AB</b>
Opportunity: To create a recruitment company, focusing on matching engineers to employers.	
“New Minds focuses on matching young engineers with a prospective employer, bringing together personalities with corporate cultures and skills with challenges”. (New Minds, 2014) (Translated from; New Minds, 2014)	
<b>Peter</b>	<b>Blue Mobile Systems AB</b>
Opportunity: To offer a complete solutions to the security guard industry.	
“GuardTools is an extensive software solution for security officers, operational staff and end-clients. GuardTools assists overall work planning and generates automated reports. Developed for the security industry, it has brought value and improved business for companies in multiple countries”. (Blue Mobile Systems, 2014)	

Table 3: Overview of Respondents and Their Ventures.

## 1. Prior Knowledge & Absorptive Capacity

*This section analyses the prior knowledge of the individuals, and the new information they received, in relation to their opportunities identification and their venture's creation. The analysis will discuss possible evidence of how the individual's prior knowledge helped them to identify the opportunity. For increased clarity I have presented a visual representation of each individual's opportunity identification, highlighting instances of access to information and prior knowledge. The section forms the basis for answering the research question: How does prior knowledge influence opportunity recognition in practice?*

The table below shows in overview the category of prior knowledge and the new information used to identify the opportunity and create the venture. The table indicates that the respondent's most often had prior knowledge of a problem or solution, and that they accessed new information, which aided the identification of an opportunity.

	Prior Knowledge	New Information
<b>Anna Maria</b>	solution problem	Markets
<b>Deniz</b>	solution	problem
<b>Joakim</b>	solution	problem
<b>Johan</b>	solution	problem
<b>Jon</b>	solution	problem Markets
<b>Nils</b>	problem Markets	solution
<b>Peter</b>	problem Markets	solution

*Table 4: Prior Knowledge And The New Information Used To Identify The Opportunity*

## Anna Maria

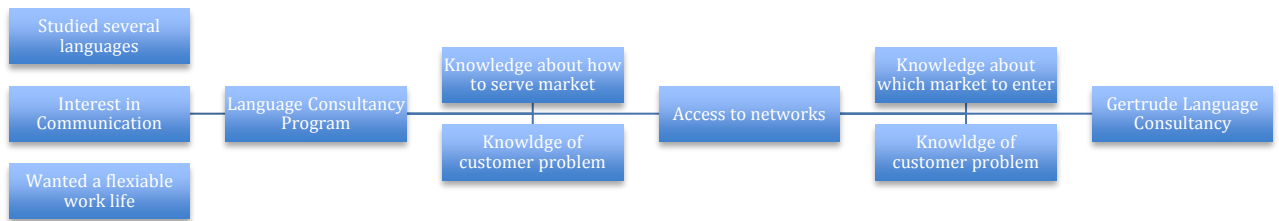


Figure 1: Anna Maria's Prior Knowledge, New Information and Knowledge Sources; Leading to Venture Creation.

Firstly for Anna Maria, it is likely that prior knowledge in languages enabled her to assimilate new information about languages and communication presented during her program. The knowledge gained from her program provided a solution to a problem; the knowledge of how to serve the market (the language consultancy solution), and to some extent knowledge of the problem (not working strategically with language), at least knowledge of which issues the solution could be applied to. Furthermore, Anna Maria was able to assimilate new information via her thesis; presumably her ability to conduct the thesis was based on the prior knowledge of the subject gained during the education. Anna Maria was able to extrapolate the new information and comprehended the value of the information assimilated during the thesis. *"I measured the effects of working with language in this strategic way - I found that it is possible to save a lot of time."*

The knowledge gained from the program does not really provide direct knowledge of Markets in order to exploit this solution. However, it could be assumed that the knowledge of knowing what the problem is enables Anna Maria to recognise the problems in which the solution can be applied. *"I also looked at the webpages and the text in general, to see if there is potential for me. I found out that, yes, people need this, or could use this."* Thus the prior knowledge of the solution provides absorptive capacity, to the extent that the new information (about a given problem) could be recognised as valuable, assimilated and exploited in a way that would enable Anna Maria to create a new means ends framework. In this sense it may be possible for Anna Maria, with the knowledge of this solution to look at several different problems and be able to relate her prior knowledge of this solution to them, in order to serve the market.

Regarding the new information gained about the Gothenburg markets, which eventually led Anna Maria to begin her venture. Prior knowledge about market analysis was not uncovered during the research; however Anna Maria's prior knowledge of language consulting may have provided an ability to assimilate new information about the markets via the ability to decode the terminology used within the industry, which may have in turn enabled a better understanding of the problems and Anna Maria's market analysis. Certainly, when Anna Maria gathered old adverts, the prior knowledge of the solution would have provided absorptive capacity in order to recognise the problem. *"I found that - I thought at least - there was a lack of this competence that is more strategic in the written communication and not only in what the brand is, or how to communicate."* This problem for example I, having no prior knowledge of working strategically with language, would not be able to recognise or analyse via reading an advert.

What is interesting to mention in this case it that the access to networks were provided by the Language Consultancy Program, where attending the University program exposed Anna Maria to industry conferences and events. Exposure to these, and the network they

incorporate, provided Anna Maria with access to information that may not have been available to those outside of the University program or industry. From these networks Anna Maria was able to access information related to the development of the Language Consultancy Program at Gothenburg University. Anna Maria’s ability to recognise the potential of the connections she had made (to individuals involved in Gothenburg University’s programme) may have been influenced by both her desire to start a venture and also her ability to link the new information (that Gothenburg University were looking to develop a new program) to her prior knowledge. *“I asked a lot of questions. I had some meetings with the university; the people who decided to start the program here, to ask what kind of background checks they had done.”*

While is not sufficiently clear what this specific prior knowledge is, I would speculate that Anna Maria’s prior knowledge enabled her to link the creation of a new university program to a local demand for the development of a particular skill set or industry. What is clear is that, in this case, the university’s development of a language consultancy program indicated to Anna Maria that there may be an unmet customer demand (localised problem) for language consultancy in Gothenburg. *“Once the University started to look into starting a Language Consultancy education here in Gothenburg, I thought this might be the right place to start.”* It must be highlighted that Anna Maria was specifically able to extrapolate the value from knowing that the there was a new university program and able to then exploit the knowledge this provided in order to gain further information, (questioning the program’s creators) and in turn extrapolate value from the new information and exploit the information in order to create a venture.

## Deniz

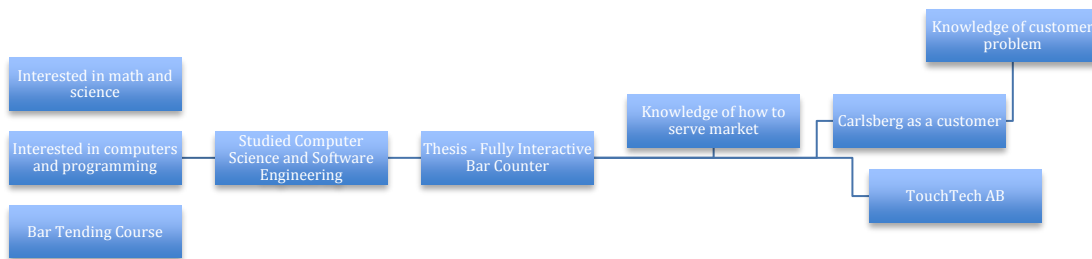


Figure 2: Deniz’s Prior Knowledge, New Information and Knowledge Sources; Leading to Venture Creation.

As Deniz’s indicated that he had an interest in computers from a young age, and explained that he had developed, for example, several websites. *“I’ve always been interested in computers and programming, designing webpages from quite a young age.”* Therefore, I make the assumption that he had prior knowledge in this subject area before entering his education. Prior knowledge in computing may have helped him to assimilate new information in his program. For his thesis Deniz opted to create a fully functional touch screen bar counter. What is interesting to note here is the Deniz made his choice in part because he had taken a bar tending course. I expect that this bar tending course provided some prior knowledge that was implemented during the creation of the bar. However, as the implementation of prior knowledge in the creation of the bar can’t be truly verified from the data, I assume that the creation of the bar was influenced by the knowledge gained on the program. Further to this Deniz explained that during the thesis project they had to learn a lot by themselves as they moved forward in the project. Within this analysis the thesis project could be considered to be both a problem and a way to serve the market. However,



information about of the problem is not truly presented within in the project, in terms of the project working backwards, creating a product then finding a need. Neither is the information about the solution, as the desired outcome is presented but the not way in which to reach the outcome. Due to this, I will assume that knowledge was gained regarding the problem and knowledge gained regarding the way to serve the market as the project developed.

Use of prior knowledge in this case should be evident in the development of the project over time and in the expansion of Deniz's prior knowledge base as the project develops. To exemplify this, if Deniz had not developed his prior knowledge in the process of conducting the thesis project, theoretically he would have been able to complete the project immediately, using only his existing knowledge and without gaining new information. Thus, simplistically, Deniz would have only been limited by the time taken to process his prior knowledge and physically conduct the project in terms of writing and producing the bar.

As this is not that case, it is clear that Deniz used new information to complete the project. One key example of this was highlighted when Deniz explained that he had access to information within an online community, and that he was able to use this information in order to create the finger recognition aspects of the touch screen. *"I think that the reason were able to create a touch screen was because there were some people who had some early research trial and so on and shared it in an online community - that was a place where we all shared and helped with building the core software that later on we used. The recognition of fingers and so on."* While the information was open access, it is highly likely that the information presented required prior knowledge in the subject area in order to assimilate and exploit the information. In addition to this, the prior knowledge of the project and of the subject area would have enabled Deniz to recognise the value of the information when he found it.

What is interesting in this case is that the decision to create a venture, and its first development, was largely serendipitous, the request by Carlsberg to purchase a bar counter pushed Deniz to create a company in order to process the invoices for Carlsberg. *"It really started as an accident because Carlsberg happened to see it and then other people showed interesting in having interactive stuff as well. The second customer found us through the newspaper article and then we ... somehow we got in touch with Microsoft and from then on a lot of customers were referred to us."* The following media expose appears to have provided access to networks which have provided access to customers.

I expect that the new information gained from working with Carlsberg would have increased the knowledge of how to serve the market and the problem. This might indicate that access to customers increased the knowledge of how to serve markets and problems, a possible indicator of this is that, while talking about sales and marketing, Deniz explained that, *"I try out different approaches I guess. I think it's quite an easy thing, once you realise what the customer would be interested in and you put it in a way that it sounds interesting for him. I've developed it since I had the company."* *"There has probably been more when we worked with partners or other companies who have resold our stuff that we get an insight into how people try to sell or what way to package."* This would further indicate that working with partners and other companies has enabled access to new information about how to serve customers. From this I assume that Deniz's prior knowledge has aided in the cognitive absorption of that new information, the outcome of that absorption being that Deniz suggests he has been able to develop his sales skills (exploit the new information) over time and that seeing partners and other companies has helped him to do this (assimilate the information available in observing others). The alternative to this would be that Deniz did not developed his sales skills despite having the opportunity to observe the new information, this would suggest that he had been unable to learn from or assimilate the information. In this case, as we can trust that Deniz's sales skill have changed over time, I make the assumption that while it is not clear which particular prior knowledge enabled Deniz to develop the

absorptive capacity to assimilate the new information about sales, he did assimilate the information. Similarly, it is unclear if or when knowledge about which markets to was developed.

## Joakim



Figure 3: Joakim's Prior Knowledge, New Information and Knowledge Sources; Leading to Venture Creation.

Joakim's expressed that he wanted to form a venture from him research, he explained that he was actively looking for a way to create a venture. Simplistically, it was Joakim's ability to link his prior knowledge about ERP system, which lead him create a structured model for his PhD thesis, to the comments of his respondents regarding their innovation processes.

Joakim has prior knowledge of how to serve a financial market, in terms of his ability to use ERP systems in a financial and accounting setting (ie. ability to use ERP systems as a solution to a problem), when presented with the new information regarding innovation processing as a problem he was able to recognise the value of and exploit this information by linking it to the prior knowledge of the ERP solutions. *"As a CFO and Financial Manager I used to work daily with different ERP systems. I was analysing data back and forth in different dimensions and I think I have quite good skills in different ERP systems and I've participated in implementing different ERP systems and business intelligence systems and to help the employees in the firm so they can analyse the data."* Firstly it is clear that he recognised the value of the new information, this could be in part that he was looking for an opportunity to start a venture, but it is also clear that Joakim recognised (the value in the information) that the information he received signified a problem, and was not just random information about innovation processes. Thus, when Joakim was told, *"your model is very structured, the reality is not structured"*, his absorptive capacity was such that that he was able to extrapolate further than the surface information and understand that there was in fact a problem/solution being presented within the information. It is of course then imperative that Joakim had the prior knowledge of the structured solution in order to solve this unstructured innovation processes (problem), without this prior knowledge it is possible that Joakim would not have made the initial link. *"I realised that if you work as systematically as in finance but in a new area, there must be a huge opportunity."* It is also interesting to note once again that as it is likely that Joakim created such a structured model due to his prior knowledge of structured systems, if he did not have that prior knowledge the observation may never have been made. Which leads to the question, would Joakim have made a link between the unstructured innovation processes and the structured processes used in financial and accounting industries, without access to the innovation process information (which was made accessible via his PhD.) This conundrum highlights the linkages between pieces prior knowledge; would Joakim have created a venture if he did not have prior knowledge of either the solution or the problem?

It is clear that Joakim was able to exploit the new information about the problem. From his PhD research Joakim would have prior knowledge about innovation processes; it is likely that this would have created the absorptive capacity which would have been used when assimilating further information about the innovation processes. Which suggests that the prior knowledge Joakim had gained during his PhD enabled him to exploit the prior knowledge of the solution...which, while valuable information, had up until assimilating this new information of the innovation processes been knowledge which had not been exploited in this way by him. *“As I worked with my PhD studies I realise that the firms I was studying - SMEs - they did not use any IT systems related to the innovation process so that’s why I thought that here is a great opportunity for me as a controller.”*

In regards to the prior knowledge of how to serve the market, in addition to his experience of ERP systems, Joakim explained that he has some prior knowledge of the solution from working with a suggestion box style feedback system when he was a technician (the solution is partly influenced by a suggestion box style system). It is, of course, possible that this prior knowledge affected his approach to the solution, specifically after the initial problem was discovered and the prior knowledge of the solution developed. What would be interesting here then is if the prior knowledge then affected the development of itself, i.e. Joakim has knowledge of the suggestion box and ERP systems; does this create a knowledge pathway in the development of a possible solution?

While checking the competitors Joakim found one to be largely based on SAP, having prior knowledge of SAP he was able to both make this connection and also exploit his prior knowledge that people find ERP systems (including SAP) to be complicated and illogical. This lead Joakim to conclude that the solutions should be structured but also simplified. *“One of the things I noticed when I worked as a Controller and CFO. I always struggled with the implementation of ERP systems and business intelligence systems. When teaching non-financial people to manage the systems, everyone said it’s too complex, and too difficult and they don’t understand and where do these figures come from and how do you do this? So most people who don’t work with ERP systems daily think that ERP systems are very complex. They see them as illogical, but when you know them they very easy.”* Thus, Joakim was able to assimilate and exploit the new information, from the competitor’s solutions, by linking it to his prior knowledge. If he had no prior knowledge about people’s reactions to ERP systems he may not have made the connection, and would not have recognised the competitors system as similar to SAP.

Joakim sought input from several sources; people within his network, technical and IT experts, the internet and books. This input is relevant to both validating the venture and developing the solution, which would imply that Joakim was able to access information outside of his immediate knowledge area. However, the extent to which prior knowledge and absorptive capacity affected this access to information is unclear. It is likely that Joakim had the capacity to value, assimilate and exploit the information accessed in this information searching, it would be illogical to embark on information searching if one is not able to (or does not) use the information which is uncovered. It is interesting to note this as it could highlight an ability or inability to reduce the effects of a knowledge pathway. I.e. Joakim may have sought information outside of his initial solution, which would have change the path of the solution and thus the information he is able to access. Alternatively Joakim’s prior knowledge may have influenced the new information he is able to access, one example of this is that Joakim talked to his former bosses and different colleagues, both of which could be considered to be accessible due to Joakim’s prior knowledge. For example Joakim knows his former boss, because at one point his knowledge enabled him to access a job...which gave him access to the network and connections within that job. An alternative example would be that Joakim sought for information in and about subject areas which he did not appear to have

any prior knowledge (the technical side of the solution, computing, programming), choosing, for example, to trust the advice of the experts. This could imply that he was able to expand his knowledge base with the new information gained from the information searching, which would mean that, as expected, Joakim was able to, and chose to, use the information presented from the information search.

## Johan

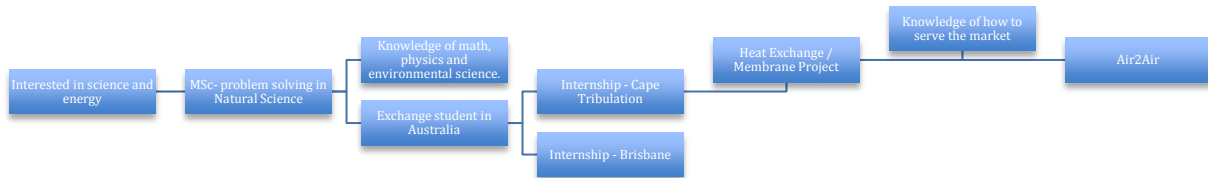


Figure 4: Johan's Prior Knowledge, New Information and Knowledge Sources; Leading to Venture Creation.

Johan's prior knowledge of physics, maths and environmental science enabled him to complete a project presented to him while on an internship. What is interesting about this case is that the project had previously been attempted by others who had not been able to complete it. This could highlight that it was Johan's specific prior knowledge that enabled him to succeed where others had not. Furthermore, it was Johan's specific prior knowledge that led to him having access to the project in the first place, as the professor decided Johan's skill set may be suitable to the project. *"During an internship I was asked to work a project, developing a concept about membranes in a heat exchanger - they had tried building a prototype about 10 years ago and never got it to work."*

Johan's prior knowledge of physics, maths and environmental science may have created an absorptive capacity that helped him to assimilate the new information presented in the ideas of the professor who had proposed an idea about membranes in a heat exchanger. *"I've always been interested in energy. The whole time that I studied all the projects that's I did usually ended up being something to do with energy."*

Johan explained how his experiences during the internship enabled him to be more resourceful and solve problems in innovative ways; this may have affected his absorptive capacity when looking at a way to solve the project. For example, Johan was able to create a solution using low cost resources that were available to him at the time.

During the project Johan was able to use his prior knowledge in the subject area to exploit, assimilate and value the new information about the heat exchanger. One example of this was Johan's ability to exploit the new information about the technology (developed during the project), within an air conditioning unit. I.e. Johan was able to develop an application for the technology, using his prior knowledge. Secondly, Johan's ability to value and assimilate the information about reduced condensation in the air conditioning units as an indicator of a reduced diesel energy cost. I.e. Johan recognised that the reduced condensation indicated an energy saving. *"When I came to this it suddenly became more of applicable work something that was hands on and had an application and you could see straight away. We actually reduced the amount of condensation in the air con unit by 1 litre, so we've saved this much energy and this much diesel."*

From these two examples it is clear that Johan's prior knowledge enabled an absorptive capacity, which he utilised in order to both develop the project, as a solution and recognise the potential application of the technology. Thus Johan developed knowledge of a

way to serve a market with a solution. What could be questioned is the extent to which a problem was presented to him, had the application within an air conditioning unit been presented by the professor, I assume that Johan must have used prior knowledge in order to understand the concepts being presented. Without his prior knowledge of energy, physics, maths etc. the concepts being presented by the professor would have been irrelevant to the development of the technology within this application. Thus, without his prior knowledge Johan may never have been able to assimilate the concept of the technology he had created within an air conditioning unit. He may have instead linked the technology to a different application. So, whether the linkage was made by Johan or introduced by the professor, Johan must have understood the concept in order to carry out the project in this way...so I assume the Johan had the absorptive capacity to either independently link the technology to the application (the problem) or to assimilate the new information presented to him by the professor. As I understand from the research the reality fell somewhere between these two extremes, both as a combination of independent linkage and new information.

Steaming from this one could theorise that had Johan studied chemistry, for example, the development of the project would have led to a different technology, and potentially a different application. Which would indicate that the skills Johan has, encompassed within his prior knowledge, created a knowledge pathway which enabled him to complete the project. In this case it is possible to state, at least, that others had tried, without success, to complete the project. This could be an indication that Johan's specific prior knowledge was central to the completion of the technology and this created a pathway in which the technology was developed, whether it was the only way the technology could have been developed or not is not a central question to this research.

We have discussed how Johan's prior knowledge enabled him to value, assimilate and exploit the problem and the way to serve the market, which could almost be combined as the benefit of the technology's application and the specific application itself (within the air conditioning unit to reduce energy usage). What has not been discussed yet is the knowledge of which markets to enter. What is interesting here then, is that Johan explained that in the beginning they were wrong about who their customer was, this could indicate that there was a lack of prior knowledge. I would speculate a few different possible reasons for this mistake, it could be from lack of experience of the possible markets, not enough exposure or access to information or perhaps prior knowledge led Johan in the wrong direction. Had there been exposure to and access to the information, but not enough prior knowledge of this subject (which could be considered some form of customer analysis) it might be suggested that Johan did not have the absorptive capacity to exploit the information available to him. Had there been exposure to the information and Johan had prior knowledge of the subject, it is likely that he would have been able to exploit information about Markets. To speculate further, what may have occurred is that Johan's prior knowledge led him to choose a particular market to serve, or to search for information particular place, and thus Johan's prior knowledge created a knowledge pathway which was in this case, the wrong pathway (much like those individuals who had perhaps taken the wrong pathway when trying to solve the project). Again, I assume it to have been a combination of these extremes.

What can be taken from the research is that while initially he may have been wrong about the customer, at some point this mistake was realised and corrected. This would suggest then even if there was an initial lack of prior knowledge, that at some point Johan developed the prior knowledge in order to recognise the mistake and assimilate the new information needed to correct the pathway and realise which market to serve, or more specifically which customer to target.

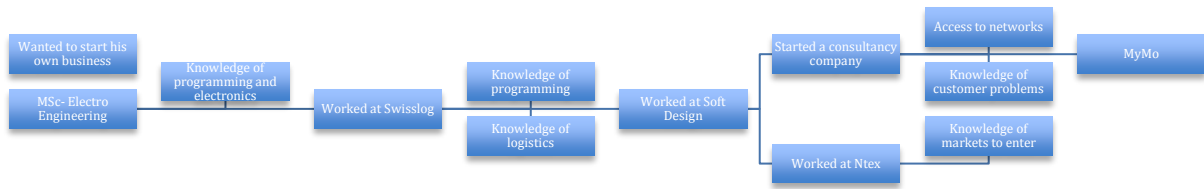


Figure 5: Jon's Prior Knowledge, New Information and Knowledge Sources; Leading to Venture Creation.

Jon was looking for an opportunity to build a business when he came across the problem of managing his personal photos it was his prior knowledge of computing which enabled him to create a solution. It was then Jon's knowledge of the problems faced by his customers that enabled him to decide Markets.

The prior knowledge of computing enabled Jon to exploit the problem he had faced when he came across the problem of managing photographs, thus Jon linked the knowledge about the problem to the knowledge of a solution. Within this this case, knowledge of the initial problem is indicative of the market in which the solution should be applied, in the sense that the problem was first recognised in the private market. For simplicity I will assume this was recognised by Jon in parallel to the recognition of the problem, which is most likely as the solution was first thought of in application to the private market.

As Jon had probably been exposed to this problem several times before deciding to develop a solution, I assume that this problem was realised as valuable knowledge over time (Ie. it was not the first time that Jon has been managing photos when he considered it to be frustrating, inefficient etc.) This highlights the question of specifically when the decision to search for information regarding a solution occurred. What is clear from the research is that Jon's prior knowledge of the solution, from a technical perspective, existed for some time before being exploited in relation to the knowledge of the problem.

The knowledge of the problem then, most likely became recognised as valuable over time as new information was gained which could be linked to it. For example, the problem would not be valuable for Jon to exploit if there was a sufficient existing solution, or if there was no possible solution. Which leads to the consideration that Jon searched for new information regarding the problem/solution before knowing that the information about the problem was valuable. Also worth noting is that while Jon's prior knowledge of the technical solution can be considered somewhat unique to him, information available about the problem is easily available (Ie. most people have managed photographs at some point). Thus it may have been Jon's linkage between the prior knowledge of a possible solution and the new information about the problem, then the information search related to the problem that helped Jon to realise the value of the combined prior knowledge (both problem and solution).

Jon sought information from several sources; his brother, his customers and work, external entities such as Gothenburg University and venture capitalists, people within his network, technical and IT experts and the internet. This information search is relevant to both validating the venture (simplistically, that there was no existing sufficient solution) and to validating the solution (that Jon's solution was possible). In a similar way to Joakim, while this would imply that Jon was able to access information outside of his immediate knowledge are, the extent to which prior knowledge and absorptive capacity affected this information search is unclear. *"I usually come up with ideas about how to solve something and I talk about it with my brother. We talk about if it is possible to solve something in a particular*

way, with this technique and that technique. So I knew that it was possible and how difficult it would be to solve it with the programming part and then I tested it on different person.”

It is likely that Jon had the capacity to value, assimilate and exploit the information accessed in this information searching, specifically as the venture moved forward and new information was exploited from the search. Ie. information received from Jon’s brother (and other sources) confirmed that the solution would be possible, and information about existing solutions highlighted that the solution may be not be best suited to the initial problem. Jon found information, which indicated to him, that it is would be difficult to compete with Google and Microsoft. Speculatively, his ability to extrapolate this conclusion from the information he had received could be related to his prior knowledge of both the problem and the solution. It is evident that Jon was able to use the information to change the direction of the venture, exploiting the new information (that while the solution was viable, the market to enter may not be right) to move forward once he had related the solution to the new information about his customer’s problem (Ntex managing photos). “I realised it was difficult to compete with Google and Microsoft so we decided to develop the solution towards a problem we had with a customer.” In this case the new information changed the path of the solution highlighting Jon’s absorptive capacity to value, assimilate and exploit the new information, which he was able to access.

What is clear is that it was Jon’s prior knowledge that led him to be able to access the new information about the problem. Ie. Jon was exposed to the information because he worked with Ntex, which he was able to do because of his prior knowledge in the industry, in which they operate, etc.

## Nils

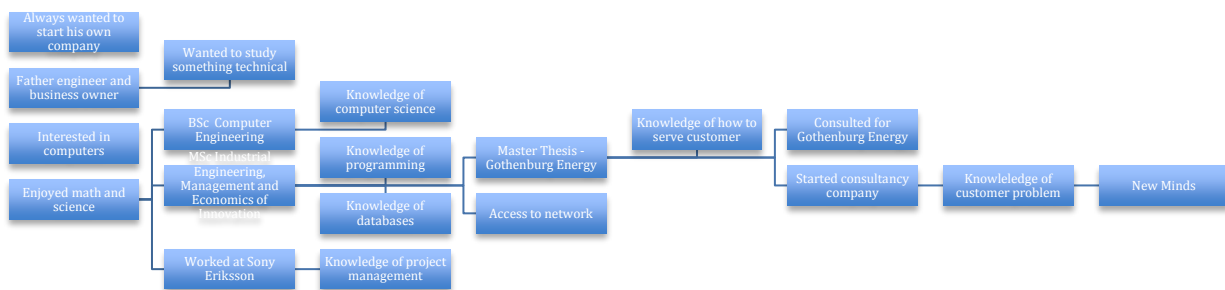


Figure 6: Nil’s Prior Knowledge, New Information and Knowledge Sources; Leading to Venture Creation.

Nils heard that a lot of companies have trouble with recruitment; it is likely that his prior knowledge about the recruitment process enabled him to create a new way to serve the market and solve this problem.

What is initially clear is that Nils was specifically able to access this new information (that companies have trouble with recruitment) because of the networks and contacts in his existing management consultancy company. If Nils had not started the management consultancy firm he may not have been exposed to this information. What is not initially apparent is what prior knowledge Nils may have relied on in order to value, assimilate and exploit that knowledge. Which leads to the questions, what made Nils recognise the potential value in this information? How did Nils realise that this information could be exploited to create a new way to serve the market?

While it is clear from the research that Nils was able to exploit this information, as the prior knowledge enabling this absorptive capacity is not clear. As the recruitment venture began as a project within a different company it may have been that Nils was exposed to new

information regarding the problem/solution over time. *“We heard that a lot of companies have so much trouble with the recruitment process, so there we had the problem. There were so many actors and we had yet to discover a company who did this really well, which was an opportunity. We looked at the factors affecting a bad recruitment and tried to eliminate them all.”* As a starting point we see that the problem was proposed to Nils and for simplicity I will refer to it as a project. There are several aspects of the prior knowledge and absorptive capacity, which I will speculatively highlight in regards to Nils’ solution to the project. Firstly, Nils had prior knowledge that it can be difficult to get a job if you have a broad education, this was especially relevant to the industry which Nils has prior knowledge and the industry which his management consultancy company operated. As Nils is exposed to this new information about this problem within this industry it is likely that knowledge of which industry to enter was predetermined when the new information about the problem was expressed. Thus Nils would have been able to link aspects of this prior knowledge in this industry (from his education, interests and work experience) directly to the problem.

Secondly, during the information searching Nils was able to access new information about the problem (ie. the fail points in the recruitment process and information about employee/employers). From this information Nils was able to make several conclusions about what makes a bad or good recruitment. This suggests that Nils had the absorptive capacity to assimilate, value and exploit this new information to create a new solution to the existing recruitment problem. Although it is not explicitly clear if Nils’ prior knowledge influenced this absorptive capacity when coming to a conclusion.

Thus while there is evidence that absorptive capacity was used to make use of the new information, specifically that a new solution was formed, it is not truly clear which or if prior knowledge was used to exploit the information

Regarding the solution to the customer project, Nils’ ability to execute his solution relied on his business partner’s networks (which provided access to companies’ CEOs, the employers) combined with his networks (which provided access to academia, the job seekers.) *“The person I started New minds with....he knew all the CEOs of all the good customers so we were fast tracked into many of the big customers... he had the connections to the companies and I had the connections with academia.”* As the exposure to these networks is due to the individual’s prior knowledge, I will state that the prior knowledge influenced the individual’s ability to create these connections. For example, Nil’s business partner has many CEOs in his network because he has worked with the CEOs previously, he would have been able to work with the CEOs because of his prior knowledge.

Furthermore, Nils ability to create such a solution may have required his prior knowledge of these networks. The question that arises here is if Nils would have created the same solution if he did not have the networks, or more specifically, did not have the prior knowledge that these networks existed and were available to be exploited. For example if Nils didn’t know his business partner had many CEOs in his network would Nils have exploited the information gained from the information search in a different way, or would the information simply not have been recognised as valuable.

A further example of Nils’ prior knowledge creating absorptive capacity is Nils’ ability to work with customers in the IT industry; Nils explained that he believes his background in computing has helped him to better understand his customers and their problems. *“I know how to program, how to build a website and build a web platform and do things like that and that helped me a little bit to gain the knowledge of how the customer things a little bit because it kind of tied the technical stuff to the market stuff more easily. So I think that that was good to have that, in the beginning at least and that helped me understand how the customer thinks.”* This suggests that Nils’ prior knowledge (in industries related to



his customers) has created an absorptive capacity, specifically the ability to decode and assimilate information from the customers. This is most evident in Nils' explanation that he is more easily able to understand the terminology his customers use. Further to this I would speculate that this highlight a knowledge pathway for Nils, that his prior knowledge in computing enables him to serve this industry (but potential not others), which leads him to develop ventures further into the industry and thus become exposed to further information and develop more knowledge. This would be evident in the development from the management consultancy company to recruitment venture within the same industry. Though it is, of course, not evident that Nils cannot expand these ventures to other industries, only that as of now he has not.

## Peter

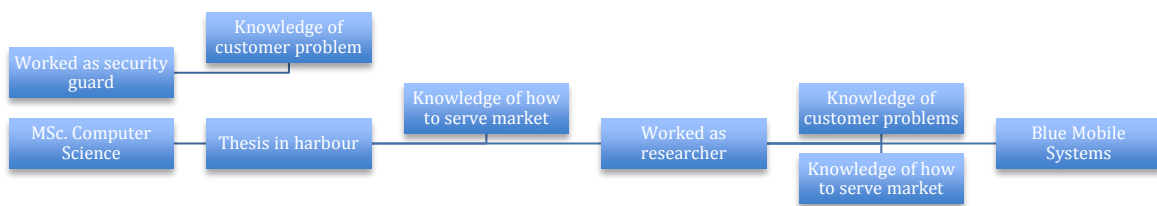


Figure 7: Peter's Prior Knowledge, New Information and Knowledge Sources; Leading to Venture Creation.

Peter first realised the problem and a way to serve the market when he was working as a security guard. "I can remember when I first started as a security guard thinking about why we always used hand written reports and files/folders with papers for information about all the clients. I thought it should be on a handheld computer" During his studies he developed further knowledge about the technical solution, he was then able to access further information (as a researcher) which he was able to use to develop his prior knowledge of the problem, way to serve the market and which market. Worth noting is that the industry which the solution is applied is the security industry, this is derived from the problem.

Peter's access to information within the security industry exposed him to inefficiencies within the industries processes, it is unclear which specific prior knowledge created an absorptive capacity, but it is clear that Peter was able to recognise these inefficiencies as problems and the Peter was also able to theories a way to solve these problems. Thus, Peter was able to value the information he was exposed to. He was also able to assimilate the information in a way which he both understood the information (the processes) and understood that it was inefficient. Peter's ability to conclude that the process was inefficient would suggest that Peter had a prior knowledge of processes which were more efficient, thought this is not explicit within the research. If Peter did not have this prior knowledge one could speculate that he would not be able to compare the process to anything and thus never come to the conclusion that the process was inefficient and thus a problem. Peter was able to at this point conceptualise a possible way to serve the market (making a hand held device) which again would be possible if he had prior knowledge from which to make link between the new information about the problem and prior knowledge of alternative processes from which to draw the concept from (ie. Peter must have had prior knowledge of a hand held device to be able to apply this as a possible solution.)

The new information gained during Peter's education would have developed the prior knowledge that Peter had in order to develop a solution (for example, knowing how to build complex IT systems). What is interesting to note is that Peter chose his education as a kind of change in direction, which would suggest that while the decision would have been based on personal preference for the program, the information he was able to access – if considered as

information searching, for a solution to the problem – would have been specifically not a knowledge pathway (ie. the information accessed in the course was not related to Peter's prior knowledge). However, as I assume Peter's prior knowledge influenced his choice of program (ie. for meeting the admittance criteria) this is not truly removed from the concept of knowledge pathway.

Further to this, Peter's ability to join the research work and his ability to conduct his thesis in the security industry is specifically related to his prior knowledge in the subject area. What is also clear is that Peter's prior knowledge enabled him to access new information via the research and thesis. Thus, Peter's initial experience of the security industry initiated a knowledge pathway that essentially created a cycle of prior knowledge and new information.

During Peter's thesis he was exposed to information that validated his solution. This information was accessed via an active search on Peter's account, firstly that he chose to conduct his thesis in the harbour and secondly that he sought out information related to his possible solution. *"I conducted my thesis in the harbour together with the head of security and my former employer G4S and when I was finished with that I had some prototypes. I showed them to head of security and for the staff in the harbour and the head of security said that if this had been commercially available on the market I would buy this for the harbour."* It is clear that Peter had the absorptive capacity to assimilate and exploit the information accesses during his thesis and it should be noted that he was also able to recognise the value in the information from the harbour manager (ie. that the information indicated a validation of the solution.)

Further to this Peter was able to value, assimilate and exploit the information he was able to access during the research, what would be interesting then (if looking at individual differences) is if any other individual working with the research was able to create the same solution of if it was Peter's specific prior knowledge which enabled him to exploit the research in such a way.

## 2. Valuable Prior Knowledge

*In this section I will discuss which categories of prior knowledge could be considered to have been most critical to the respondent's opportunity identification and thus, venture creation. This section of the analysis aims to address: Which areas of knowledge influence opportunity identification?*

The below table portrays a more detailed representation of the categories of knowledge used and the sources of this knowledge. The highlighted text represents the critical knowledge, which is considered as the prior knowledge that first started the knowledge pathway that led to the individual's opportunity identification.

	Markets	solutions	problems
<b>Anna Maria</b>	Education	<b>Education</b>	<b>Education</b>
<b>Deniz</b>		<b>Education</b>	Education
<b>Joakim</b>	Work	Education/Work	<b>Work</b>
<b>Johan</b>		<b>Education</b>	Work
<b>Jon</b>	<b>Work</b>	Education	<b>Work</b>
<b>Nils</b>	Education	<b>Work</b>	<b>Work</b> Networks
<b>Peter</b>	Work	Education	<b>Work</b> Education

Table 5: Categories of Knowledge and Sources Of Knowledge

### Anna Maria

The critical prior knowledge for Anna Maria was the knowledge gained from her education, this enabled her to both comprehend the *problem* and the *solution*. Furthermore, Anna Maria's education enabled her to access the information within industry networks, which in turn lead to the development of knowledge of *markets*.

### Deniz

The critical prior knowledge for Deniz was the knowledge gained from his education, this enabled him to both access and comprehend information which enabled him to create a *solution*. Furthermore, his education enabled him to access his first customer that may have provided access to information about *markets*.

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**Joakim**

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The critical prior knowledge for Joakim was the knowledge gained from his research, which is considered as both education and work experience, this enabled him to comprehend the *problem*. A second critical prior knowledge the knowledge gained from his previous work experience that enabled him to create a *solution*.

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**Johan**

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The critical prior knowledge for Johan was the knowledge gained from his education, which led to both his internship, where he may have accessed information about the *problem*, and his ability to create a *solution*.

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**Jon**

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The critical prior knowledge for Jon could be considered to be both the knowledge gained from his work experience, which enabled him to access information about the *problem* and *markets*. His education also enabled him to create a *solution*, and enabled him to access information from his work experience.

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**Nils**

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The critical prior knowledge for Nils was the knowledge gained from his work experience and education, which enabled him to both comprehend the customer problem and access the information about the *problem*. Furthermore, Nils work experience enabled him to access the information within his business partner's networks (ie. the knowledge of the network itself), which could be considered critical for him to create a *solution*.

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**Peter**

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The critical prior knowledge for Peter was the knowledge gained from his work experience and subsequent research work, this enabled him to both recognise the *problem* and access information about the *markets*. Furthermore, it may have enabled him to access the information within industry networks. Following this, Peter's education enabled him to create a *solution*.

### 3. Sources of Information & Origins of Prior Knowledge

From the literature review I developed four sources of information, they are considered as mechanisms which increase the likelihood of an individual gaining access to information: education, work experience, social networks, and active search process.

Here, I will discuss which areas of prior knowledge are seen to influence venture creation and discuss the sources of knowledge, as indicated by the individuals' data. This section aims to present the analysis from which I will answer: Where does this prior knowledge come from?

The table below is an extension of Table 5. It shows in overview the category of prior knowledge and the new information used to identify the opportunity and create the venture and also the presumed source of information of the knowledge category. This section focuses on the initial source of information.

	Prior Knowledge	Source	New Information	Source
<b>Anna Maria</b>	solution problem	Education Education	Market	Education
<b>Deniz</b>	solution	Education	problem	Education
<b>Joakim</b>	solution	Education/Work	problem	Work
<b>Johan</b>	solution	Education	problem	Work
<b>Jon</b>	solution	Education	problem Market	Work Work
<b>Nils</b>	Market	Education	solution problem	Work Work
<b>Peter</b>	problem Market	Work Work	solution	Education

Table 6: Prior Knowledge and New Information, and Source of information.

In order to gain a more analytical understanding of the table I have presented a generalised overview of the number of occurrences of each category and source of knowledge.

	solution	problem	Market	Totals
<b>Education</b>	6	2	2	10
<b>Work</b>	2	5	2	9
<b>Network</b>				
<b>Search</b>				
<b>Totals</b>	8	7	4	

Table 7: Categories of Knowledge and Occurrences of Source of Information.

## Education

Education and work experience appeared to be the most used sources of information; this could be due to the many elements the board headings encompass.

All of the individuals interviewed gave evidence to suggest their ventures are related to the subjects they have previously studied, most of the respondents suggested they had a prior interest in their subjects which lead them to choose a particular educational route or subject. The clearest examples of this are Anna Maria: who's interest in communication lead her to study language consulting, which lead to a venture in language consulting, and Deniz: who's interest in computers lead him to study computer science, which lead to a venture with a computing focus.

Anna Maria:

*"I've always been interested in in communication"*

*"I was looking at the different educations that there are, for communication and language, but none of the ones I knew about felt right.... I found this language consult program and I thought oh this is what I'm looking for!"*

*"I started the course and then during the years, we discussed a lot where to work and what to work with and I thought it would be nice (to start a company) and so I think that idea of starting this business grew during the years, so I started the course first then decided."*

Deniz:

*"I've always been interested in computers and programming, designing webpages from quite a young age. I wanted to create apps and games."*

*"We did this thesis, because I went to a bartender course"... "The fact that I had the experience of bar tending, it was a good match".*

*"When people saw it they wanted it as well. It really started as an accident because Carlsberg happened to see it and then other people showed interesting in having interactive stuff"... "the only way of invoicing was to create a company, so then we created a company"... "because we already had a company and we had some requests I don't think we talked about it if we should do it or not, the question was more in what way or what form"*

What is interesting in this comparison is the purposefulness which each individual created a venture, Anna Maria planned to start a company, and worked towards it's creation where as Deniz's venture creation was much more serendipitous.

What is highlighted in the data is the further access to information created by the respondent's education. This is assumed at a basic level, in that the respondents are able to access jobs because they have a qualification in a subject related to what they work with. For example Joakim's education in finance surely influenced his ability to work as a financial controller, *"I was good at math, so I studied mathematics. Once I decided to study again, I chose finance."* *"In finance I've had six different jobs"... "I've worked as a CFO and Financial Manager."*

The data also highlights that education enables access to information in terms of new networks. Anna Maria for example gained access to networks, *"through the education, they promoted a lot and, since it's kind of a network for language consultants, it's a good way to learn to know the other people working with the same questions"*.

An increased absorptive capacity for further learning is also assumed from an individual's education. Evidence which may support this assumption can be seen in examples from Peter and Deniz.

Peter developed his initial prototypes, which could suggest that his ability to build the prototypes increased in parallel to his prior knowledge, *“I didn’t use the prototypes I had started with because they were really simple, just mock ups really. When I started at the research institute I started to build new prototypes, sharper, commercial prototypes so to speak. When we finished at the research institute I had a base of prototypes to develop from, so I didn’t have to start from zero when I started the company.”*

Deniz developed the concept of the interactive bar counter, as previously discussed: use of prior knowledge in this case should be evident in the development of the project over time and in the expansion of Deniz’s prior knowledge base as the project developed. A specific example of this would be the valuing, assimilation exploitation of new information gained from the online community.

## **Thesis**

A further dimension of access to information via education is the evidence for the respondents gaining information related to their ventures from their theses; Anna Maria and Peter specifically gained validation of their potential ventures, and I assume were able to gain further insight into the market and customer’s needs.

Anna Maria: *“For my thesis - I measured the effects of working with language in this strategic way - I found that it is possible to save a lot of time”.*

Peter: *“I had some prototype that I showed to the head of security and for the staff out there and the head of security said that if this had been commercially available on the market I would buy this for the harbour.”*

Deniz: *“During my thesis I worked on a project to make a fully interactive bar counter”.*

Nils: *“I was doing my master thesis at Gothenburg Energy. I did a good master thesis and they approached me and asked me to - actually they wanted to employ me - but I didn’t want that, so I said I could do it as a consultancy through my own company and they accepted. So that’s how I came to that venture”.*

Furthermore, Johan’s internship, which he was able to access due to his education, enabled access to information in much the same way as the theses. Johan: *“During an internship I was asked to work a project, developing a concept about membranes in a heat exchanger”.*

The classification of Johan’s PhD and Peter’s research work within the Viktoria IT Research Institute, as education or work experience provides an introduction into research and development and privilege access to information. Firstly it is clear that information gained by Johan and Peter during their research was of importance to their ventures.

Joakim: *“As I worked with my PhD studies I realise that the firms I was studying - SMEs - they did not use any IT systems related to the innovation process so that’s why I thought that here is a great opportunity for me as a controller”.*

Information gained during education (PhD, Thesis, Internship) could be classified as research and also as privilege access to information. This is especially true when one considered the intention of academic research to bring something new to the subject area, in this sense it is implied that the individuals each developed their own new information in conducting these exercises within an academic setting. This further highlights the concept of education as

active search for new information, but also presents the concept of developing new information from one's absorptive capacity. This would be most easily related to Mokyr's (2002) concepts of knowledge, specifically that, "new prescriptive knowledge is created when propositional knowledge is better understood". Which would indicate that academic research of a propositional knowledge base (gravity), leads to new information of prescriptive knowledge (why things fall). (It should be noted that this is a simplification of Mokyr's 2002 work). What is clear is that of the individuals interviewed those who researched (PhD, Thesis, Internship) were likely to have developed their own knowledge of the subject by *extrapolating* from their prior knowledge and new information. Further to this the role of education and academic research could indicate that these respondents had access to somewhat privilege information, though that the information they were able to access or extrapolate is not privilege in the sense that it is private, simply that there are transaction costs to access the information.

## **Work Experience**

Work experience contributed highly as a source of information. I have previously discussed some elements of Peter and Joakim's research work experience, but here I will focus more on their non research experience. Peter's venture is the most clearly linked to his work experience, which had highlighted the problem to Peter.

Peter: *"I can remember when I first started as a security guard, I remember thinking we always used hand written reports and, for example, we also used files and folders with papers for information about all the clients, and I thought it should be on a handheld computer"*

Joakim's experiences of working as a financial controller, likely influenced his PhD research model and lead to the way he approached the identification of the problem and how to serve the market. Further to this Jon's work experience enabled him to access information about a problem, which, I would theorise, he would not have had access to if he did not have this work experience with this. This could indicate access to somewhat privilege information.

Jon: *"I had thought about companies because I always relate problems that I have where I work. I looked at companies and we also had the private sector in mind. We had the problems to solve and we started to focus on the companies and left the private sector."* *"I decided to look at the problem we had with a customer – it takes significant amount of man hours to process photographs from the containers"*.

Nils' work experience also indicates the role of work experience and it's access to information via networks, where Nils was able to access the networks used to create his venture (by meeting his business partner while working). Nils: *"I was the project manager in one project and he was project manager in another project so that's how we met. We were both working in the same area of the company so that's how we met."*

## **Research & Development**

Outside of the research already discussed as falling within the academic domain, no respondent implied they had work experience with R&D which led to the creation of their venture.

I have not yet discussed the role of prototyping and mock-ups as potential access to information. Jon and Peter both specifically discussed the use of prototypes when talking to other about their ideas. This suggests a use of prototypes – as research and development – in



order to gain better information when searching for feedback as new information. In a sense, this could be considered as working within research and development, though it highlights the difficulties of studying in the position between opportunity identification. It is difficult to place this R&D as being product development after venture creation or venture validation (i.e. opportunity recognition). From the data, Jon and Peter's responses suggest they used prototypes to gain feedback, access to information, before deciding to create venture, thus during opportunity recognition.

Jon: *"We started to ask other companies if they also had similar problems, test solutions and ask around. Make a small presentation or a mock up and try to explain how we would solve the problem together with the technique, then get feedback and improve."*

## **Marketing**

While a few respondents had work experience in marketing it was difficult to determine specific evidence for work experience in marketing as a source of information, especially information that aided in venture creation.

## **Variation of Experiences - Number of Jobs**

The exact number of jobs was considered a difficult concept to capture, requiring a more specific definition of 'job' (i.e. positions, companies, roles, tasks etc.) In this sense only a broad understanding was gained of how the number of jobs can provide access to information was gained from the study. There were no clear examples where a high number of jobs indicated better access to information than fewer jobs.

## **Variation of Experiences - Geographical Experience**

While the majority of respondents suggested varied geographical experience, both work and general travel, living and visiting, there was no real evidence to suggest this experience significantly influenced their venture creation. One case, which could be viewed as an exception to this, is Johan, who stated that his experiences in the Australian rainforests enabled him to act more resourcefully when solving problems. Johan: *"One think I learnt there, when you live in the rainforest your very isolated, because you are so isolated you have to solve all you problems yourself, you can't rely on buying things you have to actually be able to sort them out somehow"...* *"That gave me a feeling of being able to accomplish something by using my brain and whatever you have available. You don't have to buy a solution you can just figure out a solution and just do it."* The question now then would be; was this realisation of resourcefulness related to new information gained by the geographical experience? It certainly influence Johan's venture, Johan could have probably come to this realisation in other ways, but the fact that he came about it in this way means that in this case, geographical experience did provide access to information (a new way of working). The relation of Johan's absorptive capacity in the comprehension of this new information is unclear.

## Social Network

The data suggests that networks were largely used to gain information, in order to validate the venture. What is seen from the analysis is that these networks are made accessible via education or work experiences and as such, these networks fall into the categories of education or work experience and are not visible as social network (which would require the respondent to have a non education or work relationship to the network) within the analysed tables. The differentiation between social network and work experience was sometimes ambiguous, it is seen frequently that an individual gains access to information via networks which they have formed from a work experience. Thus often the respondents had gained information via networks which may not have been classed exclusively as social networks. This could highlight knowledge pathways in that access to networks and the information they potentially contain is seen to be somewhat influenced by the individual's education and work experience.

An example access to information from a network, providing information about a problem is found in Nils' case. Nils found a problem via his network, though what is clear is that this network was largely accessible due to the access to networks created by his existing work.

Nils: *"We heard that a lot of companies have so much trouble with the recruitment process, so there we had the problem."*

This distinction is seen less clearly in Anna Maria and Joakim cases; where information was gained from networks that have originally developed from education and work experiences, but may not still be considered in this way by the respondents

Anna Maria: *"I also asked some people I knew, how they were working with these questions both the companies and authorities."*

Joakim: *"I would say I used my social network, for the decision to invest in the prototype. When I decided to invest my own money I used my social network to verify my ideas"...  
"I talked to a lot of people before I invested my money before I invested lot of money in the IT system. I talked to my former bosses, different colleagues etc., just to hear their thoughts about the ideas. I talked to, say, 20 different people, they had all been working as CEOs or sales managers, or something like that so they had all different positions in different firms in different industries."*

Jon provides the clearest example of access to information via his social network, though the context suggest idea validation as opposed to information. Jon: *"I usually come up with ideas about how to solve something and I talk about it with my brother."*

## Active Search Process

Active search has largely been incorporated into the previous areas of access to information. For example, when an individual has searched for information, they have looked within their work or educational environment. The respondents actively sought information regarding the validation of their venture and how to move forwards with the venture from their networks and additionally from books, the internet and experts or individuals with specific knowledge. For example Anna Maria asking the people at university for their information, and her evaluation of the market and Joakim searching for information from books and experts.

Anna Maria: *“I asked a lot of questions. I had some meetings with the university; the people who decided to start the program here, to ask what kind of background checks they had done.” “I also began to look at the market and the companies and the possible clients. I tried to learn about how the market was working here. I tried to look at the competition amongst others.”*

Joakim: *“I read quite a bit about the new technologies. We have access to the skills here in schools, we have an IT department who conduct research about ERP systems and management control so I talked to them, to the manager there a lot about different things. I realised that - first I thought I should start to do the coding myself so I read some books about, basic books, about coding - then I realised this will take too much time.”*

It could be expected that the respondents who planned to start a venture actively search for information regarding a possible opportunity, though a deliberate active search in a strategic way was not evident from the data. One example, which could indicate active search, was Joakim, though he did not consider his search to be strategic in the way that the literatures review defines a deliberate search.

Joakim: *“During the year, I was thinking in different directions of a way to make a firm from my research, I had the idea to scale up the consultancy firm. I was trying to find a business focusing on management control and then as I got farther into my PhD and more and more involved in the research, I changed my focus and tried to find a new area instead of focusing on what I knew from my previous business I tried to focus on my PhD studies.”*

## Summary & Knowledge Pathways

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The primary sources of information are work experience and education, the use of networks and active search as sources of information were found to be linked to these two categories. This potentially highlights the role of knowledge pathways, where an individual's potential sources of information are limited by their past experience, or prior knowledge.

This is seen most clearly when considering that no respondent deviated far from their core subject area, be it from education or work experience. For example, none of the respondents who had a technological-engineering education work outside of a technological field or industry. One example where this slight deviation is evident is Joakim, who moved from a financial education to an idea management venture; however his knowledge of the solution is based on his financial prior knowledge. Related to this is the knowledge pathways caused by simply advancing in a given subject area; each individual's education influenced their ability to get a job, and thus influence what work experience they had, which controlled the information they were able to access, or at least, what information they were exposed to in this experience. While this is quite a basic concept it is seen to expand much further beyond the initial education-work paradigm; the individual's education and work experiences then influenced their network (including their social networks), which then influenced their future decisions when validating ideas for venture opportunities.

The most critical categories of information are highlighted as knowledge of a solution and knowledge of a problem. Of these, information related to knowledge of a solution is most often accessed from education and information related to a problem is most often accessed from work experience. In addition to this, most respondents had prior knowledge of a solution, before accessing (or comprehending) information related to a problem. Knowledge of markets was least often a critical knowledge and found to be accessed from both educational and work experience sources.

## CONCLUSION

*In this section I will conclude the information presented in the analysis. I will answer each research question individually. I will finish with more general discussion of the key information gained from the study and describe the advancements of knowledge made and the implications of the study's findings.*

### **How does prior knowledge influence opportunity identification in practice?**

From literature review implied that prior knowledge should create an absorptive capacity that enables an individual to value, assimilate and exploit new information, dubbed the *Prior Knowledge - Absorptive Capacity Process (PK – AC process)* This process enables an individual to comprehend new information in order to identify opportunities.

In practice we see several examples of this PK – AC process enabling individuals to comprehend new information in a way that leads them to opportunity identification and venture creation.

Prior knowledge influences opportunity identification in practice, in that it provides an individual with the ability to value, assimilate, exploit and also to extrapolate new information from sources of information or prior knowledge. The data suggests evidence for individual's valuing, assimilating and exploiting new information as was expected from the literature review. Further, the use of prior knowledge is used in order to access new knowledge; this is evident in the ability to 'decode' problems, access networks and validate solutions.

The data suggests that individuals are able to extrapolate new information from their own evaluation of prior knowledge, or from, for example new information presented to them where the information must be processed in a way which involves more than the valuing, assimilation and exploitation of the new information. This extrapolation appears to involve; generalisation, reasoning and deduction, which are not incorporated into the literature reviews' current definition of absorptive capacity.

Prior knowledge is seen in practice to be used, as suggested by Shane (2000), both in the discovery and recognition of opportunities. In practice we see that individual's rely on prior knowledge to make linkages between new information and prior knowledge in order to form possible ventures. This is seen most clearly when individuals make linkages between new information and prior knowledge about problems and solutions, at which point an opportunity discovery is made, which leads to opportunity recognition, where the discovery is validated; often via the search for new information. This search for validating new information is often influenced by knowledge pathways, caused by the individual's prior knowledge and its influence on the individual's access to new information (including new experiences, networks and jobs). Furthermore, even if the new information representing an opportunity is not closely related to an individual's prior knowledge, the way in which an individual goes about exploiting the opportunity is shown in the analysis to be linked to their prior knowledge.

Prior knowledge is seen to influence the individual's future access to information, as the prior knowledge does appear to cause knowledge pathway. Though this is seen to be more naturally occurring than an unavoidable occurrence. The evidence simply suggests that an individual's venture is likely related to a prior knowledge pathway, often reaching back to their education and their interests that lead the individual to choose that education in the first place.

In summary prior knowledge influences opportunity identification in practice by:

- Generating an absorptive capacity to value, assimilate, exploit and extrapolate new information.
- Providing access to sources of information (including new experiences, networks and jobs).
- Providing an ability to actively search for venture validating information.
- Generating knowledge pathways, leading to access to information within a specific knowledge area.
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### **Which areas of knowledge influence opportunity identification?**

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From the literature we are able to label three categories of prior knowledge; problems, solutions, markets.

Of these knowledge categories, knowledge of solutions and knowledge of problems have been most evident as critical knowledge, leading to venture creation. From the data knowledge of markets has appears to be the least critical category of knowledge.

The simultaneousness of knowledge and information makes these categories difficult to decipher in terms of the categories being new information or prior knowledge. Most often prior knowledge of a way to create a solution is seen as the critical prior knowledge which is then related to new information about a problem.

Thus, while all three categories of knowledge influence opportunity identification, prior knowledge that can be used to develop solutions appears within in the data to be the primary category of knowledge to influence the likelihood of opportunity identification.

### **Where does this knowledge come from?**

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Information related to a solution tends to come from an individual's education. Information related to a problem tends to come from an individual's work experience.

What can be determined in the data, when information related to solutions comes from education, is that the individuals develop prior knowledge from education that is both propositional and prescriptive. In this sense an individual's education provides them with an absorptive capacity to comprehend further information about the subject and equips them with a skill set which enables a more tangible ability of solution building, for example; computer programming, accounting etc.

In the cases where the critical prior knowledge was related to a problem, the information of this problem tended to come from an individual's work experience. As such it was an individual's ability to comprehend the problem and then create a solution; either via relating the problem to prior knowledge or active search for new information (accessing further information from an educational or work experience source), or a combination of both. Thus knowledge that influences opportunity identification tends to come from an individual's formal education or from an individual's work experience.

## **Propositions**

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Evidence was found for the PK-AC process in practice, which supports the proposition that the PK-AC process, as modelled from the theory, is representative of the PK-AC process in practice, in relation to opportunity recognition.

Evidence was also found for the concept of knowledge pathways; this is most clearly noted when considering that none of the respondents had deviated far from their education's subject area.

## **Discussion of Key Points**

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In conclusion to the thesis, the PK – AC process enables individual's to comprehend new information in order to identify opportunities. The analysis appears to show that prior knowledge is more critical than new information in that absorptive capacity created by prior knowledge forms a basis to which new information can be comprehended and linked. Critical prior knowledge tends to come from an individual's education; this prior knowledge tends to be about how to serve a market or create a solution.

This prior knowledge then provides an absorptive capacity which enables the valuing, assimilation, exploitation and extrapolating of new information which aids opportunity identification and creates links between prior knowledge and new information in a way which enables the individual to form a new means ends frameworks, leading to venture creation.

This leaves to be discussed the question of how individuals can influence their ability to identify opportunities. The findings of the research suggest that an individual is most likely to identify an opportunity which relates to their prior knowledge of how to serve a market, thus in order to influence the chance of identifying an opportunity an individual should focus on an education which enables access to information about ways to serve the market. This would suggest educations which are skills based; such as computer programming, language consulting or accounting provide a increased ability to create solutions and thus recognise a problem in which the solution can be applied, thus providing an individual with an increased chance or recognising an entrepreneurial opportunity.

## **Evaluation of the PK – AC Process**

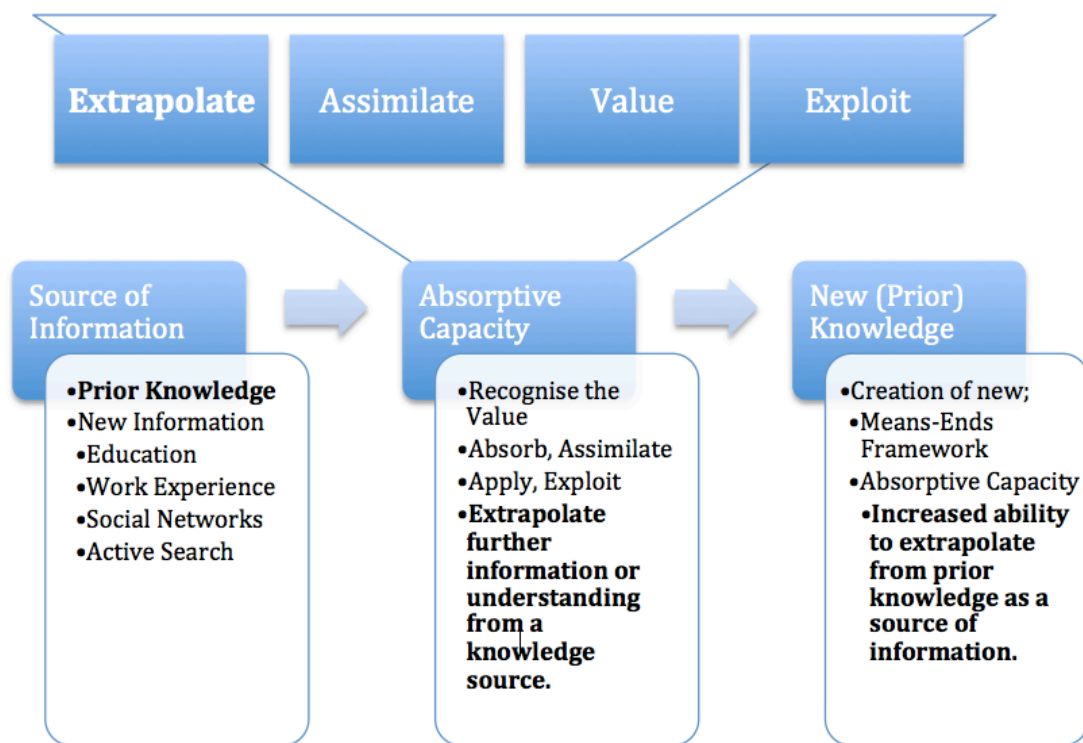
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The PK-AC Process, as modelled in the thesis provided a suitable framework from which to base our understanding of the role of prior knowledge in opportunity recognition.

The thesis uses the formation of new means-ends frameworks as an indication of new prior knowledge and thus opportunity recognition. As such, the model of the PK-AC process makes a connection between the concept of gaining new (prior) knowledge (ie. adding new information to an individual's knowledge store) and opportunity recognition. However, it is clear that an individual can gain new (prior) knowledge and exploit that knowledge in way which does not create a venture. Ie. the PK-AC process - which is considered to occur each time an individual comprehends new information - does not always lead to the generation of a new-ends framework. For example new information about the health benefits of a food may be exploited next time the individual cooks a meal. This highlights the simplification and focus of this particular interpretation of the process.

Somewhat incorporated in this simplification is the extrapolative aspect of absorptive capacity, where an individual creates further linkages and generates further information

which from new information or speculatively, from existing prior knowledge. Extrapolation from new information suggests that the individual is able to analyse and further develop from a given piece of new information, most likely based on linkages between the new information and the individual's prior knowledge (thus knowledge pathways may come into play), and an individual's ability to form assumptions. To further this concept, extrapolation from prior knowledge may suggest that an individual can develop new prior knowledge by considering what they already know (ie. thinking about the knowledge in the prior knowledge store). This would be especially relevant should an individual have possessed both knowledge of a problem and knowledge of a solution for a considerable period of time before making a link between the two, (ie. the individual knows about a problem and how to solve it but doesn't instantly put the two pieces of knowledge together). While this concept of knowledge extrapolation over time may delve in the cognitive psychology research fields it could also be used to develop the model further, in future studies. In this sense the PK-AC process can be updated with the findings of the thesis.



*Model 8: Updated Visual Interpretation of the Prior Knowledge – Absorptive Capacity Process*

The updated model considers prior knowledge as a source of information, though at some point this prior knowledge would most likely have come from an external source of information. Further, extrapolation has been added to absorptive capacity and the ability to extrapolate, as it is considered a part of absorptive capacity (when considered as the ability to generate and comprehend new information) is added as sub heading within the creation of new absorptive capacity, as the prior knowledge increases.



## Implication of Findings

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*In this section I will discuss the implications of the findings for theory and research.*

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This thesis has taken a step towards cataloguing evidence that an individual's prior knowledge does, in practice, influence which opportunities they identify and which ventures they create. This has previously been an assumption in the literature; the evidence highlighted in the thesis implies that the entrepreneurial characteristic to spot opportunities when they 'see' them could be due to many more individualised factors, and that these factors; such as absorptive capacity and prior knowledge are influenced by specific decisions an individual has made which influence; the new information an individual is exposed to, the way they comprehend that new information and the linkages they are able (or unable) to make to their prior knowledge. In this sense the literature should place further emphasis on the entrepreneur's prior knowledge when attempting to understand venture creation.

The findings suggest that an individual's prior knowledge from their education plays a significant role in their ability to identify opportunities. Furthermore the individual's education influences the networks which they can access and their absorptive capacity, which further influences their access to information and the potential information they can access.

Due to the way in which an individual's prior knowledge influences their ability to access to new information and the choices they make when accessing new information, an individual's prior knowledge also influences the ways in which they choose to validate their venture. This could imply that entrepreneurial venture validation is a much more personalised concept and much more knowledge dependant than is previously considered within the theory. One example of this would be the gut feeling or perceptive abilities considered as entrepreneurial characteristics relied on when choosing a venture, it could be that these perceptive characteristics are much more influenced by an individual's prior knowledge, specifically the way in which they relate a discovered opportunity to their prior knowledge.

In addition to several rhetorical questions asked throughout the thesis, there are two specific areas of possible future research which, the information gathered in this thesis suggests could be fruitful future study areas. They are: knowledge pathways and the extrapolation of new information.

There are several knowledge pathways indicated in the data; I would speculate that they are formed due to an individual following a life path which takes them towards subjects and experiences which are interesting to them, creating access to information, and thus a prior knowledge base, related to their interests. From a venture creation perspective, these individuals' knowledge pathways – as indicated in the literature review – may create a knowledge lock in/out affect from new information and the ability to then identify opportunities. The question that can't be answered from this thesis is if this is a positive or negative affect. Should potential entrepreneurs focus on one area of knowledge, in order to develop an in-depth prior knowledge and absorptive capacity, or is an (assumed, shallower but wider) broad prior knowledge based more constructive to opportunity identification. Further, just how breakable are these pathways, is really possible to choose to change direction in our education for example or do the effects of absorptive capacity make these knowledge pathways more ridged? Related to this, the thesis does not consider transaction costs of access to information – while this would be more relevant when studying knowledge pathways directly – it is considered slightly limiting to this thesis. The role of transaction costs in the formation of, or attempt to break away from, a knowledge pathway could significantly affect an individual's prior knowledge.

An individual's ability to extrapolate new information has been suggested within this thesis; this further advances the research of absorptive capacity at an individual level. What

could be interesting in future research is how this could be developed within the concept of absorptive capacity and the PK – AC process, a more specific and in depth study of this concept could benefit the research area.

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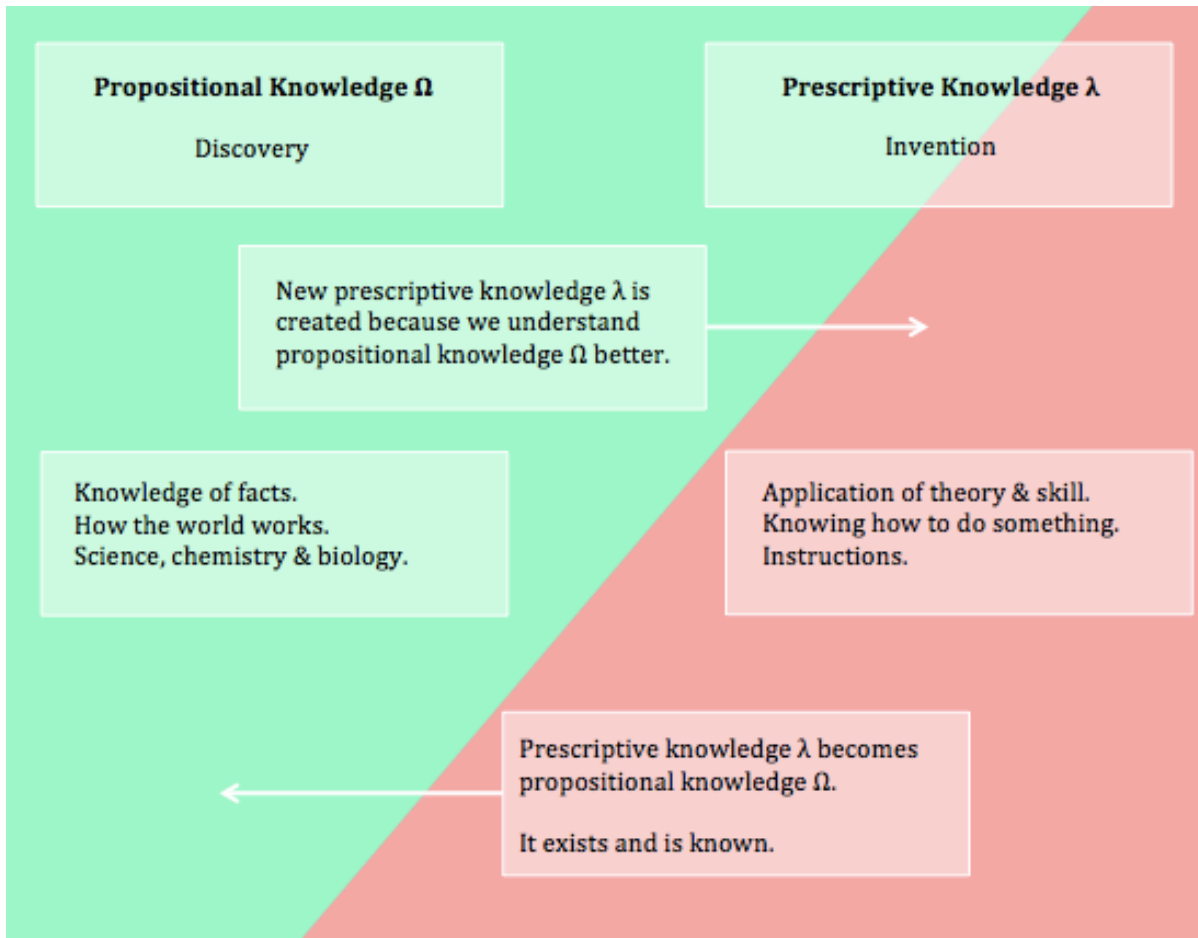
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# APPENDIX

## Appendix I - Propositional and Prescriptive Knowledge

*Representation of propositional and prescriptive knowledge, based on Mokyr (2002).*



## Appendix II - Interview Question Outline

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Age

How many ventures?

First venture?

Approximately how many jobs have you had in your lifetime?

How many different geographical locations were they spread across?

How many countries have you lived in?

Before you started this venture, what kind of knowledge and experience did you have related to the opportunity?

How did you come to recognise this as an opportunity?

What drew you to this opportunity?

What led you to develop that knowledge?

What kind of knowledge and experience do you have related to this venture?

How did you find out about this opportunity?

What do you consider to be the cause of the opportunity?

Where you actively looking for an opportunity? Where did you look?

What kind of changes in the information you had indicated the opportunity?

How did you find out about the opportunity?

Did you consider yourself to have any extra knowledge about this opportunity?

What kind of knowledge did you have about which markets to exploit?

What kind of knowledge did you have about how to serve the market?

What kind of knowledge did you have about customer problems?

How did your previous knowledge help you to start this venture?

What kind of experiences did you use to support the venture?

Which individuals helped you to recognise this as an opportunity?

Had you had any experiences which helped you recognise the opportunity?

Have you had some experience with this type of venture before? What?

Did you have any specific knowledge, which pushed you towards this opportunity? (Explain)

Did you gain any specific knowledge, which helped you to see this opportunity? (Explain)

Do you consider yourself to have some 'extra' knowledge about markets or customers, or a new way to serve customers, which helped you to secure this venture? Where someone else might not have? (Explain)

Do you considered yourself to have access to privileged/private information?

Have you any experience in research and development related to this opportunity?

Have you any experience in marketing related to this opportunity?

## Appendix III – Conducted Interviews

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Interviews conducted, data, location and interview length

Respondent	Interview Date	Location	Interview Length (Approximate)
Anna Maria	19 <sup>th</sup> March 2014	Gothenburg	50 Minutes
Deniz	27 <sup>th</sup> March 2014	Gothenburg	50 Minutes
Joakim	18 <sup>th</sup> March 2014	Gothenburg	60 Minutes
Johan	28 <sup>th</sup> March 2014	Gothenburg	60 Minutes
Jon	25 <sup>th</sup> March 2014	Gothenburg	50 Minutes
Nils	26 <sup>th</sup> March 2014	Gothenburg	60 Minutes
Peter	25 <sup>th</sup> March 2014	Gothenburg	60 Minutes

## Appendix IV – Interview Request Email

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*The questions provided in advance*

Here is a little more information about the interview...

The concept that I will look at is knowledge in opportunity recognition. I am hoping to gather quite a lot of information about what led you to start your venture and what kind of experiences and knowledge helped you along the way. It is quite important for me to gain examples of events or specific knowledge that pushed you in any given direction.

Here is the general outline for the interview questions, but the interview will be quite open.

Approximately how many jobs have you had in your lifetime?

How many different geographical locations were they spread across?

How many countries have you lived in?

Before you started the venture, what kind of knowledge/experience did you have related to the opportunity?

What led you to develop that knowledge?

How did you come to recognise this venture as an opportunity?

How did you find out about the opportunity?

Were you actively looking for a new opportunity? Where did you look?

Do you consider yourself to have some 'extra' knowledge about markets or customers, or a new way to serve customers, which helped you in this venture? (Please explain)

If there is anything you don't want to share or if you would like to be anonymous in the report just let me know.



## Appendix V - Sample Control Criteria

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The respondents and the control criteria.

Respondent	Entrepreneur	Ten Years	Discovery	New Means Ends	Gothenburg Based	Higher Education
Anna-Maria	Yes	2013	Yes	Yes	Yes	BSc
Deniz	Yes	2008	Yes	Yes	Yes	MSc
Joakim	Yes	2013	Yes	Yes	Yes	MSc
Johan	Yes	2006	Yes	Yes	Yes	MSc
Jon	Yes	2013	Yes	Yes	Yes	BSc
Nils	Yes	2010	Yes	Yes	Yes	MSc
Peter	Yes	2004	Yes	Yes	Yes	MSc

## Appendix VI – Example Data

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*A formatted example of the interview data; formatted as a chronological story.*

Peter had been working as a security guard full time for around five years, he continued to work part time while he pursued a Computer Science degree at Gothenburg University.

How long had you been a security guard for?

*Full time it was for five or six years and I continued to work while I was studying, extra work so to speak, for another seven years. I can remember when I first started as a security guard, I remember thinking we always used hand written reports and, for example, we also used files and folders with papers for information about all the clients and I thought it should be on a handheld computer. The big companies like Securitas and G4S they didn't do anything like that by themselves. I think that they should have started ten years ago actually. When we came out on the market our customers won really big contracts because they could offer a risk management system instead of a written report and that was a big impact in the local markets where we had our customers. So actually with the small companies now starting to win big contracts from Securitas and G4S, they have started to develop customer systems and hand held device systems but not before.*

What do you think made you change?

*From being a security guard, I don't know actually, I think I got bored. I think I wanted to do something with my career and my life. So I went back to school.*

While studying at Gothenburg University, Peter conducted his Thesis with Gothenburg Harbour and his previous employers G4S. His thesis led him to further develop ideas that had occurred to him while working as a security guard.

*I studied at Gothenburg University, Computer Science, for four years. I chose the softer path not so much programming and more business, and knowing how to build complex IT systems and things like that. That was more my focus or specialty. I conducted my thesis in the harbour together with the head of security and my former employer G4S. When I was finished with that I had some prototypes, I showed them to the head of security and for the staff out there in the harbour. The head of security said that if this had been commercially available on the market he would buy it for the harbour - the harbour is a high security facility so they really know what's out there, what kind of systems there are - I thought 'oh this is a spot that hasn't been covered yet so I should see what I could do'. That was the exact moment that I realise that this would be my thing to do.*

Following his thesis, Peter was offered an opportunity to work with the Victoria ICT Research Institute. The opportunity enabled him to continue his research in the Security Industry for a further three years, financed by the City of Gothenburg.

*I met a guy who said that there was a possibility to join the research group so I could study another three years in the industry, learning a lot about the situations for the security guards.*

*I was able to stay in the industry for three years. I followed them for over 1000 hours, night and day shifts and all over the place actually. I spent sometime with the*

*supervisors as well and interviewed a lot of end clients to see what kind of system or services they want in the future and so on.*

*It was just coincidence that I met the guy at the research institute and he just told me that they have a group called public safety that look into police and rescue services - I thought, "aha, that could be something for me!" I contacted them and they thought it would be a good idea to include the private sector in the group as well. I was employed for three years by the Victoria IT Research Institute. We belong to a research group for public safety who were researching the police and rescue services. My background as a security guard and my studies in the harbour really fit well into this group.*

*The City of Gothenburg paid for my research because they are also a big buyer of security services. They buy security for almost one hundred million Swedish Kroner a year. They were not satisfied with the services big companies delivered, they got hand written reports and were forced to work reactively all the time. Read the report and then call the glass repairer man, for example, and they put that report in the file and forgot about it, so they didn't know what the security situation was in the Gothenburg area. They said to me that they wanted to more work proactively with the security, see how things develop in different areas and so on.*

*Did you keep developing the first prototypes?*

*No I didn't use the prototypes I had started with because they were really simple, just mock ups really. When I started at the research institute we started to build new prototypes, more sharp, commercial prototypes so to speak. When we finished at the research institute we had a base of prototypes to developed from so we didn't have to start from zero when we started the company.*

Once the research project was coming to a close Peter decided to start up the Blue Mobile Systems venture, implementing the concepts and prototypes he had been developing.

*I haven't found any research in the world that has focused on security guards, and tried to make an operational support system for an entire branch or industry. We see that now that we don't actually have any big competitors on the market. Most of the competitors support some part of the customers processes, but we have focused on the whole core business for them and that's really good because we know exactly what kind of problems they have and how we can make solutions for that.*

Were you looking for an opportunity when you came about this?

*Not really it just happened, I think. When the three year period started to come to an end, I was just thinking, "what should I do now?" I had all theses results. I remember taking my colleague with me to the waterside for a cup of coffee and asked him if we should start a company together and he said pretty much, "yeah lets do that", and the day after we did.*

The first colleague that you had, where did you meet him?

*I took him into the project at the end of the research actually, for about six months or something just to develop some ideas that I had. He's not with us anymore so it's just me. I think I met him at the IT University here at Lindholmen. Just talking to him over a cup of coffee, then we became friends. Later on I asked him if he wanted to work for some hours for me in the research group.*

## **Blue Mobile Systems**

*So after three years since starting in the industry, luck has been with us and we started Blue Mobile Systems in 2004 and have ever since developed the product Guard Tools, supporting security companies, security guard companies.*

Could you explain for me exactly what it is you are currently doing?

*We have three different systems, one for the mobile worker; it's a software on a hand held computer that supports the guard with instructions, reporting, barcode readers, GPS positioning and stuff like that. Then we have another system that we call Guard Tools Office; that's where they put all the information about the clients and planning the guards as well. Then we have a third system for the end clients; they can log into a web portal and get the reports in real time from the security guard company and it also records statistics and things like that. So that is pretty much it. Now we are going abroad with our services, we have customers in Denmark, Norway, UK and Iceland, Faro Islands as well. We are really moving forward.*

*Everybody who doesn't know about the industry and what's important always starts to believe they need map systems, positioning and GPS, fleet management systems for example, it looks nice and you can see the guards and things like that. They always started in that direction, but you don't gain so much from those kind of systems actually because you don't gain extra revenue. You're actually just adding costs, because you can't make it more efficient by using those systems. So we started to work with the non sexy features, automating manual processes for example; so when the guard is finished with the work shift the servers go through a schedule and see when the customers should have the reports and what should be in it. That is wholly automated and there are a lot of gains there for the efficiency. That is a typical example, they don't know what they need, they think they need a fleet management system but what they really need is to cut overhead costs. So that we have been doing a lot with our system.*

*You can plan in advance all the patrols for example for each and every customer, so the computer says which shift you should download for each day, which ground sheet to use. That kind of work is manually done today. There is a lot of money to be saved there, when you can automate what is being done. Everyone we meet thinks they need fleet management systems and all kind of systems which are not really important for them, but we always talk them into what they really need and then they realise, "yeah, you are probably right".*

*When we started it was just a colleague and me, we had to focus on how to finance the company. It was quite hard in the beginning because we had to find some money to finance ourselves. We found early venture capital money, not much in the beginning but it was enough to get going. Later on we found bigger venture capital money, since then we have been really good at searching for government money.*

How do you keep up to date on new research?

*I'm constantly searching the web for new projects or products. There are some apps starting to pop up now when the android platform is in place and new cheaper devices are coming, we tend to call them shallow solutions because they are not so deep in functionality and the value is not so high. Maybe you can make a report but you can't have the automation which we have spent millions of hours to create and so*

*I think our main value is that we have been doing this for almost ten years now and made all the alterations and the server and parts of the system. We are also developing apps so we can offer that as well, our earlier versions are more software, apps are smaller and easier to learn and things like that, so I think we should have both.*

*I'm out a lot with the clients and customers, partly our direct customers but also the end clients just to interview them, to ask what you need what do you want to use in the future, and things like that. I try to use my methods that I learn in the research, now when I develop new features and things, trying to be in the front all the time. So for instance right now we are looking to develop some video integration into our product and we haven't seen that anywhere else so I think we could be in the front there as well.*

So across the three products, is it specialised per customer?

*No, I'm so happy now that we decide a long time ago not to make special developments for individual customers. It's easy to maintain the system and develop just one code base for everybody, and that's quite easy to do in our industry because every customer has the same problems and is seeking the same solutions. We had so many requests from the customers, "can you do that just for me? I just want this feature?" We said no every time. I'm so happy about that now because it would be a mess to handle different versions and things like that.*

How did you decide which customer you were going to find?

*We started off in Sweden, but we said we wanted to go abroad. We thought the UK should be the first, because its one of the biggest countries and when it comes to security. They have a lot of companies as well and we had been in the UK the past ten years with the exhibition so we knew some people there and thought it's quite easy to get to London and so on. So we started in London and in the UK and got our first three customers there, but the economy in the UK is tough so it was hard to expand quickly. We went to Denmark and Norway and it was quite easy for us to sign contracts but we are moving forward with the UK as well now.*

How do you find new customers and make those connections?

*We use the internet a lot, just to search for companies and then we can see if there is any organisations in the counties where the security guard companies are registered or something like that, then we usually send out some information about our products or some follow up telephone calls. It's quite easy for us to use mail actually because we are never seen as a spam; they are really interested in the things that support their industry so it is quite easy and good for us to use that forum. In the UK really hard to call because you have company secretaries who are instructed not to take sales calls, but in Sweden and Denmark it is easier to reach the owners directly or the top management.*

*We will increase our newsletters; we have started with Germany right now. We have learnt that once you have one company it is so much easier to get the second and the third, so we have to ensure we have the first customer and then we can build on that. The first customer always helps us with the language in the software for example they can say, "here you should use this word instead". So we can make our language better in the program and they can often give us some connections as well because they know other companies in the network and they recommend us.*

Do you use networks?

*Yeah, I'm starting to use LinkedIn quite a lot. I think that is a good forum, I get some good response from just short messages. I think it's quite a good tool so I will try to use it more in the future. It's almost like you are recommended when you are in someone's network and he can see that I know some people that he knows, that is fantastic in a way. So I think we will try to use that in the future.*

*We always go to a big exhibition in the UK as well, it is usually in Birmingham but this year it's in London. So we will be there in June and go to this exhibition, we want to have a nice feature which catches the eyes so to speak to have something really nice things to show off at the exhibition. We have live streaming functionality so you can take up your phone and broadcast live feeds from our application and then add that as part of the reports later on.*

Do you make lots of new connections at the conferences?

*Yeah, we always have ten to twenty cards that we will connect with and see if we can do something together, collaborations or partnering up with someone. Actually we always meet some possible customers as well, security guard companies in the UK.*

Do you work with collaborators?

*Yeah quite a lot, we have integrated our software into other software. For instance, MS Dynamics for automated invoices when they respond to call outs it will automatically create an invoice for the customers. Then we have integration with alarm centre software, so the alarm centre can just push a button and send it into our software, so the guards can get the alarms directly to their mobile devices.*

## **Background**

How many jobs have you had in your lifetime?

*Five jobs, all in Gothenburg. I started off as a security guard in the beginning, that's why I am with this company right now as it's built with my experience from the past career as a security guard. Then I went back to school for approximately seven years. I was able to do my master's thesis, together with my former employee, G4S, and that's why we started this company.*

Have you always lived in Sweden?

*Yes, I have always lived in Sweden. I have been abroad quite often; I was actually away for a year on a world tour. I went to China, Thailand, Australia, United States and then back to Sweden. I stayed on for the full year.*

Did you find any other people that you bounced the ideas off of?

*No, I think we had so many ideas from the beginning so it took us some years to put that bit together. Then later on it was actually our customers that asked us to develop special features.*

Do you have any experience in Marketing?

*Not really, we have built up our experience. We haven't had the money to buy those services yet but in the future we will do that, so we have done almost everything ourselves.*

Do you think you have any knowledge, which helps you to continue to learn in this field?

*Yeah, I think that the methods which we learnt in the research institute. Like the methodology we used when we did the research. It was field studies, so following security guards, taking notes and doing semi structured interviews. Making prototypes all the time and testing with security guards and got some feedback and response and resigned the prototypes then went back, so that was a method that we used in the research and we are actually doing the same here, so it was a good way of working there.*

Do you think you have any experience that helped you recognise this opportunity that we haven't talked about yet?

*I noticed that Swedish companies have a high trust value when we come to other countries, which has helped. I think my personal approach is not so selling, I try to give them a background as a security guard and as a researcher and I notice that they are really listening to me because I have this knowledge, they always recognise the problems which I explain because they always listen and they are smiling a little bit so its quite easy for me to get our message out there.*

Where do you think you developed that style of selling?

*I think that when you meet a really selling person; don't feel so good about the hard selling, always when I get pressure from a sales person you don't want to have the product. It's easier if you are honest and tell them, "this is how it looks, call me if you are interested". It's easier that way, there is more trust in that I think. If you don't take a really selling approach, they always they say, "I felt comfortable with you and you looked like a person that I can trust".*

## Appendix IIIV – Decoded Data Sample

Decoded Data Sample: Showing quoted text from the respondents.

	Opportunity	Description of Discovery Process	Prior Knowledge	New Information
Anna Maria	To operate as a language consultant in Gothenburg.	It was during my studies - I always thought that was the only way to go (to start my own company). Once the University started to look into starting a Language Consultancy education here in Gothenburg, I thought this might be the right place to start. I also asked some people I knew, how they were working with these questions both the companies and authorities and I tried to do some, calling and just trying to see if there's interest, I also looked at the webpages and the text in general, to see if there is potential for me. I found out that, yes, people need this, or could use this.	<p>Interests I've always been interested in in communication.</p> <p>Interested in learning languages.</p> <p>Education Language Consultant Program at Umeå University.</p> <p>For my thesis - I measured the effects of working with language in this strategic way - I found that it is possible to save a lot of time.</p> <p>Work In the HR firm...I tried to work more and more with the texts. To get some experience from it.</p>	<p>I asked a lot of questions. I had some meetings with the university; the people who decided to start the program here, to ask what kind of background checks they had done.</p> <p>I figured Gothenburg was a good place, since there is not a lot of competition here. There is only 2 people working with these questions and they work with authorities mostly and I wanted to work with private companies.</p> <p>When I decided to start this I also began to look at the market and the companies and the possible clients. I tried to learn about how the market was working here. I tried to look at the competition amongst others - not only people with the same background but also with similar backgrounds, there are a lot of copy writers but we don't do the same things. I found that - I thought at least - there was a lack of this competence, that is more strategic in the written communication and not only in what the brand is, or how to communicate with covers and everything. I gathered old adverts, but only with the written language, I did think that there is no such - or not so many - companies that are working strategic with the written communication and also educating people who write a lot as well because its not only about putting guidelines and writing text but also helping the people who write a lot so that they have the tools to do it good. I'm not sure there is the expressed need yet. So I'm trying to make companies understand that they need me.</p>



	Opportunity	Description of Discovery Process	Prior Knowledge	New Information
Deniz	To create and sell high tech, interactive, multi touch devices.	<p>During my thesis I worked on a project to make a fully interactive bar counter, which was supposed to be installed in our department at Chalmers. Carlsberg came to visit and just happened to see this counter, we agreed that we would create two tables for them.</p> <p>The only way of invoicing was to create a company, so then we created a company. Our parents came in with the capital to start the company and then we still had two years of studies. During that time we got some rooms at Chalmers where we could further develop this thing, we showed it to some other interested clients, we got some news interviews and so on some promotion that way so when people saw it they wanted it as well. It really started as an accident because Carlsberg happened to see it and then other people showed interesting in having interactive stuff as well. The second customer found us through the newspaper article and then we ... somehow we got in touch with Microsoft and from then on a lot of customers were referred to us.</p>	<p><b>Interests</b> I've always been interested in computers and programming, designing webpages from quite a young age. I wanted to create apps and games. I had a computer quite early, and I had a lot of friends also interested in computers. I'm interest in math and science.</p> <p><b>Education</b> Computer science and software engineering. During my thesis I worked on a project to make a fully interactive bar counter.</p> <p><b>Work</b> I took a bar tending course during one summer vacation. I thought that could be cool. I got an offer to be a bar tender and at the same time an offer from Eriksson, but I tool the Eriksson job. At Ericsson I was creating automatic tests for their base stations, so I programmed specific tests based on their specification.</p>	<p>I think that the reason were able to create a touch screen was because there were some people who had some early research trial and so on and shared it in an online community - that was a place where we all shared and helped with building the core software that later on we used. The recognition of fingers and so on.</p> <p>We had a meeting with the Computer Science student department and we presented our prototype. They said that they wanted to create something which was cooler than the other bars and asked us to create the interactive bar counter for the student bar.</p> <p>Carlsberg came to visit and just happened to see this counter, we agreed that we would create two tables for them.</p> <p>We have partners who create the touch screens, they need to see the touch screens with some sort of software. We collaborate to create a kind of package solution and try to describe together to a reseller how that can be a useful and what for. That reseller needs to communicate that to their client so there are a lot of parts that need to come together.</p> <p>When we have worked with partners or other companies who have resold our stuff that we get an insight into how people try to sell or what way to package and how to make a pricing or business models</p>

	Opportunity	Description of Discovery Process	Prior Knowledge	New Information
Joakim	To create an idea management software system for SMEs.	I wanted to make a firm from my research. From my research I realised that the innovation is a process that it is worked as a process even though the respondents told me that my model is a model I realised that they were working in a process. I also noticed that they did not use any IT support. I realised that if you work as systematically as in finance but in a new area, there must be a huge opportunity.	<p>Interests</p> <p>I was interested in calculating different stocks. I realised that I found maths very easy - the math course - and I've continued to study finance.</p> <p>Education</p> <p>I was good at math, so I studied mathematics etc. Once I decided to study again, I chose finance Maths and Finance Masters in Economics and Commercial Law</p> <p>Work</p> <p>I've had three different careers. First as a technician, for five or six years, in three different firms, firstly at Saab, the car manufacturer. They had a factory in Gothenburg near Liseberg, there I worked as a technical controller. Then I worked as a technician and after that I worked at a security company called Securitas.</p> <p>After that I decided to take another direction so I worked as a security guard and I did military service abroad as a UN soldier, then I practiced to be in the police but I decided not to become a policeman. Then I changed to finance. In finance I've had six different jobs.</p> <p>As a CFO and Financial Manager I used to work daily with different ERP systems. I was analysing data back and forth in different dimensions and I think I have quite good skills in different ERP systems and I've participated in implementing different ERP systems and business intelligence systems and to help the employees in the firm so they can analyse the data.</p>	<p>As I worked with my PhD studies I realise that the firms I was studying - SMEs - they did not use any IT systems related to the innovation process so that's why I thought that here is a great opportunity for me as a controller. Here we can structure the process, because theoretically I structured what they did but when they work it is not structured. The respondents told me several times that - 'your model is very structured, the reality is not structured' - that's why I thought, well why is this? Why can we not structure the reality?</p> <p>I realised that if you work as systematically as in finance but in a new area, there must be a huge opportunity.</p> <p>I found Hype (a competitor)...I thought their system was very good but too complex, because one of the things I noticed when I worked as a Controller and CFO. I always struggled with the implementation of ERP systems and business intelligence systems. When teaching non-financial people to manage the systems, everyone said it's too complex, and too difficult and they don't understand and where do these figures come from and how do you do this? So most people who don't work with ERP systems daily think that ERP systems are very complex. They see them as illogical, but when you know them they very easy.</p>

	Opportunity	Description of Discovery Process	Prior Knowledge	New Information
Johan	To develop and sell components for heat exchangers.	<p>During an internship I was asked to work a project, developing a concept about membranes in a heat exchanger - they had tried building a prototype about 10 years ago and never got it to work so they shelved it - I built two prototypes in 2001 and then I came back in 2002 and 2005 to keep working with it.</p> <p>When we started looking at this we realised there was nothing out there like it and when we Google it we couldn't find anything that looked anything like it and couldn't find a patent, so I decided this probably is something I can do.</p>	<p><b>Interests</b> I've always been interested in energy. The whole time that I studied all the projects that's I did usually ended up being something to do with energy.</p> <p><b>Education</b> Master of Science, Applied Environmental Science. (Physics, Maths and Environmental)</p> <p><b>Work</b> I've had a lot of summer jobs, I worked in construction companies and a marketing company. I've never really worked in a 9 to 5 job. I spent three months with a company here in Gothenburg doing marketing for them, but I hated it. I hated sitting in one place and being in one place and having to be there certain times. I worked part time as a bar man for almost 11 years. I never took permanent employment. Ever since we had enough funding I've been self employed - my company is a consultant for the development company.</p>	<p>The professor had this idea about membranes in a heat exchanger.</p> <p>One think I learnt there, when you live in the rainforest your very isolated, because you are so isolated you have to solve all you problems yourself, you cant rely on buying things you have to actually be able to sort them out somehow. So the professor had a big workshop and machining tools and a big lab - a big chemical lab- a lot of different things like that. That gave me a feeling of being able to accomplish something by using my brain and whatever you have available. You don't have to buy a solution you can just figure out a solution and just do it.</p> <p>When I came to this it suddenly became more of applicable work something that was hands on and had an application and you could see straight away. We actually reduced the amount of condensation in the air con unit by 1 litre, so we've saved this much energy and this much diesel.</p> <p>When we started looking at this we realised there was nothing out there like it and when we Google it we couldn't find anything that looked anything like it and couldn't find a patent, so I decided this probably is something I can do.</p>

	Opportunity	Description of Discovery Process	Prior Knowledge	New Information
Jon	To create a cloud based, sharing and management system for photos and documents.	To start with we were just handling pictures, to make a better solution for people to handle their photos. This was a problem that we had ourselves so we started to look at creating a solution. I realised it was difficult to compete with Google and Microsoft so we decided to develop the solution towards a problem we had with a customer.	<p>Interests I had a dream to have my own business or to make a project that you can build a business.</p> <p>Once I've learnt something I'm looking for something more. I want another opportunity or challenge. I've always focused on IT and solving problems and working in projects.</p> <p>Education I didn't know what I wanted to do so I chose the most open one. At Chalmers, I studied Electro Engineering, that was some programming and similar things. Same in School, I always selected the most difficult just to be able to choose later. Electronic I chose, not because it was the most advanced but because it was only two years. I wanted to have the reference at high school just to be able to get a job.</p> <p>Work I started at Swisslog after University, focusing on IT Systems and problem solving projects.</p> <p>I used to program automatic truck and automated warehouse systems.</p> <p>I got the opportunity to take another job at Soft Design. In the same business but a smaller company, then there was an economic crisis. So Soft design had to let me go after one half, two years.</p> <p>I was actually happy because then I had to take the step and I started the business while I was also looking for jobs. Then I started my one business as a consultant. I got jobs directly.</p>	<p>I usually come up with ideas about how to solve something and I talk about it with my brother. We talk about if it is possible to solve something in a particular way, with this technique and that technique. So I knew that it was possible and how difficult it would be to solve it with the programming part and then I tested it on different person.</p> <p>We realised it was difficult to compete with Google and Microsoft</p> <p>I decided to look at the problem we had with a customer – it takes significant amount of man hours to process photographs from the containers.</p> <p>I had thought about companies because I always relate problems that I have where I work. I looked at companies and we also had the private sector in mind. We had the problems to solve and we started to focus on the companies and left the private sector.</p> <p>We started to ask other companies if they also had similar problems, test solutions and ask around. Make a small presentation or a mock up and try to explain how we would solve the problem together with the technique, then get feedback and improve.</p>

	Opportunity	Description of Discovery Process	Prior Knowledge	New Information
Nils	To create a recruitment company which focuses on matching engineers to prospective employers.	We heard that a lot of companies have so much trouble with the recruitment process, so there we had the problem. There were so many actors and we had yet to discover a company who did this really well, which was an opportunity. We looked at the factors affecting a bad recruitment and tried to eliminate them all.	<p>Interests I think I have always wanted to start my own companies.</p> <p>I've always enjoyed playing with computers programming a little bit, so it's been kind of natural for me to go a little bit towards that I've done.</p> <p>Education My Bachelor was more in computer engineering but towards computer science, my specialty was in computer science. Master's of Science in Industrial Engineering, Management and Economics of Innovation.</p> <p>Work I've had several jobs parallel to my university studies. I have also worked as a project manager in an IT project in Sony Ericsson, so that was also, we were 15 people in the project for half a year, that was kind of educating as well.</p> <p>I was doing my master thesis at Gothenburg Energy. I did a good master thesis and they approached me and asked me to - actually they wanted to employ me - but I didn't want that, so I said I could do it as a consultancy through my own company and they accepted. So that's how I came to that venture.</p>	<p>We heard that a lot of companies have so much trouble with the recruitment process, so there we had the problem.</p> <p>We looked at the companies and what they had to say and asked the employees, the good employees... the ones they like and who like to be there. We came to the conclusion that a successful recruitment is usually done to find people who really love their job. I don't know if that's the truth but that's what we found out and so then we just asked how can we find people who love their next job - just find out what they want to do and then find that job.</p> <p>The person I started New minds with....he knew all the CEOs of all the good customers so we were fast tracked into many of the big customers... he had the connections to the companies and I had the connections with academia.</p>

	Opportunity	Description of Discovery Process	Prior Knowledge	New Information
Peter	To offer a complete solutions to the security guard industry.	I can remember when I first started as a security guard thinking about why we always used hand written reports and files/folders with papers for information about all the clients. I thought it should be on a handheld computer but the big companies like Securitas and G4S they didn't do anything like. I conducted my thesis in the harbour together with the head of security and my former employer G4S and when I was finished with that I had some prototypes. I showed them to head of security and for the staff in the harbour and the head of security said that if this had been commercially available on the market I would buy this for the harbour - I thought 'oh this is a spot that hasn't been covered yet so I should see what I could do'. That was the exact moment that I realise that this would be my thing to do.	<p>Interests</p> <p>I met a guy at the research institute and he just told me that they have a group called public safety that look into police and rescue services, I thought, ah, that could do something for me!</p> <p>I wanted to do something with my career and my life. So I went back to school.</p> <p>Education</p> <p>I studied at Gothenburg University, Computer Science, for four years. I chose the softer path not so much programming and more business, and knowing how to build complex IT systems and things like that. That was more my focus or speciality.</p> <p>I conducted my thesis in the harbour together with my head of security and my former employer G4S</p> <p>Work</p> <p>As a security guard, full time it was for 5/6 years and I continued to work while I was studying, for another seven years or something like that.</p> <p>Then I was employed for three years by the Victoria research institute, IT research institute. We belong to a research group for public safety who were researching the police and rescue services and I thought that with my background as a security guard and my studies in the harbour really fit well into this group.</p>	<p>I conducted my thesis in the harbour together with my head of security and my former employer G4S and when I was finished with that I had some prototype that I showed to the head of security and for the staff out there and the head of security said that if this had been commercially available on the market I would buy this for the harbour - the harbour is a high security facility so they really know what's out there, what kind of systems there are on the market.</p> <p>Within the research group, I could study another three years in the industry learning a lot of the situations for the security guards so I followed them for over 1000 hours, night and day shifts and all over the place actually. I spent sometime with the supervisors as well and interviewed a lot of end clients to see what kind of system or services they want in the future and so on.</p>