Key concepts for building customer references - creation of a domain model for start-up technology companies

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Abstract

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The market for a complex technology product is sometimes called a “reference business”, because the need for references is emphasised by corporate customers. A first customer reference is especially important for a start-up technology company trying to enter the business-to-business market with complex products. This article concentrates on evaluating the concepts of the customer reference from the start-up technology company’s perspective. Topics relating to customer references are very much under researched although the topics can be considered important. The current concepts concerning the use of the first customer references, in particular, are vague and inadequate, because the subject has scarcely been discussed in the literature. The purpose here is to present a domain model, which describes the key concepts and the relationships between these entities. The domain modelling technique is well-known and widely-used for defining the concepts of large scale IT systems. The domain model increases the understanding of the problem domain by structuring it into classes, attributes and relations. This article starts the concepts’ identification by introducing an example case. Then the known concepts, close to the topic of this article, are reviewed based on the literature research. Redefinition for the customer reference and definitions for new related concepts are introduced.

1 Introduction

Customer references are needed for convincing potential customers to purchase products from a supplier. The importance of the customer reference is critical for business success. The importance of the reference can even exceed the importance of innovativeness of the product. A customer appreciates a working reference more than the new technical features of the product, which is not tested in the market. The first customer reference is especially important for start-up technology companies, which aim at producing large complex systems, such as software for Human Resource Management, for corporate customers. Usually start-up technology companies want a customer reference to prove their credibility.

The customer reference is a well-known concept in marketing but the customer references are hardly researched. Beard and Easignwood (1996) write that the commercialisation stage is often neglected in the literature on new product development, innovation and high technology marketing. According to Salminen (1997) the concept of reference is almost unknown in the scientific literature. He adds also that the subject of using industrial references has not been studied in the scientific literature. According to the *Quarterly Bulletin of Bank of England* (2001) there are only few, quite recent studies, which have concluded that industry and market factors are also important for the success of start-up technology companies. Earlier start-up technology company studies have mostly focused on the characteristics of the entrepreneur and their teams. Salminen (1997), Ruokolainen and Igel (2004) and Ruokolainen (2004), Ruokolainen *et al* (2004) have elaborated on the use of the customer reference but none of those articles include concepts and definitions of the problem domain of a first customer reference of a start-up technology company.

The growth of societies is partly based on the growth of start-up technology companies. Start-up technology companies are often research and development driven companies that plan to capitalise on their knowledge after a breakthrough in their research and development work. This can be far from easy due to the volatility of the high technology market. Therefore, the overall research interest of the present article lies in the question of how the start-up technology companies can realise the market potential. It is believed that the first customer references might play a role in the process of realising the market potential in a specific business sector.

The author's pre-understanding of the research subject is based on three research studies (Ruokolainen and Igel (2004) and Ruokolainen (2004), Ruokolainen *et al* (2004)) and **on** being the head of the team of project managers whose job was to implement the first versions of software products for corporate customers**.** No separate footnotes are given in this article when referring to the above-mentioned research studies. The research studies consist of a multiple case study, a nomothetic research and a longitudinal case study.

1.1 Research objective

The object here is to increase understanding of how the first customer references are built and how they are used to generate further business. In order to increase the understanding the following sub-objectives are set: (1) The concepts belonging to the problem domain are needed to be identified. (2) The concepts are needed to be investigated to increase the understanding of the related attributes. (3) Missing concepts are needed to be defined. (4) And finally the concepts of the problem domain are needed to be organised into a model, describing the relationships of the concepts. A "map", describing the objects and relationships between the objects, gives a holistic overview of the problem domain, and thus increases understanding of the investigated phenomena.

This article consists of the following parts: The used domain modelling methodology is introduced in Chapter 2. The concepts to be investigated are identified with the help of an example case in Chapter 3. The concepts are defined and related attributes are sought in the literature in Chapter 4. New concepts are introduced in Chapter 4.7 and the domain model is given in Chapter 5. The conclusions are introduced in the last chapter, Chapter 6.

2 Methodology

Because the concepts of the research subject have not been defined in the literature, a method, by which the relevant and missing concepts can be identified, is needed. Focusing on describing concepts and constructing the domain model is a mean of approaching the ontology of the problem domain of this article. An ontology can be regarded as an explicit specification of a conceptualisation: what "exists" is that which can be represented. An ontology of a problem domain can be described by defining a set of representational terms and by readable text defining the meaning of the concepts, relationship between them etc.

In the process of engineering the requirements (Loucopouls *et al.* 1995) of large-scale information systems, various presentations are proposed, such as state transition diagrams, dataflow diagrams, domain models etc. The main benefit of producing these is a better understanding of the nature of the problem. The domain analysis and modelling are used for producing domain models that include concepts of that specific domain in the form of classes, attributes and relations. Applying the domain analysis and modelling to the present research subject means a systematic approach that should be used to attempt to adequately describe the problem domain.

Domain models can be constructed using various presentation diagrams. Gen Voca (Batory *et al.* 1992) is an object-oriented method for hierarchal domain analysis and modeling. Unified Modeling Language (Rumbaugh and Booch 1995) uses class diagrams for describing the problem domain. In the simplest form the domain model introduces just the vocabulary. In this article the combination of verbal descriptions and Unified Modeling Language's class diagrams are believed to deliver the best results from the point of view of communication.

Building of a domain model is largely discussed by Sommerville (2004) and Pressman (2004). According to them a problem domain includes real–world things and concepts concerning the problem that the system is being designed to solve. The building blocks for a domain model are identified with help of an example case consisting of a story relating to the problem domain. The candidates for the concepts are tangible real-world things, users, events and interaction, which can be conceptualised. Those concepts and real-world things, which are redundant, vague, meta-language or describing operations and not belonging to the research topic, should not be considered.

3 Problem domain: concepts identification

The items of problem domain are identified with help of an example case, which was picked from the literature (Ruokolainen et al 2004). The candidates for concepts are underlined. The candidates' links to the literature are identified.

3.1 An example case for building the first customer reference

The Thai entrepreneur of a start-up software company received her degree, a Ph.D. in mechanical engineering, at a university in USA. Before setting-up her own software start-up company she had gained her work experience in the software development in an oil refinery company.

The first reference customer of the start-up software company was one of the largest pig farms in Thailand, owned by the entrepreneur's good friend with whom the entrepreneur had often been in contact since school. This friend and customer had contacts with major players in the pig rearing industry. From the entrepreneur's point of view the case looked like a good business opportunity to develop a software product for managing pig farms and for devising feeding plans for pigs.

The idea of the software package was conceived and developed together with the first reference customer. The focus of the joint development was on determining the specifications and figuring out the business logic for the pig feeding system and implementing it. The first customer was willing to act as a test site, thus, helping to verify the functionality of the new software. The entrepreneur contacted a professor at a local university to get a better understanding of the optimum feeding plans. The software package was finalised with contributions from all of the parties involved, without considering the ownership of the

Intellectual Property Rights. The entrepreneur commented that her team learned much about how to build software systems.

The case study company and the local university together arranged a seminar and an exhibition for pig farmers introducing the opportunities offered by new technologies. In the seminar, the new software package and the first reference customer's experiences of the new system were presented to the pig rearing industry as a success case. The price of the package was considered modest by the next potential customers. The development cost of the software product was paid by the case study company.

Soon it turned out that only large pig farms wanted to use the software product offered by the case company. Small and medium-sized farms preferred to use software packages distributed free of charge by medical companies. Medical companies delivered their software products to farms to support their sales. However, large pig farms did not want to become too dependent on one medical supplier. Therefore, they were interested in using software products provided by an independent software company. Taking into account the modest pricing of the new software package and the low number of large pig farms in Thailand, it was clear that the anticipated business could not be profitable.

As the home market could not generate enough revenue, the case study company attempted to export the software product to a neighbouring country. An agent, a local software company, was found to help in this endeavour. Six software packages were sold before the agent "disappeared". All subsequent efforts to contact the agent firm failed.

Although the software product was developed and implemented successfully, the attempts to earn money from selling software to pig farms ended in failure. The entrepreneur felt afterwards that the work done at that time was valuable although the market entrance failed: during this initial business stage the entrepreneur and her team gained valuable experience in marketing.

3.2 Concepts identification with help of the case example

According to the example case description, the following list of the concepts candidates has been identified. Each of the identified candidates represents an instant of a concept or a concept to be included in the domain model, for example, a medical company is an instant of the concept a competitor in this context.

Table 1: Concepts identifications

Candidate for concepts	**Concepts in the current problem domain**
An entrepreneur	A technology entrepreneur
A start-up software company	A start-up technology company
Educational attainment, work experience	An entrepreneur's background
A first customer reference	A first customer reference (new concept)
One of the largest pig farms	A first reference customer (new concept)
Entrepreneur's good friend, contacts to major players	Social Capital
Business opportunity	Business opportunity
A software product	A technology product
Joint development with a customer	Collaboration in R&D with a customer

Intellectual Property Rights	Intellectual Property Rights
Introducing new technologies in a seminar or exhibition	Entering high technology market
A medical company	A competitor
Next potential customer	Next potential customer
Customers' experience	A reference business case (new concept)
Did not want to become too dependent on one medical supplier	(Customer's) business case

The concept relating to the building of the first customer references or the customer references generally have been scarcely discussed in the literature. The new concepts are introduced in the chapter 4.7. The author assumes that a customer reference reduces the perceived risk (Bauer 1967; Hutt and Speh 1992), increases the suppliers' credibility (Blomqvist 1997; Levitt 1967) and increases the reputation of the supplier (Herbig and Milewicz 1993; Doney and Cannon 1997), and thus helps the start-up technology companies enter the market.

Start-up technology companies have been widely studied in the literature by several authors (Autio 1995a; Yli-Renko 1999; Freel 1998; Huang and Brown 1999). The technology entrepreneurship has also been extensively discussed in the literature in studies of start-up technology companies. Sevaral authors (Freeser and Willard 1990; Hannan and Freeman 1989; Maes 2001) have discussed the effect of the background of the entrepreneur on the success of the business. The characteristics of the technology market including entering the market have described by Moriarty and Kosnik (1989), Beard and Easingwood (1996), Shanklin and Ryann (1987) and Sheth and Ram (1987).

The example case includes several thoughts on how the entrepreneur's social capital was used or was planned to be used: The first customer reference was found from her old friend's company. The old friend's relationship to the industry was believed to assist the start-up technology company in entering the market. The subjects concerning social capital have been discussed by Grannovetter (1973), Aldrich and Zimmer (1986), Otsgaard and Birley (1994, 1995) and Eisenhardt and Schooven (1996).

The example case developed the first product together with the customer. Collaboration with a customer in product development has been discussed especially in the leader user methodology (Herstatt and von Hippel, 1992, Urban and von Hippel, 1988).

Some of the concepts, which can be found from the example case, are ignored because the scope of this article **had** to be limited to **the** supplier's interface towards its customer, for example, collaboration with the partner, "a professor at a local university", is not dealt in this article.

4 Concepts' descriptions

4.1 Customer reference

Customer reference is a well-known concept in industrial marketing, but according to Salminen (1997), the concept of reference is almost unknown in the scientific literature. Salminen's description of the reference is as follows: "A reference is the supplier's relationship to its existing / former customer that might be evaluated by that customer in terms of the supplier's product / service, management, and cooperation performance." The above statement is quite similar to descriptions of the reference used in labor market: "A formal recommendation by a former employer to a potential future employer describing the person's qualifications and dependability" (Wordnet 2004).

Salminen's proposal for the definition of the concept of the reference is problematic because it combines two entities, which should be kept separate. The existing / former customer is its own entity. The relationship to the existing / former customer might tell something or nothing about the performance of the supplier's product, service etc. And the reference itself is also its own entity. The reason for site visits is that a potential customer can verify the reference with his/her own eyes, and not just be dependent on recommendations coming from the supplier, reference customer etc.

Ahmed (1993) mentions reference in the context of reducing purchase uncertainty. He states that projects executed by the supplier are deemed as much similar in nature as possible to the project in question. His idea for a customer reference is based on the past events building the credibility of the success of the future events if a reference case is similar to a case in question. One of the problems of the utilising the reference is that it can take in practice from one to two years before enough experience has been gained (Salminen 1997).

The concepts credibility, perceived risk and reputation are well known in the literature, and the concepts can be related to building the first customer reference. The concepts are briefly introduced here.

The Blomqvist's (1997) definition of credibility is as follows: "The actor's perceived ability to perform something he claims being able to do on request." This definition includes the aptitude of the actor to "keep his/her word", which can be one of the elements in building trust with a customer. Levitt's (1967) statement supports the assumption that credibility is one of the key purchasing decision criteria. The meaning of credibility is descried by Levitt as follows: "When it comes to the most important and most risky of customer actions – actually deciding to buy or to reject a new product – assuming the various supplies' products to be equal in all respects source credibility exerts a dominant influence over the other considerations." Especially in the high technology and in the complex business credibility is needed to convince the corporate customer. Credibility in the context of the present research means how likely customers believe the claims that the start-up technology companies express. One of the means to prove the claims is to provide a customer reference.

The concepts, credibility and perceived risk, represent the opposite side of the same phenomena. The perceived risk means the extent to which a customer or client is uncertain about the consequences of an action, often relating to purchase decisions. The first definition of perceived risk was introduced by Bauer (1967). According Hutt and Speh (1992) the perceived risk has two components that relate to the outcome of the decision and to the magnitude of the consequences if the wrong decision is made. It can be assumed that the sellers' credibility reduces the buyers' perceived risk if the seller is capable of keeping his/her word.

Herbig and Milewicz (1993) define reputation as an entity's willingness and ability to repeatedly perform an activity in a similar fashion. Doney and Cannon (1997) define reputation as honesty and the concern of the supplier towards its customers. Reputation and credibility cannot be considered as completely separate concepts: if the company has a good reputation, it also has credibility and vice versa. A question that can be asked is whether the first customer reference increases the reputation of the start-up company. Intuitively the answer is yes, but according to Herbig and Milewicz the building of the reputation needs more evidence.

In this present research, the concept credibility is mainly used as one of the preferable outcomes of the successful first customer reference, and it is assumed that the increase in credibility decreases the buyer's perceived risk. The concept reputation is not assumed to be one of the outcomes of the first customer reference although the reputation of the start-up company might increase after the successful implementation of the first customer reference. However, to build the reputation in this writing is assumed to be an outcome of several successful implementations of the customer references.

4.2 High technology market

Newcomers might find the high technology market challenging despite attractive business opportunities. According to several authors (Moriarty and Kosnik 1989; Beard and Easingwood 1996), the high technology market is characterised as being sceptical, uncertain, labile and fast moving. In addition, buyers also tend to cancel and postpone deliveries and, therefore, there is a high risk of obsolescence of the products (Shanklin and Ryann 1987). On top of this, the

increasing complexity of the products creates barriers for customer adoption of the new technology (Sheth and Ram 1987).

It has been demonstrated that the whole business concept including account management and product support creates a base for business success in the high technology market (Shaw *et al* 1989). Actually, selling the business concept to customers, instead of just selling the product, leads to a situation where relationships on multiple levels are needed to ensure effective communication. This extensive communication between buyers and sellers is called a multiheaded customer and seller concept (Gummesson 1987).

It can be reasoned that the high technology markets are especially difficult for those start-up technology companies, which deliver complex products to corporate customers and which have no customer reference to dispel the uncertainty of their credibility. The dilemma for those start-up companies is to convince the potential first reference customer to buy their products, although the start-up companies have not been able to test the product in real life. It can be assumed that this might be one of the main problems that make it hard for those start-up technology companies to enter the market.

4.2.1 Partnership theory – buyer's perspective

In the past, competition and an arms-length approach were believed to help to obtain the best price, delivery and quality terms (Spekman 1988). The current partnership theory emphasises the importance of long-term co-operation, an open and honest relationship and mutual commitment (Keough 1993; Spekman 1988; Asmus and Griffin 1993). The long-term and intense co-operation lead to a situation, in which it would be difficult for a new player to intervene in the existing co-operative arrangements. Opportunities usually open up in a discontinuity of current technology or business relationships. This emphasises that the start-up companies usually have to offer customers new ideas and innovations.

The partnership theory also emphasises the win-win situation, which contradicts traditional purchasing practices: using competition to knock down the prices and to gain better delivery terms (Spekman 1988). In the reference business, the win-win situation can be achieved, for example, in a situation in which the customer has the opportunity to get something from a supplier, a start-up technology company, that does not yet exist on the market and, on the other hand, the supplier gets positive arguments in order to enter the market.

The start-up companies might not have the resources, which are needed to take care of big accounts, like large companies with a centralised purchasing function. It might be useful for start-up companies to use small and medium sized companies as the first customer reference. In addition, the decision process can be assumed to be more straightforward in small companies than in large enterprises.

4.3 A start-up technology company

The report of the Bank of England (2001) defines the characteristics of the technology-based small firms as follows: "their success is linked to difficult-to-value growth potential derived from scientific knowledge and intellectual property; they lack tangible assets in the early stages of their life cycles which may be used as collateral; and their products have little or no track record, are largely untested in markets, and are usually subject to high obsolescence rates."

Autio (1995b) and Yli-Renko (1998) have studied new, technology-based firms. Yli-Renko's definition for the new, technology-based firms is as follows: "they are not more than ten years old, (2) are independent, that is, not subsidiaries of other companies, and (3) base their business on exploiting their technology resources, that is, are active in developing, manufacturing and or commercializing technology." Autio emphasises that the founder or founders of new, technology-based firms should have been affiliated with the source of technology before establishing the company. The source of technology could be a research establishment, laboratory etc. Such a strong connection to the research community and the expectations of one's own research prior to the establishment of one's own company limit the number of the companies to just a few. In this article, it is not assumed that the entrepreneurs have a research background.

The New Oxford Dictionary (2001) defines start-up as follows: “The action or process of setting something in motion” and “a newly established business”. Therefore, a start-up technology company means a newly established company, which focuses on technology and aims at entering the market with technology products. In this article, the start-up technology company means as follows: The capabilities of start-up technology companies and their products are largely untested in the markets. The start-up technology companies are assumed to be entrepreneur driven and they design, implement and/or maintain complex, high technology products. Usually entrepreneurs of start-up technology companies have received a university education. Software start-up companies are a subset of start-up technology companies concentrated on a specific technology sector. It can be assumed that start-up technology companies need customer references.

4.4 Entrepreneurship research

According to the literature the main investment criteria used by venture capitalists relate to the business experience and characteristics of the entrepreneur (Bank of England 2001). Freeser and Willard (1990) have stated that market opportunities might occur too rapidly for those without prior knowledge of the business sector. In addition, entrepreneurs with an advanced education are assumed to be more competent in creating relationships with the customer and stakeholders (Hannan and Freeman 1989). But, for example, Maes (2001) found no correlation between the education of the entrepreneurs and financial performance of small construction companies.

The more recent studies according to the report of the Bank of England (2001) contradict the traditional investment criteria used by the venture capitalist. These studies propose that the industry and market factors have more effect on success than the entrepreneur and entrepreneur’s team. The limited number of similar studies and the small sample sizes used in those studies are criticised by the report.

The entrepreneurship research also shows that entrepreneurs of the start-up technology companies tend to concentrate on solving technological problems at the expense of the commercialisation (Freel 1998). It can be suggested that the characteristics of the entrepreneurs affect the success of the start-up company. Another research proposes also that more than 40 % of the start-up companies have problems with marketing (Huang and Brown 1999).On the other hand, it can be assumed that the work experience and education influence the characteristics of the entrepreneurs.

Autio (1995a) wrote that empirical studies suggest that rapid organic growth is both rare and often even unwanted among new, technology-based firms. Representative of their thinking is a Thai software technology entrepreneur who stated that the profit is a bonus from satisfied customers.

Entrepreneur research states that start-up technology companies tend not to take the necessary actions to start marketing their new products. The real reason behind this might be that the high technology market is difficult to access as was earlier described by several authors (Beard and Easingwood 1992; Beard 1995). This, together with the fact that many entrepreneurs have no education in marketing, might create the phenomenon which appears as the entrepreneurs’ unwillingness to execute activities relating to commercialisation as described by Autio and Freel. The remedy might be to increase the marketing and sales knowledge of the start-up companies.

4.5 Social capital

The following definitions can be found for social capital: “Features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (Putnam 1995). Bourdieu’s and Wacquant’s (1992) definition of social capital also includes a time element which is not mentioned in the previous definition. They state that the social capital works only in the networks, in which relationships are permanent. The definition of them is as follows: “The sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition.”

The definition of the mutual benefit is problematic in the context of small companies: what is the mutual benefit if the purchaser decides to buy products or services from a start-up technology

company whose credibility is questionable or nonexistent. The mutual benefit might include the assumption of counter services, which can exceed the scope of business ethics. On the other hand, friendship or sharing the same visions can form the basis for mutual benefit. Tsai and Ghoshal (1998) actually state that there is a strong correlation between the trustworthiness and shared visions.

Social capital meaning past and present contacts and network of contacts can be assumed to help find customers. In this article, social capital means mainly the contacts that can be useful for start-ups in selling their products. It can also be assumed that those who have a relationship with a customer may have a better chance of succeeding in entering the market. Several studies have proved the key role of social capital in setting-up a start-up company (Aldrich and Zimmer 1986; Otsgaard and Birley 1994). Start-up technology companies can use the existing contacts of the owners to find customers or to get venture capital (Birley 1995; Eisenhardt and Schoonhoven 1996). However, the need for social capital along with the innovation process seems unclear.

4.6 Lead user design methodology

There are different opinions in the literature about the benefit of the lead customer in the research and development process. The lead user methodology of the involvement of the key customer in the research and development process has been reported to positively affect the success of the product design (Herstatt and von Hippel 1992, Urban and von Hippel 1988). However, some of the research studies do not support this. Actually, the customer's involvement has been criticised as limiting the research and development innovativeness (Bidault and Cummings 1994; Johne 1994). This is because the customers' proposals are often improvements to existing products rather than radical changes. In addition, the strong involvement of the customer might also lead to a situation where the start-up company ends up in the role of subcontractor – and not developing the product for a large market.

Problems with Intellectual Property Rights have been reported (Bruce *et al* 1995): customers, in some cases, tend not to give the Intellectual Property Rights of the product to the start-up company and claim to own the rights. This can, in the worst cases, lead to the bankruptcy of the start-up company.

4.7 New concepts

The current concepts concerning the building of the first customer references are vague and inadequate. This is because the subject has not been widely discussed in the literature, in fact hardly at all. The problem with current reference definitions is that they include various topics that can be recommended to the next potential customer, such as product or service performance, reliability, earned savings etc. Actually, the list can be endless. From such lists it is difficult to grasp information concerning what could be essential for potential customers. Therefore, new and/or complementary definitions are needed. The proposals for new concepts are as follows:

- customer reference
- reference customer
- first customer reference
- first reference customer
- next potential customer
- reference business case
- reference business

The author's proposal for the definition of the customer reference is as follows: "The customer reference consists of a supplier's commercial product including related services and the reference business case of the product. A good customer reference demonstrates the attractiveness of its reference business case to the next potential customers." The relationship to the reference customer can either hinder or promote the use of the customer reference.

The concept business case is described as follows: “Information that describes the justification for setting up and continuing a project or procurement. It provides the reasons for the expenditure and is updated at key points during the project or procurement process” (ITILpeople 2005). The other definition for the business case is: “A justification of why the project is required for the business and what the product is going to be. It should include an outline of the Return on Investment (ROI), or a Cost/Benefit Analysis (C/BA) for the project, the project's product and performance characteristics, major project risks and the upside opportunities. The project's sponsor is responsible for developing the business case” (Projectauditors 2005). The new concept, the reference business case, can be defined as follows: “A reference business case includes those verified sales arguments, such as return of investment, user experience and implementation time that are assumed to match with supplier’s next potential customers’ business cases.”

In this present study, the first customer reference consists of the start-up company’s first commercial product, which is usually complex, and high technology, and the business case of it. The first customer references are provided by the first reference customers, which are typically corporate companies.

A next potential customer might be interested in the product provided by a start-up technology company. In order to evaluate and build the business case for using the supplier’s product the next potential customer needs the business case of the customer references, which can be compared to the next potential customer’s own business case. The business case of the next potential customer might include that they are interested in getting the intellectual property rights of the start-up company.

In the reference business, typically complex, high technology products for corporate customers in business-to-business market are sold. Credibility is an important factor in sales success. References are needed in order to prove credibility.

5 Domain model

A box in the domain model (see Figure 1) represents a concept, a class that interacts with other classes. A concept can be another concept’s attribute, for example, the entrepreneur’s background, in which background can be considered as a concept, is an attribute to a technology entrepreneur. A class can refer or need not refer to one or more instances of another class, for example, a start-up technology company can compete against zero or more competitors. The attributes of the technology market are expected to be built in the customers’ behaviour. In other words, customers inherit the attributes of technology markets in the model. The start-up technology companies’ attributes are also affected by the entrepreneurs’ attributes.

The domain model of the reference business, which integrates the concepts, is presented in Figure 1. The integration can be described by explaining the processes relating to the domain model. Two different view points can be found for the processes, namely the market entry of the start-up technology company and the buyers’ purchasing decision-making.

The process for entering the market can be described briefly as follows: The start-up technology company needs a reference customer for its product, which is typically innovative, complex and high technology. Lacking credibility the start-up company needs to use its entrepreneur’s social capital to find the first reference customer. After getting the customer, the product must be implemented. The first reference customer might have an interest in the intellectual property rights of the product if, for example, the cost of the implementation and development is not shared between the first reference customer and the start-up technology company. The focus of the start-up technology company should be on collecting sales arguments for the business case to which the potential customers’ business cases can be compared.

The corresponding process, which is the interest of buying a product from a supplier, that is, from a start-up technology company, can be described as follows according to the domain model: The next potential customer is interested in the product proposed by the start-up technology company. In order to verify the purchasing decision the potential customer needs to know about the business case of the customer reference. The business case is usually validated by the statements of the reference customer.

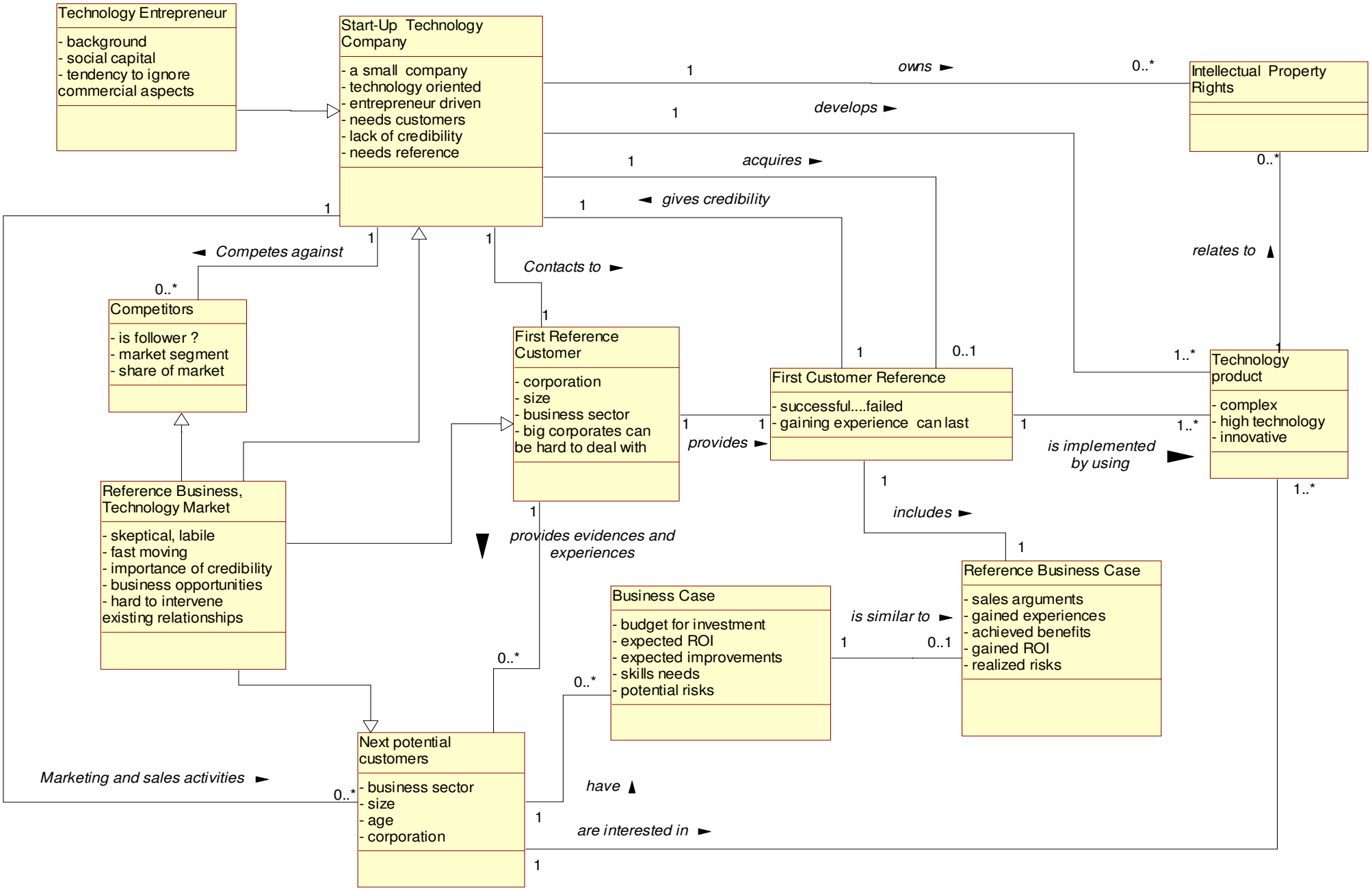

Figure 1: The domain model of the reference business for start-up technology companies

6 Conclusion, discussion and proposal for future research

The targets set for this research were achieved: The concepts concerning the problem domain were identified. The concepts and their attributes were also studied by searching the literature references and definitions. Finally, the domain model, which structures the knowledge, was created. It can be concluded that understanding of the problem domain is increased. The domain model can be called the domain model of the reference business for start-up technology companies.

The literature references describe well the problems, which a start-up technology company might face, when entering the market. The difficulties consist of three different aspects: (1) The high-technology market can be assumed to be sceptical to new players. (2) The existing buyer-seller relationships are difficult to intervene. (3) The entrepreneurs of the start-up technology companies are not commercially oriented. In addition, the customer reference studies, which could advise start-up technology companies to enter the market with their new, complex, high-technology product, are ignored by the scientific literature.

The topic of building and using customer references is very much under researched. Therefore, there is room for different kinds of research and research methods. It might, however, be that more qualitative research is needed rather than quantitative research in order to increase the basic understanding of all the variables relating to the topic. The investigation of the topic can be started from the business sectors in which the references are most important. It is assumed that the first customer reference is especially important for start-up technology companies, which plan to serve corporate customers. Marketing and sales activities of start-up technology companies in general also need more research focus as has been stated earlier. Next, in order to stimulate future research the following propositions are made.

The analysis of the problem domain indicates that the concept reference can be separated into two different subconcepts, namely the customer reference and the reference customer. Thus the concepts have different roles relating to success in sales and marketing. For further research the following proposition can be formulated:

> *Proposition 1: The next potential customers are interested in the customer reference, the physical installation of the system and the related business case, rather than in the reference customer, which can recommend or not the suppliers' system to the next potential customers. The reference customer is valuable if its statements validate the claims of the supplier.*

Proposition 2 deals with the credibility gap faced by the technology company. It is assumed that credibility is one of the major benefits achieved by the customer reference. Credibility seems to be one of the key concepts relating to gaining the benefits out of customer references as was proposed by the domain model. The purpose of the customer reference is to narrow the credibility gap. The following proposition is made for further research:

> *Proposition 2: The market type affects the size of the credibility gap. The market, which is fast moving and labile, is especially sensitive to credibility. The size of the credibility gap depends also on the newness, complexity and expensiveness of a product. In addition, a start-up technology company with **no** reference is a risk for a corporate customer and, thus, increases the credibility gap. The credibility gap for a new solution offered by a start-up technology company can be narrowed by a customer reference in the labile market.*

According to the research done by Ruokolainen (2004), start-up technology companies seldom develop the sales and marketing arguments. This statement was also supported by Freel (1998), who writes that start-up technology companies have a tendency to concentrate on technical issues at the expense of commercialisation. One of the benefits of the model is that it increases the understanding of why finding sales arguments with help of the customer reference is important for start-up technology companies. According to the domain model (Figure 1) the reference business case, sales arguments verified by the customer reference, should match with potential customers' business cases. Therefore, from the start-up technology companies'

point of view it would be important to select the right type of first customer reference. The following statement is proposed:

> *Proposition 3: The reference business case provides information, which helps the potential customers' decision-making if the cases are similar to each other. The more similar the two cases the easier the comparison. Therefore, it is important to consider, while selecting a first customer reference for a start-up technology company, how to ensure the generality of its reference business case among the next potential customers.*

In particular, how to evaluate the generality of the first customer reference's business case needs further investigation. One suggestion to ensure the generality is to test those sales arguments, which have been identified with help of the customer reference, on the next potential customers.

The final proposition considers the need for social capital when entering the market. The linkage between the two concepts presented, credibility and social capital, remain**s** unclear. Intuitively it can be assumed that the two concepts form equilibrium**,** that is, a lack of credibility is substituted by using social capital and vice versa. The following proposition is made for further research of the topic:

> *Proposition 4: The consequence of the increased credibility is that the need for social capital to gain further customers decreases. On the other hand, the lack of credibility forces start-up technology companies to use their social capital.*

One of the main problems of the start-up technology company is to find the first customer reference. Because there is no reference and thus no credibility, the start-up technology companies might have major problems convincing the next potential customer to buy the product. The first customer reference is usually found with the help of the various type **of** contacts that the entrepreneurs have gained (Ruokolainen, 2004).

In the general domain model of reference business, in which a start-up company has more than one customer reference, the following additional concepts can be expected to be found:

(1) The positive reputation based on several references starts to play a role in gaining the next customers. As was discussed earlier, the reputation is a result from more than one customer reference.

(2) The importance of a relationship with existing customers from the point of view of the revenue starts to grow. Especially in the software business, the maintenance costs can even be 20 % from the original sales price. The existing customer can also be a potential customer for new versions.

(3) Competitors can start to use failed customer references against the supplier. In such cases, the social capital, in the form of the relationship management to the customer in question, might provide a shield against the declining reputation.

Several successful customer references can prove that a supplier's success has not been a random phenomenon. The contingency of the success can be evaluated by using binominal distribution: if, for example, the likelihood of success with a customer case is 0.25 then four out of four successful customer cases prove that the contingency is not in question if the level of likelihood 0.005 is applied. One of the future studies could be the creation of the mathematical model for evaluating the supplier's credibility based on the customer references.

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