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**GROWTH AND INTERNATIONALIZATION
OF VENTURE CAPITAL BACKED
TECHNOLOGY-BASED NEW COMPANIES**

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<p>Previous research on growth models of companies has been focusing on modeling the growth of a company through a sequence of developmental stages. The stages models offer a simple, easy to understand framework to deal with the rather complex phenomenon of corporate growth. However, there are clear deficiencies which compromise the idea of stages models. A large number of different versions of stages models have been published, but yet there is not a widely accepted model. The purpose of this study is to establish a new conceptual framework for modeling the growth and internationalization of venture capital backed technology-based new companies.</p> <p>Based on the literature review and expert interviews, a new model is developed by applying a process view of the corporate growth. The model conceptualizes the growth and value creation of a technology-based new company, while using milestone achievement as the primarily input. The model is based on the idea of four parallel processes: 1) Value creation process, 2) Technology and product development process, 3) Business development process, and 4) Network and market development process. The Value creation process is seen as the backbone of the model, as the value creation is the ultimate target of a venture capital backed company. To map the development of a company on each one of the four processes, a set of key milestones has been composed.</p> <p>The new model developed in this study is further validated and tested through eight exploratory case studies. The case companies were selected from the Finnish ICT cluster. The case studies include detailed case descriptions, but the core of the case studies is the mapping of the acquired milestone information to the new model.</p> <p>The initial model is then further supplemented and finalized based on the case studies. As a result, the final evolution model for a technology-based new company is obtained. Key findings of the study include the discovery of different patterns of evolution revealed by the milestone mapping and the role of venture capital investors in accelerating the milestone achievement. Implications for entrepreneurs and recommendations for further research are also presented.</p>		
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<p>Aikaisempi yritysten kasvumalleja käsittelevä tutkimus on keskittynyt kuvaamaan yrityksen kasvua kasvuvaiheiden sarjan kautta. Vaihemallit tarjoavat yksinkertaisen, helposti ymmärrettävän viitekehityksen, joka auttaa käsittelemään varsin monimutkaisena ilmiönä pidettävää yrityksen kasvua. Vaihemalleissa on kuitenkin selviä puutteita, jotka kyseenalaistavat vaihemallien lähtökohtaisen idean. Erilaisia vaihemalleja on julkaistu suuri määrä, mutta yleisesti hyväksytty malli puuttuu edelleen. Tämän tutkimuksen tarkoituksena on luoda uusi konseptuaalinen viitekehys venture capital -rahoitteisten alkuvaiheen teknologiayritysten kasvun ja kansainvälistymisen mallintamiseen.</p> <p>Kirjallisuustutkimukseen ja asiantuntijahaastatteluihin pohjautuen on kehitetty uusi malli soveltaen yrityksen kasvamisen prosessinäkökulmaa. Malli havainnollistaa teknologiayrityksen kasvun ja arvon luomisen käyttäen virstanpylväiden saavuttamista pääasiallisena lähtötietonaan. Malli perustuu ideaan neljästä rinnakkaisesta prosessista: 1) Arvon luomisen prosessi, 2) Teknologian ja tuotekehityksen prosessi, 3) Liiketoiminnan kehittämisen prosessi ja 4) Verkoston ja markkinoiden kehittämisen prosessi. Arvon luomisen prosessi nähdään mallin tukirankana, koska arvon luominen on venture capital -rahoitteisen yrityksen perimmäinen tarkoitus. Yrityksen kehittymisen seuraamiseksi jokaisessa neljässä prosessissa on luotu joukko keskeisimmistä virstanpylväistä.</p> <p>Tässä tutkimuksessa kehitetty uusi malli on edelleen validoitu ja testattu kahdeksan eksploratiivisen tapaustutkimuksen avulla. Tutkittavat yritykset valittiin suomalaisen ICT- klusterin yrityksistä. Tapaustutkimukset sisältävät yksityiskohtaiset kuvaukset yrityksistä. Tapaustutkimusten ydin on kuitenkin kerätyn virstanpylvästiedon kuvaaminen uutta mallia käyttäen.</p> <p>Alkuperäistä mallia on edelleen täydennetty ja viimeistelty tapaustutkimuksiin pohjautuen. Lopputuloksena esitetään valmis teknologiayhtiöiden evoluutiomalli. Tämän tutkimuksen tärkeimmät löydökset ovat virstanpylväiden kuvaamisen kautta löydetty erilaiset evoluutiopolut sekä venture capital -sijoittajien rooli virstanpylväiden saavuttamisen kiihdyttäjänä. Lopuksi käsitellään tulosten merkitystä yrittäjille ja annetaan ehdotuksia jatkotutkimuksia varten.</p>	
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1 INTRODUCTION

1.1 Background of the study

Technology-based new companies seek to commercialize technological innovations. Although technological development seems to be driven most of the time by large well-established multinational companies, technology-based new companies may still provide the means for major technological breakthroughs. In order to create unique new ways of solving problems, fresh thinking without too many given parameters may prove advantageous. While well-established companies in most cases build their future on their existing core technologies, product portfolio, customer relationships, sales channel, distribution system, or other existing factor, new companies may rival them by doing something differently.

Another important factor on raising the odds for the success of technology-based new companies is the risk averseness. In general, far greater risks are allowed in newly established companies when compared to companies listed on the stock market, reporting to owners in public. The high-risk position of technology-based new companies means that usually many of them are likely to fail. Venture capitalists, typical financiers of growth oriented technology-based new companies, often state that it takes more than ten ventures to deliver one success story. Delivering even adequate commercial results is uncertain, as more than one-third of the investments made by venture capitalists result in losses.¹

As the growth of a technology-based new company seems to be a struggle for a survival, understanding the development of a new venture becomes very interesting. Although there is a wealth of literature on corporate growth, some of it focusing on early technology-based companies, yet detailed modeling of venture capital backed new venture development towards international success is limited. This study focuses on developing a model to better understand and monitor the growth and internationalization of venture capital backed technology-based new companies.

¹ Barry, Christopher B. (1994) New Directions in Research on Venture Capital Finance, *Financial Management*, Volume 23, number 3. Page 3.

1.2 Research problem

The purpose of this study is to establish a conceptual framework for modeling the growth and internationalization of venture capital backed technology-based new companies. The research problem can be expressed as follows:

What kind of model could be used to map and evaluate the growth and internationalization of venture capital backed technology-based new companies?

The evaluation of the research problem requires understanding of the developmental patterns of technology-based new companies. In addition, as the value creation is selected as a prime measure for the growth, value creating factors of new companies as well as the market mechanisms involved in assessing the value of a company need to be understood.

1.3 Objectives of the study

This study aims to construct a model that can be used to (i) better understand and map the developmental patterns of technology-based new companies, (ii) evaluate the value creation during the growth of a company from the emergence of a business idea to the phase of profitable business, and (iii) compare different developmental patterns between technology-based companies.

The key objectives of the study in more detail include the following:

1. To construct a generic model to map and evaluate the growth, internationalization and value generation of a technology-based new company.
 - a. To determine the most essential milestones in the development process.
 - b. To analyze the value creation through milestone achievement.
 - c. To identify the key processes in the development of a technology-based new companies.
 - d. To understand the first steps toward the internationalization of a technology-based new companies.
2. To test, validate and complement the model through experience gathered while applying the model to the case companies.
 - a. To analyze the growth of a few case companies, focusing on the early days of the company.

- b. To analyze the value creation of the case companies, through (i) milestone achievement and (ii) company valuations during venture capital financing transactions.
- 3. To perform inter-company analysis by comparing the developmental patterns within the case companies.

1.4 Scope of the study

Growth of a company is evaluated primarily through value creation in this study. The growth of a company as an organization, including organizational changes is left out of the scope. The evaluation period starts at the emergence of a business idea and focuses on the early days of a company (or a business project in the cases where the legal status of a company is acquired after the initiation of the venture development). This study focuses on high growth oriented Finnish technology-based companies, which are in most cases funded by venture capital investments. Thus this study does not deal with companies set up in employment purposes for offering services with a small number of staff (often one-man-companies). Rather this study focuses on growth-oriented companies, which are typically set up to capitalize on technology or business innovations.

1.5 Research methods

This study is conducted as an exploratory study. The research approach chosen is the constructive approach², in which the problem and its solution are tied to the accumulated theoretical knowledge. The elements of constructive approach are illustrated in Figure 1 below.

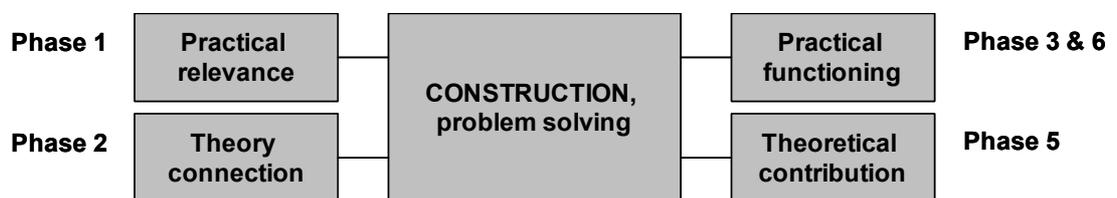


Figure 1 Elements of constructive approach as defined by Kasanen et al.³

² Kasanen, Eero, Lukka, Kari and Siitonen, Arto, (1993) The Constructive Approach in Management Accounting Research. Journal of Accounting Research, Fall 1993. Page 246.

³ Kasanen, Eero, Lukka, Kari and Siitonen, Arto, (1993) The Constructive Approach in Management Accounting Research. Journal of Accounting Research, Fall 1993. Page 246.

According to Kasanen et al.⁴, the constructive approach can be characterized by dividing the research process into following phases:

1. Find a practically relevant problem, which also has research potential.
2. Obtain a general and comprehensive understanding of the topic.
3. Innovate, i.e. construct a solution idea.
4. Demonstrate that the solution works.
5. Show the theoretical connections and the research contribution of the solution.
6. Examine the scope of applicability of the solution.

The above listed phases form the core of the research process. The first phase consists of finding relevant research problem and dividing it into objectives. The outcome of this phase is stated at the beginning of this chapter.

In the second phase a literature study is conducted. In addition, professionals, including venture capitalists, business consultants, and researchers are interviewed to determine coarsely, what are the essential activities on the emergence and growth of technology-based new companies. These activities are later converted to form the initial set of milestones that are most likely to contribute to the value creation. The literature review focuses on existing models on early corporate growth, with particular focus on stages models.

In the third phase of the research, based on the literature review and the interviews, a new model for mapping the development of technology-based new companies is constructed. The new model is developed by applying a process view of the corporate growth. The model conceptualizes the growth and value creation of a technology-based new company, while using milestone achievement as the primarily input.

In the fourth phase of the research, eight exploratory case studies are conducted. The purpose of the case studies is to validate and supplement the model developed as well as to provide material for the inter company comparisons. The case studies include gathering background information of the case companies, including a description of the business idea, outlining the history behind the business idea, and evaluating the overall success during the early days of the company. The core of the case studies is the mapping

⁴ Kasanen, Eero, Lukka, Kari and Siitonen, Arto, (1993) *The Constructive Approach in Management*

of the achieved milestones to the value creation process by utilizing the model generated in the third phase of the research. The objective of this phase is to test the model by using the case material.

In the fifth phase, the initial model is supplemented with the information and findings provided by the case studies. As a result, the final evolution model for a technology-based new company is obtained. Finally, in the sixth phase, the scope of applicability of the model is examined cursorily.

1.6 Structure of the report

The structure of the report has been designed to follow the constructive research process. The structure of the report is illustrated in Figure 2.

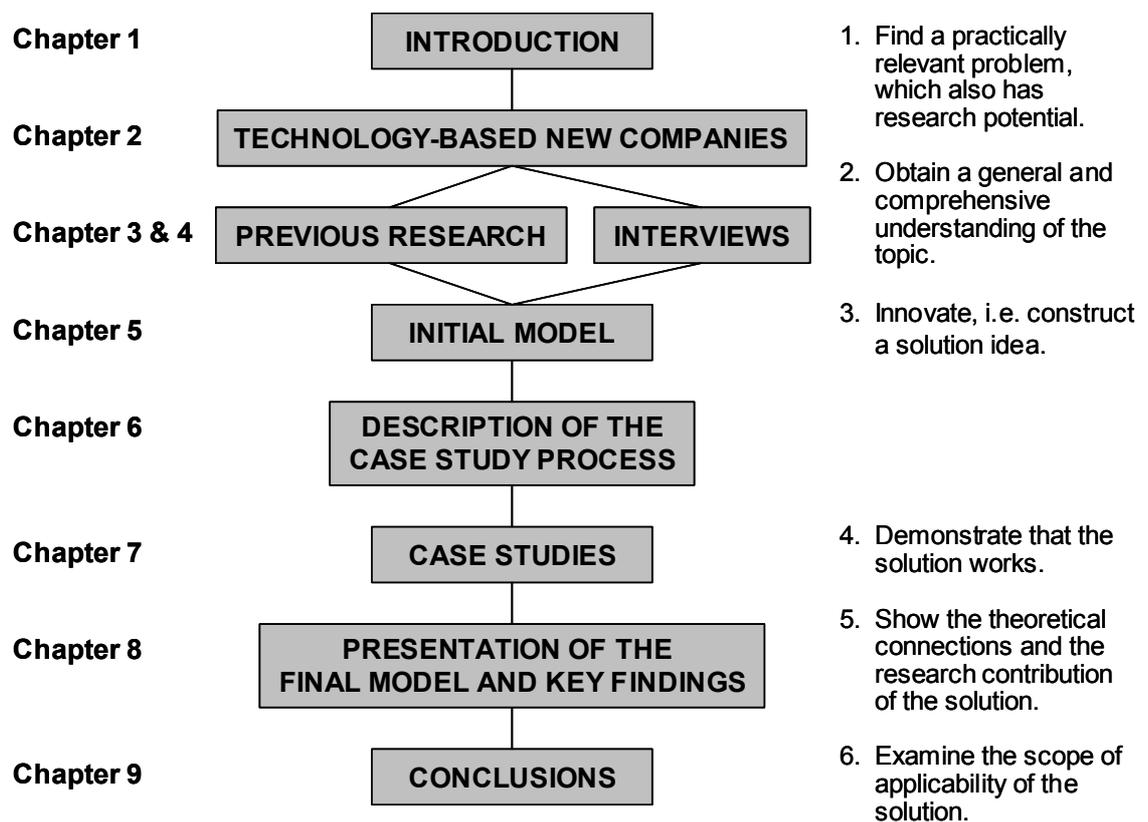


Figure 2 Structure of the report and research process

The purpose of Chapter 2 is to provide general understanding of the topic by describing briefly what is a technology-based new company and what are the typical means of finance for them. Background on the development of the Finnish venture capital market is also described to provide a better understanding of financial climate for the technology-based new companies. Chapter 3 presents an overview of previous research on the field of early corporate growth models. Chapter 4 describes the interview process and summarizes the findings of the expert interviews. Chapter 5 concludes the findings from the exploratory research and presents an initial model for growth and value creation of a technology-based new company. Chapter 6 discusses the criteria for choosing the case companies and presents the methodology used. In chapter 7, eight case companies are presented and mapped to the model. Chapter 8 complements the model by applying the findings provided by the case studies and presents the final model along with key findings. Chapter 9 summarizes the results and concludes the study.

2 TECHNOLOGY-BASED NEW COMPANIES AND VENTURE FINANCING IN FINLAND

Growth oriented technology-based new companies are typically founded (1) to commercialize a technological innovation, or (2) to capitalize on a unique business idea or business model utilizing technology (later referred as business innovation). Following high growth oriented strategy usually demands considerable amounts of capital. Thus this chapter focuses on describing the venture finance climate during a time period from mid 1990's to 2006. The late 1990's and 2000 are at a special focus as it was the time of the founding of most of the case companies analyzed in this study.

Although venture capital is most likely the most important source of financing for high growth oriented new companies, there are a number of other sources of financing for new companies as well. To allow a broader view to the financing climate, different sources of financing to small and medium sized companies will be discussed first in brief then followed by a more detailed look on the venture capital financing.

2.1 Sources of financing to small and medium sized companies

The most important forms of financing, both equity and debt, for small and medium sized enterprises (SMEs) include:

- **Debt financing** by banks and other financial institutions
- **Private venture capital** through venture capital funds and investment companies, normally in the form of equity, but also in the form of loans and convertible loans. *As the venture capital financing has a central role in this study, Appendix I provides a brief introduction to venture capital for readers not familiar with venture capital financing.*
- **Public venture capital** through public and semi-public venture capital funds.
- **Business angel investments** by wealthy individuals, who invest their own funds professionally in a manner similar to venture capital funds.

- **'Petite angel' investments** by individuals providing relatively small amounts of equity either to start a company, or to fund a start-up phase company of a friend or relative. Petite angels do not operate professionally like business angels and are usually passive investors.
- **Government subsidies** in the form of soft loans, investment subsidies, collateral and tax breaks, mostly to support R&D development and internationalization. Most important providers include Sitra (the Finnish Innovation Fund, under the supervision of the Finnish Parliament) and the Ministry of Trade and Industry, with its operations through Tekes (the National Technology Agency), Finnvera (the Export Credit Agency), Finnish Industry Investment Ltd (FII) and the local Employment and Economic Development Centers (T&E Centres).

Debt financing is by far the most popular financing instrument used by SMEs in Finland. In 1995, more than 80 % of SMEs had debt financing. Mainly because of the overall increased profitability of the SMEs, the popularity of debt financing decreased during the late 1990's. In 2000, less than two thirds of all SMEs had bank debt.⁵ However, debt financing has regained its popularity in the recent years. According to the SME survey in the fall 2006, 84 % of SMEs seeking external finance will approach banks, 31 % Finnvera, 11 % venture capitalists, 5 % insurance companies, and 15 % other sources.⁶

As collateral is usually needed in debt financing, equity financing becomes more important when high growth oriented pre-seed and seed phase companies are concerned. In these companies the most important sources of equity are governmental bodies, and equity investors: 'petite angels', business angels, and venture capitalists.

At the time of the founding and/or the first capital injections in most of the case companies analyzed in this study, during 1999, some 6000 new limited liability companies (Finnish legal form *osakeyhtiö*, abbreviated *Oy*.) were registered in Finland. The capital required for establishing these companies totaled over EUR 48 million in equity.⁷ According to the population survey of the GEM Global Entrepreneurship project 2000, during 1999, at least EUR 170 million of equity was channeled from petite angels to

⁵ The Finnish Bankers' Association www-page, (<http://www.pankkiyhdistys.fi/>), 16.1.2001.

⁶ Finnvera and the Federation of Finnish Enterprises. (2006) SME Barometer 2/2006. Finnvera and the Federation of Finnish Enterprises, Helsinki, Finland.

⁷ The minimum equity amount upon registering a limited company in Finland is EUR 8 000.

starting and financing new ventures.⁸ Therefore, petite angels represented already in 1999 an important source of pre-seed financing, and, thus, contributed to the renewal of the population of Finnish companies.

While petite angels were active in Finland, professional business angel activity had been relatively insignificant. For a comparison, according to author's estimates, business angel investments totaled less than EUR 20 million in 1999. In the US, for example, business angels accounted already 1999 for the largest share of all equity investing. However, business angel investing has developed significantly in Finland due to many entrepreneurial success stories. It is common that wealthy entrepreneurs channel their funds into new start up businesses. The number of petite angels and business angels has risen steadily according to Sitra's records. In 1996 Sitra's Matching-service listed 100 petite/business angels, whereas Sitra's INTRO market place had 450 registered petite/business angels in 2007.⁹

Towards the late 1990's venture capital already accounted for the largest share of all equity investing. In 1999, venture capital investments totaled 285 million euros, of which 77 million euros was invested in the information and communications technology (ICT) segment. Considering the investments made by foreign investors on top of those made by domestic venture capitalists, it is fair to say that risk capital was readily available in Finland in the turn of 1999-2000. Of all venture capital investments, only 19 million euros were invested in start-up stage companies and EUR 15 million in seed stage companies in 1999. Of all seed investments, 84 % was carried out by SITRA (Finnish National Fund for Research and Development). The evident lack of adequate seed financing was caused mostly by the immaturity of the business angel activity as well as the private equity market, where just a few investors were actively investing into seed-stage companies.¹⁰

In 2005, venture capital investments totaled 313 million euros, of which 75 million euros was invested in ICT segment. Still in 2005 start-up and seed investing accounted only for 17 and 23 million euros respectively, but now the reason was the tightened screening by

⁸ Arenius P. and Autio E. (2000) GEM Global Entrepreneurship Monitor, 2000 Finnish Executive Report. Espoo. Helsinki University of Technology.

⁹ Maula, M., Murray, G. & Jääskeläinen, M. (2007) Public Financing of Young Innovative Companies in Finland. MTI Publications. Page 33.

the venture capitalists rather than the availability of funds. In 2006 there were more than 10 venture capital companies seeking actively investments in seed phase companies in Finland.¹¹

The public sector has traditionally been the most important financier of seed and start-up companies in the form of various subsidies, soft loans and other instruments. Government subsidies for e.g. technology development and foreign trade have been readily available for years before 1999. As venture capital became more popular and the VC investors were aggressive in making new investments during 1998-2000, the role of government diminished. A new kind of syndication emerged: the venture capitalist carries the market risk of a new company, while e.g. TEKES carries the technology risk. Through this type of syndication the public sector has a more focused role as a catalyst of technological development. During the years 2001-2006 the public sector regained its importance in supporting and financing seed and start-up companies, as venture capital investors become more selective and cautious in their investments.

2.2 Rise of the Finnish venture capital market

Private equity investing increased considerably and began to show professional traits during the mid 1980s. During the late 1990s, the sector matured and became an important investment class amongst institutional investors. Already in 2001, there were 36 private equity firms as members of the Finnish Venture Capital Association,¹² as in 2006 there were 42 full members (private equity firms) of the Finnish Venture Capital Association.¹³

Along with the rise of the private equity industry the role of the government diminished during the late 1990's and year 2000. Public activities in venture financing were limited mainly to subsidies through Tekes, seed financing, offering guarantees for private equity investments, and providing capital through the fund-of-funds vehicles. During the years 2001-2003 the partly overheated VC industry adapted to the new market situation, tighter screening of the deal flow directed the investments to more mature target companies

¹⁰ Finnish Venture Capital Association FVCA [www-page](http://www.fvca.fi/), (<http://www.fvca.fi/>), 19.1.2001.

¹¹ Finnish Venture Capital Association FVCA, (2006) FVCA Yearbook 2006. Finnish Venture Capital Association FVCA, Helsinki, Finland. Pages 37, 42, 68-109.

¹² Finnish Venture Capital Association FVCA [www-page](http://www.fvca.fi/), (<http://www.fvca.fi/>), 19.1.2001.

¹³ Finnish Venture Capital Association FVCA, (2006) FVCA Yearbook 2006. Finnish Venture Capital Association FVCA, Helsinki, Finland. Page 14.

rather than investing aggressively in seed, start-up and early stage cases. Because of the underserved seed, start-up and early stage investment climate the role of public sector increased to its current balance, where it is typical that in seed and start-up rounds syndication between e.g. Tekes, public venture capital (e.g. FII and Sitra thanks to their new seed financing programs) and private venture capital occurs quite frequently. The share of private investors in all early stage (including seed and start-up) investments has dropped from above 60 % in 2000 to around 30 % in 2005.¹⁴

Table 1 Private equity investments and new funds in Finland in 1994-2005¹⁵

	Number of Cases	Growth %	Invest- ments M EUR	Growth %	Av. Inv. Size M EUR	Growth %	New funds M EUR	Growth %
1994	115		28		0,246		63	
1995	122	6 %	38	34 %	0,310	26 %	129	103 %
1996	137	12 %	84	122 %	0,612	97 %	194	51 %
1997	205	50 %	136	63 %	0,665	9 %	305	58 %
1998	265	29 %	192	41 %	0,726	9 %	328	7 %
1999	325	23 %	285	48 %	0,878	21 %	656	100 %
2000	418	29 %	397	39 %	0,950	8 %	563	-14 %
2001	449	7 %	340	-14 %	0,757	-20 %	411	-27 %
2002	462	3 %	391	15 %	0,846	12 %	814	98 %
2003	431	-7 %	328	-16 %	0,761	-10 %	206	-75 %
2004	419	-3 %	369	13 %	0,881	16 %	309	50%
2005	423	1 %	313	-15 %	0,740	-16 %	637	106 %
2006	454	7 %	350	12 %	0,771	4 %	517	-19%

Table 1 demonstrates the rapid development and the adaptation period of the venture capital industry in Finland. To mention few of the highlights, the amount of new funds doubled during 1995 and boosted the average investment size significantly in the following year. Starting in 1999, successful public listings of high-tech start-ups have further added the interest to private equity investments, which has been mirrored in the

¹⁴ Maula, M., Murray, G. & Jäskeläinen, M. (2007) Public Financing of Young Innovative Companies in Finland. MTI Publications. Page 32.

¹⁵ Finnish Venture Capital Association FVCA www-page, (<http://www.fvca.fi/>), 19.1.2001 and 11.10.2007.

volume of new funds. The biggest venture capital deals closed during 2000 have hit national records. The deteriorating market situation during year 2000, however, made investors more cautious, and the amount of new funds decreased for the first time in years. The adaptation to the new market situation can be seen in the inconsistent development of the new funds during the years 2001-2006 as well as in the slightly decreasing trend in the amount of investments. When only initial investments are considered the difference can be seen even more drastically. However, the industry itself views the considerable growth in new funds during the year 2005 as a signal of a new phase in the cycle of Finnish venture capital industry. Another positive signal indicating the maturity and internationalization of the Finnish venture capital industry is that the level of foreign capital raised by Finnish private equity funds was quite high at 249 million euros making up 46 % of the total amount raised by the independent funds. This is about three times the cumulative level of foreign capital raised by Finnish private equity funds.¹⁶

While looking at the growth period, a kind of a snowball effect can be seen behind the rapid growth of equity investments. First, success stories demonstrate business potential to investors. Thus, the amount of new funds increases, which is, in turn, mirrored in bigger investments, giving rise to new start-ups with better resources, which are then capable of showing promising results faster than their predecessors. As a result, during the growth period the amount of new capital has grown every year, until 2000. As new funds still kept coming in during the adaptation period, the total capital committed in Finnish venture capital funds, by the end of 2006, was EUR 3156 million, of which 58 % was already invested in portfolio companies.¹⁷

Public listings and trade sales demonstrated that remarkable capital gains were attainable through private equity investments in Finnish technology start-ups. *Iobox* serves as one of the first good examples of rapid value creation. The company was acquired by Spanish *Terra Mobile* in July 2000 with a cash payment of EUR 230 million, just some two years after the company was introduced to the public. In 2000, a number of record-breaking

¹⁶ Finnish Venture Capital Association FVCA, (2006) FVCA Yearbook 2006. Finnish Venture Capital Association FVCA, Helsinki, Finland. Page 27.

¹⁷ Finnish Venture Capital Association FVCA, (2006) FVCA Yearbook 2006. Finnish Venture Capital Association FVCA, Helsinki, Finland. Page 31.

venture capital rounds were raised by Finnish technology companies, such as *Solid Information Technology* (EUR 55 million) and *Riot Entertainment* (EUR 17,3 million).

Despite the collapse of technology company valuations during the latter part of year 2000, large amounts of venture capital were still flowing into Finnish technology companies in the turn of 2001. These included *Digia* (EUR 34,8 million), *AVS Technologies* (EUR 6,4 million), and *LPG Innovations* (EUR 10 million) to name a few of the largest. This indicates that the most promising companies were still able to acquire venture capital.

However, large investments to start-up companies soon became scarce. According to FVCA, only 7 seed, start-up or other early stage ventures received initial investments of 2 million euros or more during the years 2004-2005. Of these the largest investments being *Codenomicon* in 2005 (EUR 3 million), *Ipsat Therapies* in 2005-2006 (EUR 4,5 million), and *Igglo* in 2005-2006 (EUR 12,5 million, involving also a direct investment by a foreign venture capital investor, Benchmark Capital Europe). Other recent large venture capital investments include *Ekabau* in 2006 (EUR 12,8 million, involving foreign investors) and *Silecs* in 2006 (EUR 4 million, involving foreign investors).¹⁸

The deteriorating market situation struck hardest the companies where the success was less obvious. At the end of 1999, at the peak of the technology start-up hype, almost all companies were able to get funding. The role of venture capitalists in screening and selecting the best ideas was almost forgotten for a moment. Ultimately, the shakeout in start-up valuations made the venture capital business healthier.

Close to one third of all venture capital investments during years 2000 and 2001 in Finland was made in the ICT industry. The share of ICT companies was even bigger when regarding seed and start-up stage investments. During these years, the institutional learning among Finnish investors has been very strong due to the rapid development of Finnish ICT companies. Simultaneous rapid growth of both the Finnish ICT cluster and the venture capital industry is not a coincidence. While new ICT start-ups have attracted more and more capital to venture capital funds, increasing venture capital money has boosted the growth of new ICT start-ups. The emphasized role of the ICT companies in

¹⁸ Maula, M., Murray, G. & Jääskeläinen, M. (2007) Public Financing of Young Innovative Companies in Finland. MTI Publications. Pages 25, 31.

new venture capital investments settled slightly during the years 2002-2006. In 2005 one fifth of the initial investments were made into ICT sector. However, the ICT cluster still remained as a very important sector of the venture capital investments, as still one third of all VC investment were made to ICT companies in 2005.¹⁹

2.3 Landing of international venture capitalists in Finland

International venture capitalists have actively monitored the emergence of the ICT cluster in Finland since the early 1990's. Success stories in the late 1990's have encouraged also international investors to start investing in early-stage Finnish technology companies. Rather than seed phase financing, most of the funds provided by foreign investors have been first, second, or third round venture capital investments. This is mainly due to the fact that internationalizing companies usually look for foreign investments in order to strengthen their international network. The majority of the capital raised in the large private placements during the years 1999-2001 (e.g., Solid, Digia, Riot, AVS and LPG) was supplied by international venture capitalists.

Thanks to mostly hard technology-oriented start-ups rather than pure Internet businesses, or 'dotcoms', Finnish ventures have been able to keep up the interest of international investors, despite the wave of bankruptcies in foreign markets during the years 2000-2001.

While in 1999, foreign investors made just a few investments in Finnish technology start-ups; in 2000, foreign investors became a substantial part of the Finnish technology financing pool. 2001 was again a year of rapid growth in foreign investors' market share. Foreign investors are also expected to participate more and more in start-up and even seed round investments as their knowledge of the Finnish market increases. Syndication of investments with local and international investors is becoming more popular as seen in the recent large investments (e.g., Igglo, Ekahau and Silecs). Local expertise combined with an international network of contacts makes a successful match in many cases.

¹⁹ Finnish Venture Capital Association FVCA, (2006) FVCA Yearbook 2006. Finnish Venture Capital Association FVCA, Helsinki, Finland. Page 42.

2.4 A developing industry

In the early years of the Finnish venture capital market, the investments were made by banker-type investors, who were minimally involved in developing portfolio companies. As the amount of investors and funds has increased, investors have become more active and focused on their chosen special areas of expertise. Towards the turn of the millennium, venture capitalists have become more like active industry specialists than passive portfolio investors. Naturally, the degree of contribution to business development varies between venture capitalists, and international investors are likely to have built even stronger skills in some areas of expertise than their Finnish colleagues because of their longer experience in venture capital investing and building global success cases. After all, it is the background and experience of the managers of the venture capital company that determine the value-add received by the target company. It should be mentioned that a number of the large currently private venture capital companies have been set up as spin-offs or management buyouts from public investors e.g. Eqvitec Partners (Ex-Sitra Technology Management), Biofund Management (ex-Sitra Biofund Management), 3i Finland (ex SFK Finance Oy, ex-Startfund of Kera Management) and many of the smaller regionally operating private venture capital companies originate from Sitra (e.g. Aboa Venture Management, Innofinance, Midinvest, Sentio Invest, Teknia Invest, Teknoventure Management, among others).²⁰

The better financial status of start-ups, owing to increased professional venture capital funding, has attracted more qualified, experienced, and motivated entrepreneurs. This, in turn, has increased the amount of growth-oriented and rapidly internationalizing start-ups, and increased significantly the quality of new ventures. Due to venture capital financing the risk tolerance of entrepreneurs has also increased. While in the old days of bank debt financing, aggressive growth-oriented business plans were usually considered too risky, some of them are today faced as challenges worth pursuing. The increased risk tolerance of entrepreneurs is critical for the existence of more and more ambitious new ventures with the potential of international take-off.

In addition to increased capital resources, more experienced people are shifting to venture capital business as well. Experienced individuals, coming from both large

²⁰ Maula, M., Murray, G. & Jääskeläinen, M. (2007) Public Financing of Young Innovative Companies in Finland. MTI Publications. Page 34.

technology companies, and start-ups having reached initial public offering (IPO) or trade sale, have also set up new venture capital companies and funds. They are often highly focused on specific technologies and/or development stages in order to differentiate and offer more value to their target companies. In this manner, investors have been able to enhance their expertise and, thus, to offer value adding business development assistance to their portfolio companies. The accumulated experience of venture capital companies form a base for the Finnish ICT cluster to flourish and produce new generations of start-up companies.

2.5 Changing attitudes and the high-tech roller coaster

Entrepreneur's attitudes towards venture capitalists have undergone a dramatic change. Until 1998, venture capitalists were not familiar to most Finnish entrepreneurs, who usually tried their best to avoid equity investments to protect their managerial independency. Businesses were kept running with sales revenues, often from resource-draining project work, which was done at the expense of the primary goals, such as product development. Only companies struggling to survive approached venture capitalists. Thus, venture capital backed businesses did not represent first-class start-ups.

It appears that the change in attitudes started at the turn of 1999. Already successful companies started approaching venture capitalist in the hope of making their business even more successful. Although entrepreneurs realized the opportunity to gain extra resources for growth through venture capital, they did not, however, see venture capitalists as potential business advisors.

As equity investors started demanding more active roles in their portfolio companies, Finnish entrepreneurs realized that it was more than only financing that the best investors were able to offer. At the same time, equity investors increased in number and started focusing on specific technologies in order to develop as business advisors.

Soon it became customary that entrepreneurs shopped around investors to see who was able to give the best value added, in addition to financing. The best venture capitalists took the role of a management consultant in their portfolio companies. Ultimately, the investor and the entrepreneur shared a common interest: to create a successful company with the ability to grow and internationalize rapidly. There are a growing number of cases

demonstrating that working with venture capitalists has taught entrepreneurs to see their companies more objectively. For example, in some cases entrepreneurs have realized that stepping aside and recruiting a new CEO is in the best interest of the company to take it further in business development.

More and more companies that showed profit and were already on a growth track started seeking financing to accelerate growth and internationalization. The Finnish venture capital business was suddenly booming because the number of potential investment targets kept increasing, and more resources flowed into venture capital funds. Simultaneously, valuations of Internet and technology companies rocketed worldwide, as seen in Figure 3.

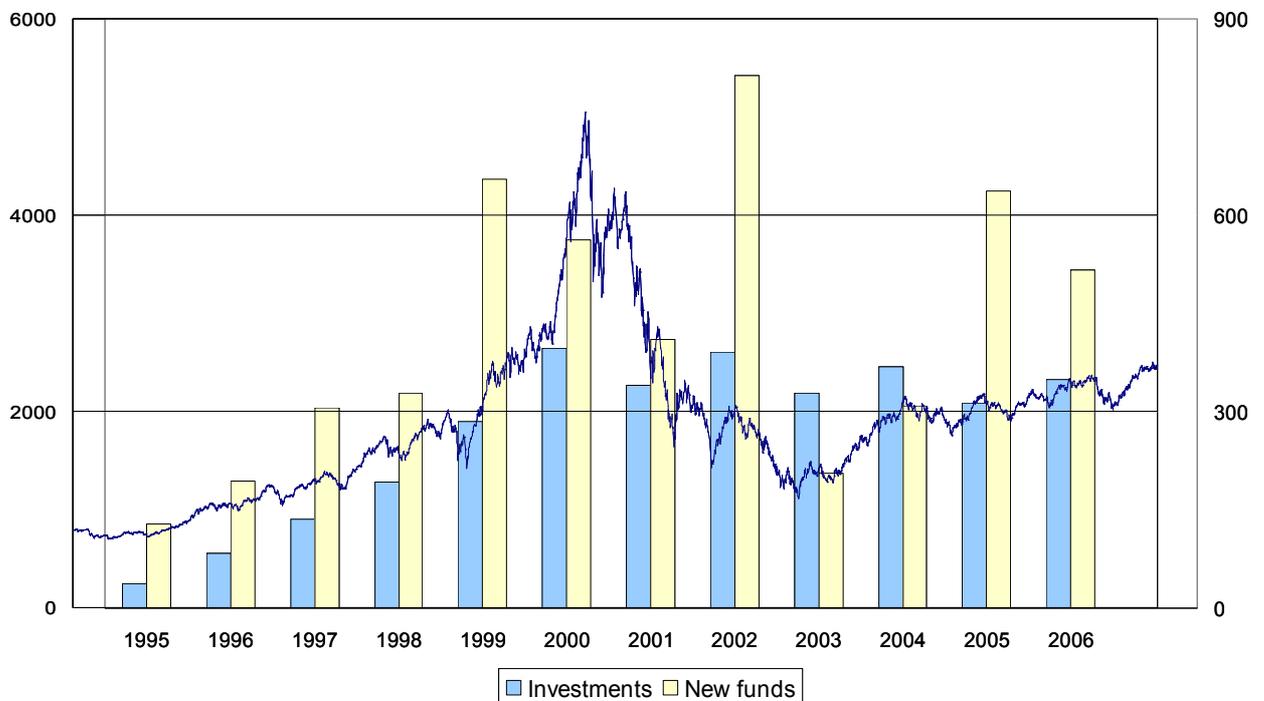


Figure 3 Nasdaq Composite Index (left-hand scale) and Finnish venture capital investments and new venture capital funds, in million Euro (right-hand scale), 1995-2006²¹

It appears that valuations of early stage technology companies have mirrored the Nasdaq index quite directly.²² The technology boom reached its peak on the Nasdaq in early

²¹ Nasdaq www-page, (<http://www.nasdaq.com/>), 19.1.2001 and 3.2.2007 AND Finnish Venture Capital Association FVCA www-page, (<http://www.fvca.fi/>), 19.1.2001 and 11.10.2007.

²² The Nasdaq Composite Index is used here as an indicator of valuations of global early-stage IT companies, as it consists mainly of technology companies in their early or expansion stage. Major European exchange indices (including the HEX index), in contrast, are strongly affected by non-technology industries.

2000, but it was soon followed by decreased valuations of start-ups, also in Finland. Many Internet ventures collapsed around the world as funding to ICT and especially Internet dependent companies was almost entirely cut off. More technology-oriented companies were better sheltered by their more tangible core competence.

It seems that Finnish technology companies overcame the downturn better than, for example, their Swedish counterparts. This might be due to the fact that Sweden was a little ahead of Finland in starting aggressive Internet ventures, such as *boo.com* that later collapsed with major casualties. In Finland, new ventures were in most cases more technology-driven and, thus, less affected by the Internet hype. It was finally realized that unique perhaps patented technological solution was usually worth more than a mere domain name.

Although equity investors became more cautious and started investing more selectively, many investments were still being made in Finland during the latter part of 2000. It was not the end of the high-tech and venture capital industries, but rather a play-off for start-ups as well as for investors. As seen in Figure 3, the annual amount of venture capital investments in Finland also reached its peak in 2000 and then found its current balance ranging between 300 and 400 million euros. Venture capital companies that survived the first years of the millennium and are still active in 2007 are now much more mature and experienced to take on a new generation of Finnish start-ups with realistic expectations.

3 PREVIOUS RESEARCH ON GROWTH MODELS

The purpose of this chapter is to familiarize with previous research on growth models. At first, generic growth models will be reviewed and discussed. The research on growth models of companies seems to be almost entirely bound around the thinking that companies evolve through stages of development. Thus this chapter focuses on research on stages models. In addition to stages models the venture capitalist view on company development will be discussed.

3.1 Stages models

To help better understand and describe the development of a company, a number of different growth models are presented in the literature. A large body of the research focuses on constructing theoretical models in which the growth of a company is seen through a sequence of developmental stages, or in other words life-stages. Jonathan Levie and Michael Hay list 63 different published stages models in their review paper.²³

A key strength of stages models is that they offer a simple, easy to understand framework to deal with the rather complex phenomenon of corporate growth.²⁴ Most of the early research on organizations and organizational growth builds on the analogies drawn from the natural sciences. To concretize the intangible organizational growth, metaphors of tangible growth of familiar organisms (e.g. plants, animals) were widely used. As Haire stated “organizations grow as if they are developing organisms”,²⁵ Gardner goes further in pointing out the analogy: "Like people and plants, organizations have a life cycle. They have a green and supple youth, a time of flourishing strength, and a gnarled old age... An organization may go on from youth to old age in two or three decades, or it may last for centuries."²⁶

According to the organismic life cycle analogy, inspired by Gardner (also including the above quotation in their paper), Lippett and Schmidt like a few other researchers in the

²³ Levie, J. and Hay, M. (1999) Progress or just proliferation? A historical review of stages models of early corporate growth. London: London Business School. Page 2.

²⁴ Kazanjian, R. K. (1988) Relation of dominant problems to stages of growth in technology based new ventures. *Academy of Management Journal*, 31(2): 257-279. Page 258.

²⁵ Haire, M. (1959) *Biological models and empirical history of the growth of organizations: Modern Organization Theory*. New York: John Wiley & Sons. Page 272.

late 1960's presented a stage model in 1967. The model consisted of three stages: (1) Birth, (2) Youth and (3) Maturity, with main focus on crises in a developing organization.²⁷ As the three-stage model serves as a platform for the discussion on managerial challenges related to corporate growth, rather than a framework to model the corporate growth, the shortcomings of the model may be overlooked.

In fact, many of the stage models were initially introduced as frameworks for discussing one or several strategic, managerial, organizational or other aspects related to corporate growth. On the other hand, many of the stage models were developed to model or predict the growth of a company. When focusing on the latter perspective, any serious mismatches of models and gathered case data should be taken more seriously.

The shortcomings of the life cycle analogy, the corner stone of the stage models, have been discussed widely, Penrose (1952) and Gardner (1965) to name few. It should be noted, that Lippett and Schmidt (1967) omitted the following sections with restrictions to the life cycle analogy while quoting Gardner:

"But organizations differ from people and plants in that their cycle isn't even approximately predictable. More important, it may go through a period of stagnation and then revive. In short, decline is not inevitable. Organizations need not stagnate. Organizations can review themselves continuously."²⁸

On the same lines with Gardner, Penrose already in 1952 discussed the problems related to the use of biological analogies when explaining corporate growth: "...the available evidence does not support the theory that firms have life cycle characterized by a consistent transition through recognizable stages of development similar to those of living organisms."²⁹

Despite restrictions and shortcomings, the life cycle idea based on the biological analogy has been the inspiration to most of the corporate growth models. As seen in Table 2,

²⁶ Gardner, F. W. (1965) How to prevent organizational dry rot. Harper's Magazine, October 1965. Page 20.

²⁷Lippitt, G. L. and Schmidt, W. H. (1967) Crises in developing organization. Harvard Business Review, (November/December): 102-112. Page 103.

²⁸ Gardner, F. W. (1965) How to prevent organizational dry rot. Harper's Magazine, October 1965. Page 20.

²⁹ Penrose, E. (1952) Biological analogies in the theory of the firm. American Economic Review, (42):804-819. Page 806.

there are a number of stages models including the life cycle idea in the form of consecutive stages. More detailed summary of the stages models listed in Table 2 is presented in Appendix II.

Table 2 Summary of various stages models (1951-1992)

Year	Author	Model title	No. of stages
1951	Davis		3
1954	Drucker		4
1960	Rostow	Economic stages	3
1962	Chandler		4
1966	Katz and Kahn	Organizational structure	3
1967	Downs		3
1967	Lippitt and Schmidt	Crises in a developing organization	3 /6
1968	Salter		4
1971	Scott		3
1972	Greiner	Evolution - revolution	5
1974	Torbert	Mentality of members	8
1974	Kroeger	Life cycle	5
1975	Lyden	Functional problems	4
1976	Thompson	Phases of growth	5
1977	Parks	Hurdless	11
1977	Hosmer, Cooper and Vesper	Stages of growth	4
1978	Gervais (and Basire)	Dynamic 1 to 1000 employees	5
1979	Adizes	Major organizational activities	6
1979	Kimberly		4
1979	Mintzberg		4
1980	Filley and Aldag		3
1980	Robidoux	Crises	7
1981	Naoum	Stages of growth	5
1983	Tyebjee et al.		4
1983	Churchill and Lewis	Stage model	5
1983	Quinn and Cameron		4
1984	Robinson, Pearse, Vozikis and Mescon		3
1984	Miller and Friesen		5
1987	Scott and Bruce	A model for small business growth	5
1987	Smith and Gannon	Organizational development	3
1988	Baird and Meshoulam	Stages of Human Resource Management	5
1988	Kazanjian		4
1992	Dodge and Robbins	The Organizational Life Cycle Model	4

To allow a closer look into the stages models, two models will be discussed in this paper in more detail. The five-stage-model titled as “Evolution and Revolution” by Larry E. Greiner (1972)³⁰ was selected as it is found to be the most influential stage model by Levie and Hay (1999) in their analysis of citations and links between different models.³¹ The five-stage-model by Miller and Friesen (1984)³² was selected due to its unique longitudinal data set of 36 case companies.

3.1.1 Greiner’s model

Greiner’s model is based on his idea that the future of an organization may be less determined by outside forces than it is by the organization’s own history. The development of an organization is seen through phases of evolution followed by phases of revolution as illustrated in Figure 4.³³

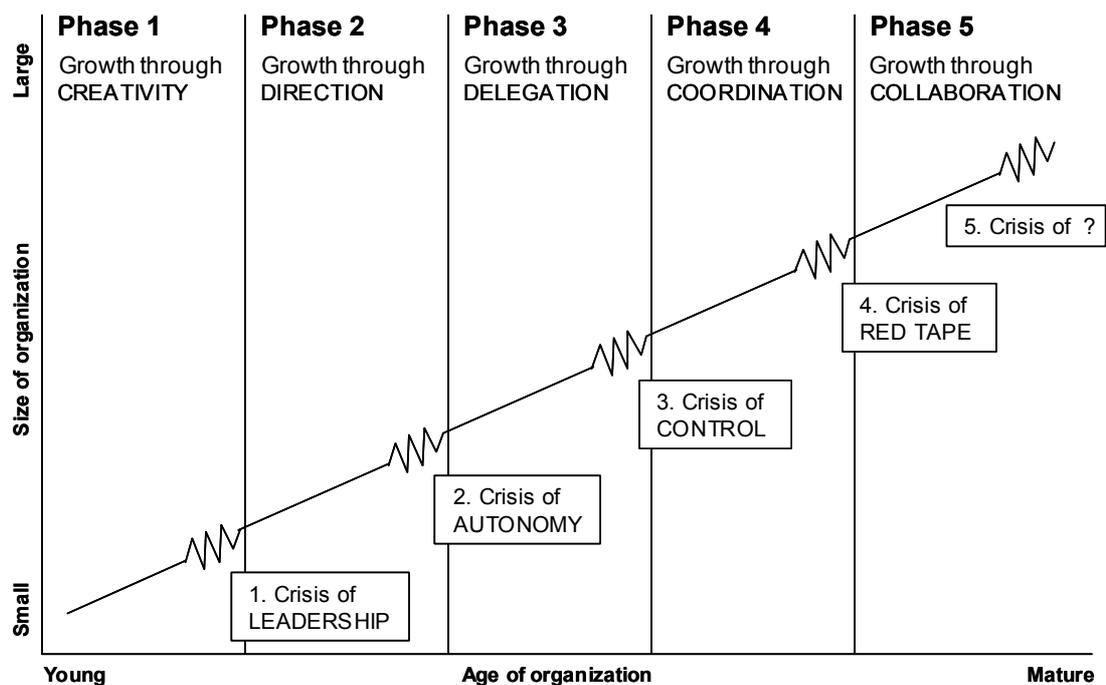


Figure 4 Greiner’s five phases of growth

³⁰ Greiner, L. E. (1972) Evolution and revolution as organizations grow. *Harvard Business Review*, 50(4), 37-46.

³¹ Levie, J. and Hay, M. (1999) Progress or just proliferation? A historical review of stages models of early corporate growth. London: London Business School. Page 10.

³² Miller, D. and Friesen, P.H. (1984) A longitudinal study of the corporate life cycle. *Management Science*, (October): 1161-1183.

³³ Greiner, L. E. (1972) Evolution and revolution as organizations grow. *Harvard Business Review*, 50(4), 37-46. Pages 38-41.

According to Greiner, as a company progresses through developmental phases, each evolutionary period creates a new revolution. For instance, centralized practices eventually lead to demands for decentralization (Crisis of AUTONOMY)³⁴.

One of the purposes of the article by Greiner is to give managerial advice based on the situation of the organization. In the same time, Greiner expresses also a strong opinion that organizations tend to move through the presented five consecutive phases of development.³⁵

The key strength of Greiner's article is its contribution to managerial insight: once the management of a new company realizes the challenges and possible crises ahead, it will be better prepared to tackle the problems and manage the growth. Greiner's view on the consecutive phases of development, however, may be criticized due to its overly simplistic assumption that all companies follow a similar growth pattern through five phases and similar crises.

3.1.2 Miller and Friesen model

The five-stage-model by Miller and Friesen (1984) builds on the literature on the corporate life cycle. Miller and Friesen found that the mostly conceptual literature seems to point to five common stages of development, summarized in Table 3.³⁶

Table 3 also describes the classification criteria, based on which Miller and Friesen identified and classified 161 periods of history from 36 case companies studied. When studying the transitions from phase to phase, Miller and Friesen found that the life cycle pattern was only roughly borne out. It represented a rough tendency, rather than evolutionary imperative thus underlining the over simplicity of most of the conceptual literature on organizational evolution.³⁷

³⁴ Greiner, L. E. (1972) Evolution and revolution as organizations grow. *Harvard Business Review*, 50(4), 37-46. Page 42.

³⁵ Greiner, L. E. (1972) Evolution and revolution as organizations grow. *Harvard Business Review*, 50(4), 37-46. Pages 37-46.

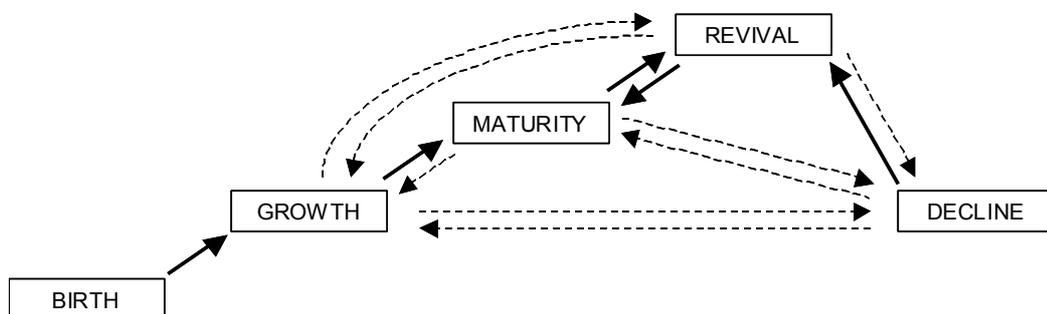
³⁶ Miller, D. and Friesen, P.H. (1984) A longitudinal study of the corporate life cycle. *Management Science*, (October): 1161-1183. Pages 1161-1166.

³⁷ Miller, D. and Friesen, P.H. (1984) A longitudinal study of the corporate life cycle. *Management Science*, (October): 1161-1183. Pages 1175-1176.

Table 3 Five phases of growth according to Miller and Friesen

Phase	Criteria (for classification)
Birth	- Firm is less than 10 years old, - has informal structure, and - is dominated by owner-manager.
Growth	- Sales growth greater than 15%, - functionally organized structure, - early formalization of policies.
Maturity	- Sales growth less than 15%, - more bureaucratic organization.
Revival	- Sales growth greater than 15%, - diversification of product-lines, - divisionalization, - use of sophisticated controls and planning systems.
Decline	- Demand for products level off, - low rate of product innovation, - profitability starts to drop off.

Figure 5 summarizes the phase-to-phase transitions discovered by Miller and Friesen. All discovered transitions are marked with arrows. The most common transitions are marked with bold arrows. The key finding of the study by Miller and Friesen is that it shows that there actually is a wide variety of different phase-to-phase transitions rather than a predicted life cycle through the phases. As pointed out by the authors themselves, the case material used has a positive bias on successful companies and thus it could be argued, that the most common phase-to-phase transitions in real life are not necessarily the same than the ones discovered as most common transitions in the study by Miller and Friesen.

**Figure 5 Discovered transitions from phase to phase according to Miller and Friesen**

A reanalysis of Miller and Friesen's life cycle data by Drazin and Kazanjian (1990) tests the Miller and Friesen's (1984) life cycle data against three separate models: the original five-phase model by Miller and Friesen, a four-phase model (which deletes the decline phase) and a three-phase model (which deletes the decline and revival phase). It was found by Drazin and Kazanjian that the three- and four-phase models show better support for the life cycle hypothesis than the original five-phase model.³⁸

3.2 Discussion on the stages models

Although the number of published stages models is relatively high, there seems to be no progress towards a widely accepted model. As illustrated in Figure 6, the number of stages within the stages models reviewed by the author (listed in Table 2 and in more detail in Appendix II) has a wide variance. In addition, Figure 7 indicates that the field has had great difficulties in reaching any kind of consensus on the number of stages over the years.

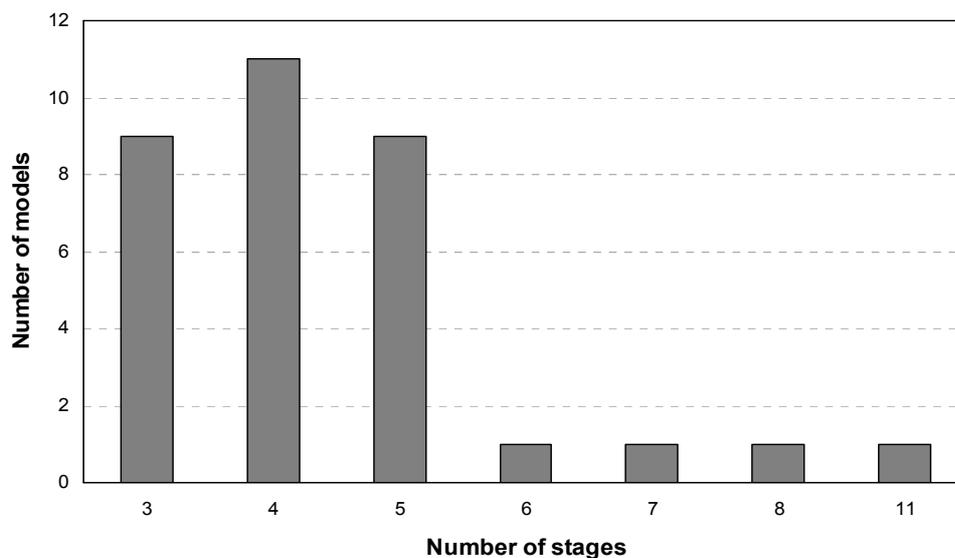


Figure 6 Stages models 1951-1992, classified by number of stages

³⁸ Drazin, R. and Kazanjian R.K. (1990) A reanalysis of Miller and Friesen's life cycle data. *Strategic Management Journal*, Vol. 11, 319-325.

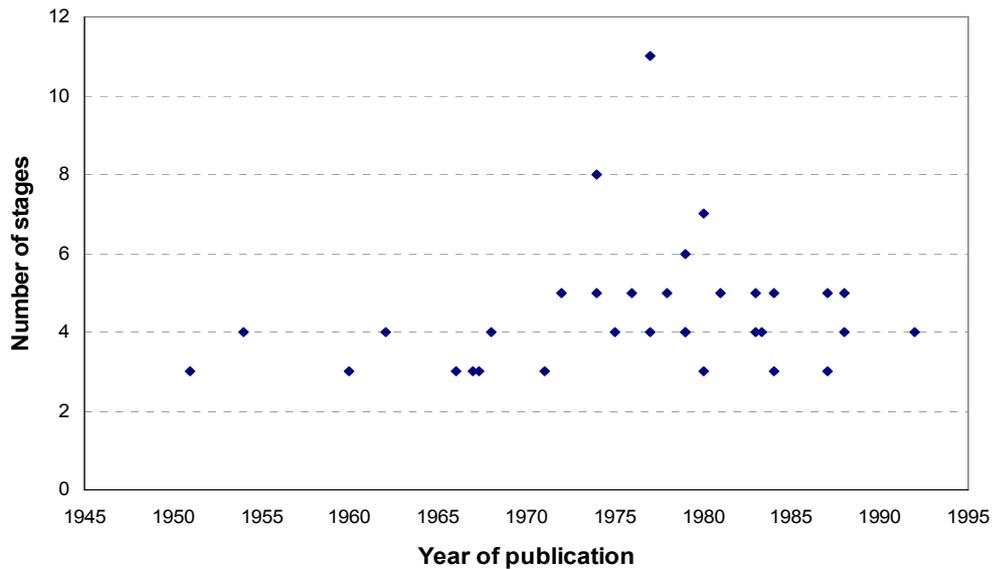


Figure 7 Stages models 1951-1992, Appearance of models by number of stages

The reasons for the absence of a widely accepted stages model are of course many-sided. However, it could be argued that the underlying reason is the difficulty to come up with a stages model that 1) is detailed enough to map companies in different statuses meaningfully, 2) but in the same time is simple enough to fit the different life cycles the companies go through in real life.

The key disadvantage of the stages models which consist of several stages and follow the life cycle hypothesis (i.e. stages models that assume that the company progresses through the stages in a predefined order) is that they do not seem to work when tested against real case companies as discovered by Miller and Friesen.³⁹ As the reanalysis of Miller and Friesen's life cycle data by Drazin and Kazanjian suggests that the three- and four-phase models show better support for the life cycle hypothesis than the original five-phase model, it could be argued that a somewhat workable model is found when the decline and revival phases are deleted from the original model by Miller and Friesen.⁴⁰ Deletion of the decline and revival phases results in a model illustrated in Figure 8.

³⁹ Miller, D. and Friesen, P.H. (1984) A longitudinal study of the corporate life cycle. *Management Science*, (October): 1161-1183. Pages 1175-1176.

⁴⁰ Drazin, R. and Kazanjian R.K. (1990) A reanalysis of Miller and Friesen's life cycle data. *Strategic Management Journal*, Vol. 11, 319-325.

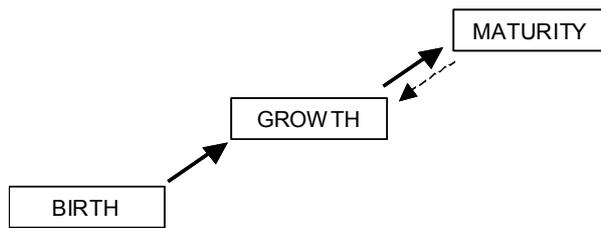


Figure 8 Three-phase model suggested by Drazin and Kazanjian based on the five-phase model by Miller and Friesen

In order for the model to fit with the case data collected by Miller and Friesen, the third stage should be re-labeled by a more general term to include maturity, revival and decline, all in the same stage. However, once the stages model is restricted into three stages, not much of the detail remains. In the view of the author, the meaningfulness of the whole stages model is questionable: A model providing a sensible amount of detail most likely fails as a general model due to poor fit with real life case data.

3.3 Venture capital view on company development

Venture capital investments are typically classified according to the development phase of the target company. Obviously this is done for, say statistical purposes, but it is quite common that the stages like thinking is adapted from the investment classification to a broader use. The first phase in the investment classification is the seed phase, followed by start-up, early stage phases, expansion and bridge finance phases. Different investing stages and types of VC investments are summarized in Table 4, along with definitions by Finnish Venture Capital Association (FVCA).

The definitions by FVCA are rather vague and thus classifying between, for example, seed and start-up stages may not be always straightforward. However, some of the definitions include more clear milestones, such as profit generation, which separates the early stage from the expansion stage (along other criteria). In addition to the milestone of reaching profitability, number of other milestones are commonly being used by the VC's. Milestones are being used in target company evaluations, performance measurement and as contractual levers linking into, for example, financing tranches and/or valuations.

Table 4 VC definitions of investing stages and type of financing⁴¹

Seed: Financing provided to research, assess and develop an initial concept before a business has reached the start-up phase.
Start-up: Financing provided to companies for product development stage and require further funds to initiate commercial manufacturing and sales. They will not yet generate a profit.
Other early stage: Financing provided to companies that have begun initial marketing and related development and needs financing to achieve full commercial production and sales.
Expansion: Financing provided for the growth and expansion of an operating company, which may or may not be breaking even or trading profitably. Capital may be used to finance increased production capacity, market or product development, and/or to provide additional working capital.
Bridge financing: Financing made available to a company in the period of transition from being privately owned to being publicly quoted.
Rescue/Turnaround: Financing made available to existing business which has experienced trading difficulties, with a view to re-establishing prosperity.
Secondary financing: Purchase of existing shares in a company from another private equity investment organization or from another shareholder or shareholders.
Refinancing bank debt: To reduce a company's level of gearing.
Management buyout (MBO): Financing provided to enable current operating management and investors to acquire existing product line or business.
Management buy-in (MBI): Financing provided to enable a manager or group of managers from outside the company to buy-in to the company with the support of private equity investors.

Examples of the above-mentioned milestones used with seed and start-up companies include:

- the business plan has been completed
- the revenue model (including detailed pricing) has been finalized
- a prototype and/or demo of the new product /offering is ready
- the product has been successfully trialed with pilot customers
- income is generated through sale of products, commonly referred as 'proof of concept'
- hiring of key personnel (usually defined in detail case by case)

⁴¹ Finnish Venture Capital Association FVCA, (2006) FVCA Yearbook 2006. Finnish Venture Capital Association FVCA, Helsinki, Finland. Page 61.

It has been learned by the VC investors, that smartly selected milestones, along with records of milestone achievement give in most cases a much more precise understanding of the status of the target company than a rough mapping by stage /phase.

4 EXPERT INTERVIEWS

To gain further understanding on the growth and internationalization of new companies ten experts were interviewed. The interviewed experts consisted of venture capitalists, public sector officials, and other experts working with technology start-ups. A detailed list of the expert interviews is provided in the references, 10.1.1 Expert Interviews.

The interviews were by nature exploratory. No questionnaire was used. The goals of the expert interviews were:

- i) to familiarize with the topic: growth and internationalization of technology-based new companies,
- ii) to understand how the evolution of a technology-based company was seen by the experts,
- iii) to understand what were the critical milestones on the development of technology-based companies, and
- iv) to pre-test the case interview outline to be used in case interviews.

This chapter summarizes the two most important themes of the expert interviews: (1) the critical view by experts on the stages based thinking on the development of technology-based companies and (2) importance of the milestone achievement on the development of technology-based companies.

4.1 Critical view on the stages based thinking

It was discussed in the interviews, that in the traditional view of the venture capitalists, the evolution of a technology-based new company has been seen through separate consecutive stages similar to the stages models described in the previous chapter: (1) First the technology is developed, (2) followed by setting up of the organization. Once the organization has reached sufficient scale, (3) internationalization is started. Finally, (4) the value of the company is realized, either through an initial public offering (IPO) or trade sale.

It was seen by the experts, that since the time-to-market of a new product needs to be shortened, and consequently, the growth of the business needs to be accelerated, the traditional view needs to be challenged: the step-by-step approach is no longer accepted

by the venture capitalists. New companies have to be fast moving, and develop all business processes simultaneously to outrun competition and deliver value in faster pace. According to traditional thinking of venture capitalist, building and realizing value through a technology-based new company takes in average 10-15 years, but when driving the business aggressively significant value could be created in much shorter period – even in 1 to 5 years time. The Figure 9 illustrates the change in the thinking of the venture capitalist.

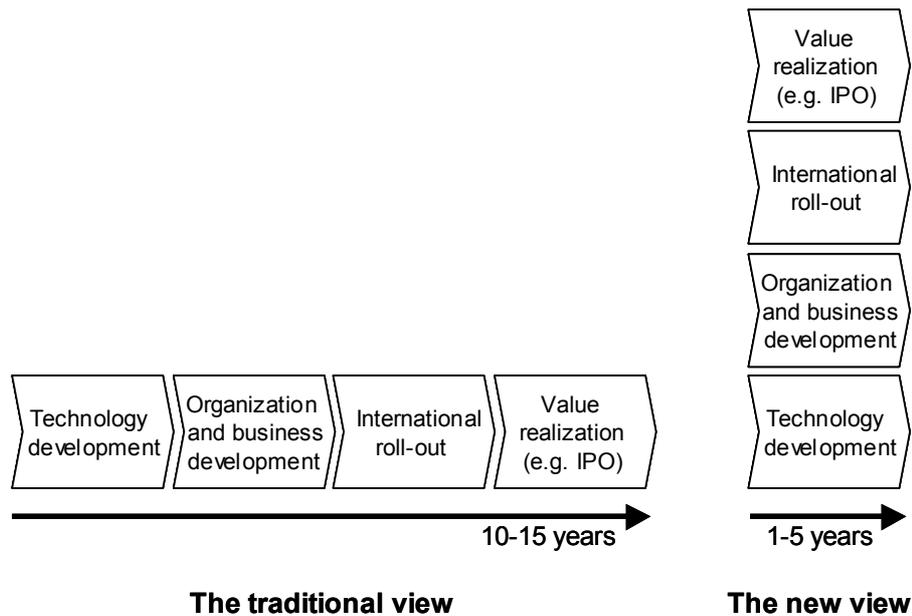


Figure 9 Traditional vs. new view by venture capitalists

Although the venture capital view of the development of a technology-based new company is very simplistic, it offered a major contribution: instead of consecutive stages or processes the development of a technology-based new company could be viewed as a set of parallel processes.

A common view of the interviewed was, that each company has its unique development path, which rarely follows a preset or “standard” growth path. Modeling the growth through a set of parallel processes was, however, seen as a promising idea. It was also pointed out, that building a general growth model for various types of start-up companies might be very problematic, but when focusing on technology-based growth oriented new companies the tasks could be more realistic.

Based on the interviews, it seems that models based on the idea where consecutive development stages follow each other as the company grows prove to be poor in describing the actual growth path of a company in most cases. Thus this paper aims at introducing a new approach based on the parallel processes.

4.2 Milestones on the development of technology-based companies

During the interviews it became evident, that much of the development of technology-based companies could be seen through milestone achievement. While talking about technology companies, it was common to refer to the achievement of key milestones.

Each of the experts interviewed were able to point out at least a few critical milestones on the development of technology-based companies. Such milestones include:

- Equity investment into the company
- Hiring of key personnel or board members
- Product development related accomplishments (ready prototypes etc.)
- Signing of crucial partnerships (technology development partners, resellers, distributors or other)
- Acquiring the first customers
- Reaching profitability (positive monthly cash flow through sales)
- Expanding the business and/or organization to foreign countries

A full list of the milestones identified during the expert interviews or derived by the author is provided in Appendix III.

5 EVOLUTION MODEL FOR TECHNOLOGY-BASED NEW COMPANIES

This chapter aims at presenting a new model to describe the growth of technology-based new companies. The applicability of the model is limited to growth-oriented companies, as many new companies, founded in employment purposes, do not have plans for growth. However, the aim is to develop a generic evolution model for growth-oriented technology-based new companies. The model will be based on the ideas of parallel processes and milestone achievement.

Appendix III presents a detailed list of common milestones for technology-based new companies in indicative order. The detailed milestone lists were generated by the author and amended during each of the expert interviews. It should be noted that all milestones may not be applicable to all companies, but when applicable they often signal an important moment in the development of a company. In order to keep the model manageable not all discovered milestones were selected for the model. The selected milestones are described in more detail in this chapter. The selection criteria for the presented milestones are (1) reasonable possibility to point out the specific time of reaching the milestone, and (2) descriptiveness of a milestone in terms of process advancement.

The model, illustrated in Figure 10, describes the development path from the initial business idea to the realization of the value of the business. The value realization is commonly referred as exit by the venture capitalists. Exit refers to investors' withdrawal of ownership, usually through an initial public offering (IPO) or trade sale. In some cases, the entrepreneur has also a possibility of a partial or full withdrawal of ownership.

The backbone of the model is the value creation process, on which three other core processes of a technology-based new company are placed. The value creation process is considered the main process since the value creation is, or at least should be, the ultimate target of any company. The value of a company is also one of the only objectively measurable parameters useful in describing the development phase of a new venture.

The three other core processes, i.e., (1) the technology and product development process, (2) the business development process, and (3) the network and market development process, each have distinctive measurable milestones. Some of these milestones are fully or partially dependent on each other. Milestone achievement in any of the core processes has a direct or indirect effect on the main process, i.e., value development. For example, before completing a first version of a business plan, i.e., meeting one of the early milestones of the business development process, it is almost impossible to get seed funding, which is, in turn, one of the milestones of the value creation process.

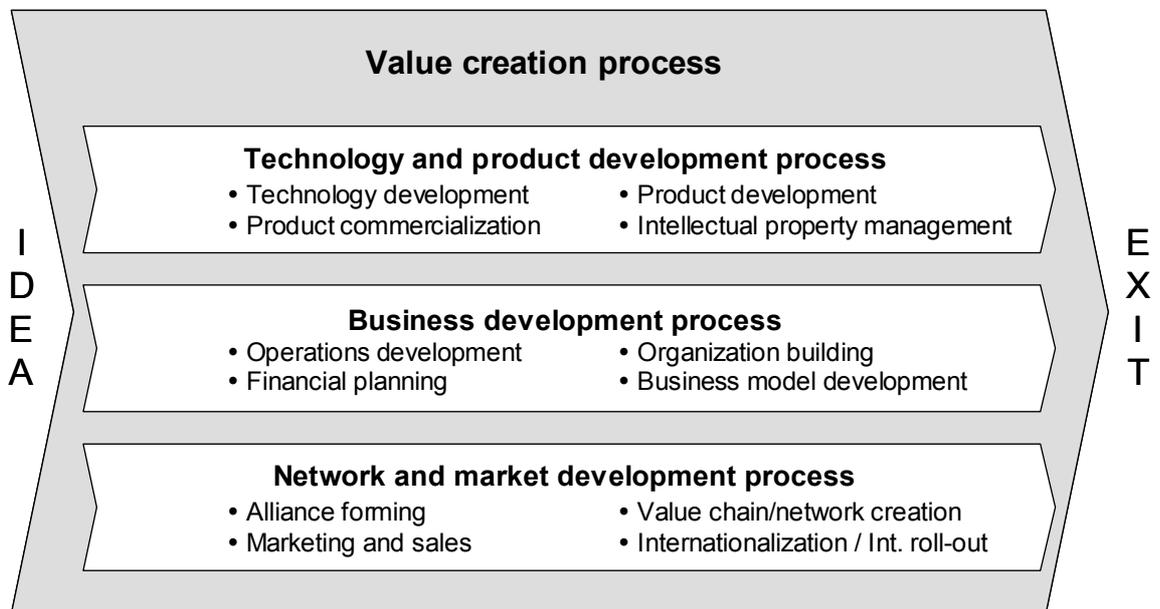


Figure 10 The evolution model for a technology-based new company

The overall goal in introducing the model is to concretize the interdependence of all actions performed in a technology-based new company, and underline the fact that all actions have either direct or indirect effects to the valuation of the company. The model also allows us to compare companies in terms of mode of operation. The order of milestone achievement tells us whether the company is technology, business, or market-driven. The purpose of the model is also to draw the attention of, for example, a technology-driven company to other processes. All four core processes of a technology-based new company are further discussed in the following.

5.1 Value creation process

In general terms the value of a new venture is derived by venture capital investors by discounting predicted future cash flows to the present. The discounting factor depends on the probability of returns. Even if a company has significant potential future cash flows, the risk of failure decreases its net present value. As a company proceeds towards profitability the likelihood of success increases, and the value of the company increases. Thus, it can be argued that every step a company takes towards its goals increases its value or to be more precise the relative value of the company. The relative value means here the value of a company on a given time compared to the value of the same company during a different time. Obviously not all actions of the company increase the relative value. Wrong business decision may destroy the relative value.

Since new ventures are not publicly quoted, the absolute monetary value of a venture cannot be exactly determined at every point in time. Instead, it is determined at each transaction where shares of the company are exchanged for money or other financial instruments. Most common transactions are equity injections by private equity investors usually in the form of issue of new shares, but mergers and acquisitions conducted through exchange of shares are also typical points of venture valuation. However, in case of share exchange the monetary price is not absolute, but rather relative to the valuation of the other party involved in the transaction.

When discussing the value of a company, it should be noted that there may be cases where a company has been progressing towards its goals i.e. building steadily its relative value, but in the same time the absolute monetary value of the company has decreased. This has to do with the market situation and the overall valuation levels of technology companies and/or start-up companies. In rough terms the absolute monetary value of a company can be seen as a product of the relative value and overall valuation level of early stage technology companies in general or a more precise peer group.

For example, when the valuation levels of technology companies suddenly fell during the year 2000 it was common that the valuations of technology start-ups decreased significantly between the financing rounds, although the company had been successfully developing according to plans. However during the year 2000 very few technology start-

ups performed as planned due to ambitious plans and overly optimistic goals common those days.

Due to the increased complexity of products and services, time-to-market tends to lengthen. In order to maintain sufficient resources until the company reaches profitability, external financing is often needed. The time needed in turning a company's cash flow positive varies considerably. A long product development phase and slow market penetration prolong the period of negative cash flow. Simultaneous internationalization drains resources at an even higher rate. Since start-ups do not usually have collateral to secure bank loans, equity financing is the most common form of financing. Venture capital funding is usually sought in order to gain business development help in addition to plain funding.

Funding is usually raised in several different financing rounds. Table 5 presents the most common rounds with indicative valuations and investment sizes. Typically, companies go through only a part of the financing rounds presented here. For example, after a large business angel investment, many companies aim directly at the first venture capital round. The number of venture capital rounds (which obviously can be more than the three presented in the table) in practice depends on the capital need of a particular company.

Table 5 Typical financing rounds of a technology-based new venture

Milestone	Indicative valuation range, million euros	Indicative investment range, million euros
Founding , establishing legal form		0,008 – 0,1
Business angel investment	0,02 – 1,5	0,01 – 0,2
Seed investment	1 – 5	0,1 – 1,5
1st VC investment	3 – 15	1 – 4
2nd VC investment	8 – 40	3 – 15
3rd VC investment	15 – 200	10 – 50
Exit	20 – 500	

Exit valuations of technology companies, alike the absolute value of a company at any given time, are dependent on the prevailing market situation. Because the presumed exit valuation is the most important measure when considering the value of a company at the last venture capital round before an IPO, it is obvious that exit valuations have significant effects to valuations at all investment rounds, although the effect diminishes towards the founding stage. Due to dramatic changes in the market situation, especially during the years 1999-2001, historic exit valuations have had notable variation.

5.2 Technology and product development process

The technology and product development process consists of functions aiming at creation, development, and commercialization of products and services. It also includes intellectual property rights management as it is, or at least should be, an integral part of company's R&D functions. The starting point of the technology and product development process is in the emergence of an idea, and its formulation to the initial product concept. In what follows, the selected key milestones used in case analyses are introduced and specified. The milestones are presented in indicative order. A more detailed list of the most common milestones is provided in Appendix III. The key word for later reference to the milestones is presented in parenthesis after the milestone title.

Technology / product patented (PATENT) The company has been granted its first patent, or the company has been able to exclusively license an existing patent.

Prototype / demo publicly announced, so-called alpha-phase (PROTO) Giving the first public demonstration of a product, service or functioning prototype. This development stage is commonly noted as the alpha-development phase.

Trial / pilot with customers, so-called beta-phase (PILOT)

Piloting the product or service launch to a selected or limited group of trial users. This development stage is commonly noted as the beta-testing phase.

Product ready for shipping (PRODUCT) The product includes at least the minimum functionality that the customer demands. The ready-to-ship product needs to also have the appropriate manuals, packaging, and installation or deploying instructions. The

product is considered ready-to-ship, when it can be released to distribution channels without major difficulties.

Income from products (INCOME) Company receives payments from customers in exchange for products or service products. Payments for project work or (highly) customized services are not considered as milestone achievement. Venture capitalists often refer to this milestone as the ‘proof of concept’.

5.3 Business development process

The business development process includes the following functions: operations development, organization building, financial planning, and business model development. In other words, the process includes both planning and execution of a company’s internal functions, excluding only the technology and product development related functions. As the business development process is initiated at the emergence of a business idea, the process starts with a business-planning phase. Latter milestones focus more on execution and organizational development issues. Mergers and acquisitions are listed towards the end due to their occasional nature.

Some of the milestones refer directly to the internationalization of the company, or to gathering the resources for internationalization, such as hiring a foreign manager. It seems that companies with vast international resources in the early phases of the process are more likely to succeed in internationalization. In the Finnish case, internationalization is vital for the growth of a company due to the small size of the home market. Selected key milestones are presented in the following.

Initial business plan (PLAN) The first written documentation, describing the business idea on a rough scale, is completed.

Founding (FOUNDING) Establishing legal form of the company. The milestone refers to the contractual establishment of the company rather than the filing date of register authorities.

Own premises (OFFICE) Moving into own premises.

Management team hired (MANAGEMENT) This milestone is considered achieved when four out of the following six positions are fulfilled: General manager, Financial manager, Sales and Marketing manager, Technology manager, Human resource manager, and Business development manager. Naturally, the management team can always be strengthened, and thus, is never 'complete'.

First foreign member of the management team (INT. MANAGER) The first foreign manager appointed.

Team size of 10 employees (TEAM OF 10) The number of the personnel reaches ten.

First foreign member of the board of directors (INT. BOARD) The first foreign member appointed to the board of directors.

Team size of 30 employees (TEAM OF 30) The number of the personnel reaches 30.

Operations in multiple countries (INT. ORGANIZATION) The company extends its operations to one or several other countries. Operations include, at minimum, hired personnel and own premises.

Acquisitions (ACQ. [name of the company, country]) This special milestone is achieved every time the company acquires more than 50 % of shares in another company, or otherwise acquires the right to vote in a company. Obviously, this milestone can be achieved several times during the life span of the company.

Mergers (MERG. [name of the company, country]) This also special milestone is achieved every time the company merges with another company. Mergers usually involve exchange of shares.

Name changes ([new company name] NAME) The company changes its name. Although a change in the company name does not increase the value of the company itself, the milestone is included in the model as it usually indicates major strategic changes in the company.

5.4 Network and market development process

The network and market development process consists mostly of company's external functions, such as value chain creation, network building, marketing, sales, and internationalization. Since the network and market development process includes numerous functions, it has the largest number of milestones, which is reflected in the number of milestones used in the case analyses.

Pilot / first customers signed (DEAL) The first agreement on product or service delivery signed with a customer. Obviously this milestone is usually shortly followed by product delivery, in other words the PILOT-milestone of the technology and product development process. However, having separate milestones for the agreement and delivery is useful in, for example, detecting lengthened time-to-market. Longer periods between the agreement and delivery are also usual in businesses where the product needs considerable customization.

First technology partnerships signed / platform decisions made (TECH-PARTNER) A partnership agreement that fixes the computing platform, hardware selection or the key technological choices is made. In some cases, the platform decision is made without a particular agreement.

Sales organization ready and launch of marketing campaign (SALES) This milestone is considered achieved once the marketing campaign is started, and a sufficient sales organization is able to carry on sales after the campaign. As in the case of the management team, the sales organization is never 'ready' – it can always be developed.

First foreign investor on board (INT. INVESTOR) Contractual time when the first foreign investor invests in the company.

Agreements with distributors / resellers (DISTRIBUTOR) Contractual time when distributors and/or resellers agree to start selling the company's products or services. Operators are considered as distributors in case of services transmitted over operators' networks to customers.

All crucial business model specific alliances signed in initial market (ALLIANCES) Each business model has its crucial partnerships. The milestone is considered achieved once all these crucial partnership contracts are signed in the company's home or first target market. The milestone refers to the contractual date.

Deliveries to the first foreign customer (INT. CUSTOMER) The first product or service delivery to a foreign customer. The customer can also be a trial or a pilot customer.

1st country manager appointed (1st [name of the city, country]),

2nd country manager appointed (2nd [name of the city, country]), etc.

Appointing a manager to lead a foreign office of the company. This is usually an indication of purposeful development of business in a particular location. Appointing country managers to new locations is a symptom of the speed and overall success of internationalization. For example, if the intervals between further appointments of country managers shorten over time, it implies that the company has learned to accelerate the internationalization process. Or, vice versa, if the interval is prolonged, it might be a signal of problems in the international rollout.

All crucial business model specific alliances signed in first foreign market (INT. ALLIANCES) This milestone is considered achieved once all crucial partnership contracts are signed in the company's first target market outside its home country.

6 DESCRIPTION OF THE CASE STUDY PROCESS

The purpose of the case studies is to test, validate and further supplement the model developed. In addition, the case material was going to be used for inter company comparisons through cross-case analysis. This chapter contains a sampling procedure description and research methodology explanation.

6.1 Sampling

The case companies for this study were selected from the Finnish ICT cluster. The goal in the selection was to have a sample representing different areas of the cluster, while at the same time representing companies with different backgrounds. Apart from Jippii Group, all case companies are private and relatively young: the age of the case companies at the time of the interviews varies from less than two to twelve years, while the average age was slightly above four years. All case companies are funded by venture capital, since they all are growth oriented start-ups with a goal to develop international operations. Companies following a path of organic growth, and those funded entirely by revenues were left out. The mapping of the case companies on the ICT cluster chart is provided in Figure 11.

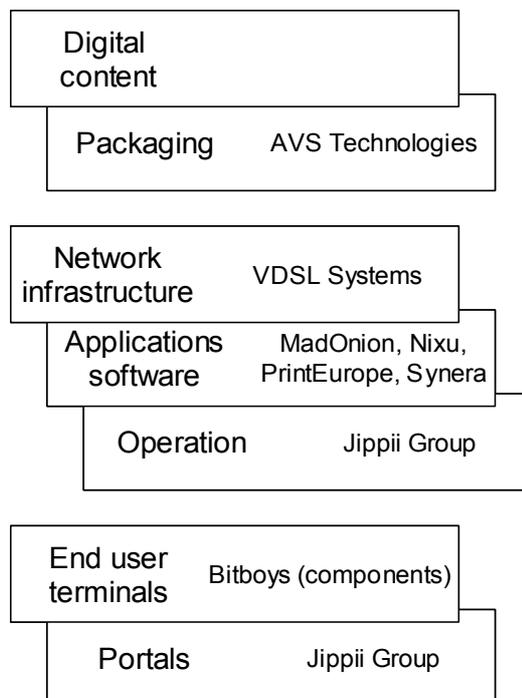


Figure 11 Mapping of the case companies on the ICT cluster chart

Because application software companies form by far the largest group in the Finnish ICT cluster, half of the sample represents this group. The selected application software companies function on different fields of software development: Synera is a pure software house, while Nixu's offering is a mix of software products and services. Printeurope represents business-to-business Internet companies, whereas MadOnion provides a more consumer focused Internet service.

The ICT cluster chart used to position the case companies was compiled by the author based on the ideas gathered from the expert interviews. The case company selection was also made with a suitable, easy-to-approach person in mind for the interviews. The contact network of the author, supervisors and the interviewed experts was used in the sample formation. Thus the sample is defined by access and the sample is by nature a convenience sample.

6.2 Methodology

Case material from the companies was collected through case interviews, public sources (Internet, articles etc.) and written documents (business plans etc.) received from the case companies for use in this study. The case material was initially collected during the time period February 2000 to February 2001. Documents received from the case companies are not publicly available and due to their confidential nature will not be presented in the appendices or anywhere else by the author. It was also agreed that the final case descriptions need to be approved by the case companies before public presentation to retain a right to discard any confidential information from the descriptions.

The interviews were semi-structured. A case interview outline was used during the interviews in addition to the milestone lists. The purpose of the author was to acquire understanding of the case company's business and products so that a brief history of each case company could be presented along the mapping of the milestones to the model to be tested against the case data. The interviews focused on understanding the status of the company at the time of the interviews as well as the development from the start of the business. Persons interviewed were founders, CEO's or other key executives of the case companies. Notes were taken during the interviews as filling in the milestone lists

during the interviews together with the interviewed persons proved to be a practical means to assure accurate results.

The cases are presented in the Chapter 7 based on the data collected in 2000 – 2001. Because the focus of the evolution model is in the early development of a technology-based company, mapping of the milestones is done starting from the start of the company until 2001. However, in order to better understand the further development and judge the success of the case companies, the cases have been revisited in 2007. All cases include a paragraph written based on the new set of case data gathered from public sources in 2007.

7 CASE DESCRIPTIONS

7.1 AVS Technologies Oy

AVS Technologies is a technology company developing next generation video distribution technology for the both wireless and fixed Internet. AVS's Java-based solutions work with standard Internet browsers without specific plug-ins. AVS is powered by its proprietary MVQ video codec, enabling fast decompression at the receiving end even with limited processing power.

Key Facts of AVS Technologies Oy (2/2001)

Website:	www.avstechnologies.com
Headquarters:	Helsinki, Finland
Founded:	11/1996
CEO:	Anttoni Vesterinen
Industry segment:	Video compression software
Employees (2/2001):	21
Owners:	Management team and investors

Investors

Business angel rounds:	1996-1998 € 0,17 M Private individuals
Seed round:	11/1999 € 0,25 M Holtron
1st VC round:	5/2000 € 1,5 M Nokia Ventures
2nd VC round:	1/2001 € 6,4 M Zouk Ventures (UK) and Nokia Ventures
Subsidies:	-

7.1.1 The start

Mr. Antero Alvesalo, previously the head of Nokia's DECT-group, founded AVS Technologies in 1996 to pursue the opportunity in transferring still images over GSM data connections. The initial idea was to develop solutions for security services. Various surveillance applications were developed during 1997 and 1998 by a small development team. However, high prices and instability problems of PC-based surveillance systems made it difficult to attract customers.

Soon AVS started pioneering streaming video solutions. In June 1998, AVS made a licensing agreement with *VTT* (Technical Research Centre of Finland) to commercialize

the Motion Vector Quantization method (MVQ) for streaming video. Later in 1999, the management came to realize that GSM-based surveillance systems on PC-platform did not have the needed business potential. Backed by Holtron's seed investment, AVS started restructuring its business towards Internet and mobile Internet based strategy. The goal of the development work was to create a fast video streaming solution powered by compact Java-based decompression software.

In early 2000, the first demos of Internet streaming video banners were running on standard web-browsers without software players or plug-ins. Later during the same year audio was added after a licensing agreement with sound processing specialist, *Voxlab*. Thanks to compact and less bandwidth consuming MVQ Java video and audio applet technology, MVQ video can be viewed with any Java compliant Internet browser. Due to the small byte-size of the decompression applet, MVQ based streaming video was soon running on handheld devices as well.

Inspired by the opportunity to utilize MVQ technology in mobile devices, Nokia Ventures invested in AVS in May 2000. With the strong equity backing AVS was soon able to attract new employees. The company started growing fast, and the management team was strengthened by a new CEO, Anttoni Vesterinen, appointed in August 2000. The first beta customer, *Elisa Communications*, launched Internet video greetings before the year ended. As AVS approaches the full-scale product launch of Internet streaming video solutions, more resources are needed for the international product rollout. *Zouk Ventures* gave the latest cash infusion in January 2001 to support the internationalization of the company.

7.1.2 Observations 2001

Currently, AVS aims at becoming a leading Internet video solutions provider. The current market leaders in streaming media, *RealNetworks*, *Apple* (Quicktime) and *Microsoft* (Media player), are all based on proprietary software-players. Partly due to the need of player software, and partly to modest connection speeds, streaming video viewing has not yet taken off as expected. Therefore, AVS has taken a whole new approach in its solutions. MVQ is an asymmetric compression software for video: once the compression is done, using the MVQ content creation toolkit, the video stream can be decompressed with a simple algorithm. Because of the light decompression, AVS has been able to make

the player as light as a 9 kilo byte Java applet, which is supported by all standard web browsers, and thus, no plug-ins or proprietary players are needed.

In the next phase, once the mobile networks offer adequate and affordable data access, and mobile terminals are Java-enabled, AVS will introduce the same concept for mobile devices. Due to effective light-weight decompression, MVQ is close to an ideal format for mobile use: it functions well even with limited bandwidth and reduced processor power, and it is less power consuming compared with symmetric compressions/decompression methods. Mobile use is not only about the future, since MVQ reaches reasonable video quality already in current GSM networks (at transfer speed of 9,6 Kbits per second).

AVS's initial target market consists of content delivery network operators that have existing content brands and customer bases, as well as large companies using video in their internal and/or external communications. Later, big global content producers are also targeted, because they often control their distribution channels.

7.1.3 Conclusions 2001

The business case of AVS is founded on solid patented technology. The development of MVQ started in VTT as early as in 1991, and today, AVS has exclusive licenses for the technology. First AVS failed in introducing surveillance applications, but after restructuring and a complete turnaround in the business strategy, the company has now solid investors and resources for the product rollout.

Presently, AVS has a strong management team and all the ingredients for successful growth. AVS's MVQ technology is very competitive compared to its rivals, but large organizations, such as Microsoft, Apple and RealNetworks should not be overlooked. There are also a number of other video streaming solutions trying to make their way to Internet and mobile devices. Although AVS recently acquired its first pilot customers, it has not yet generated any revenue.

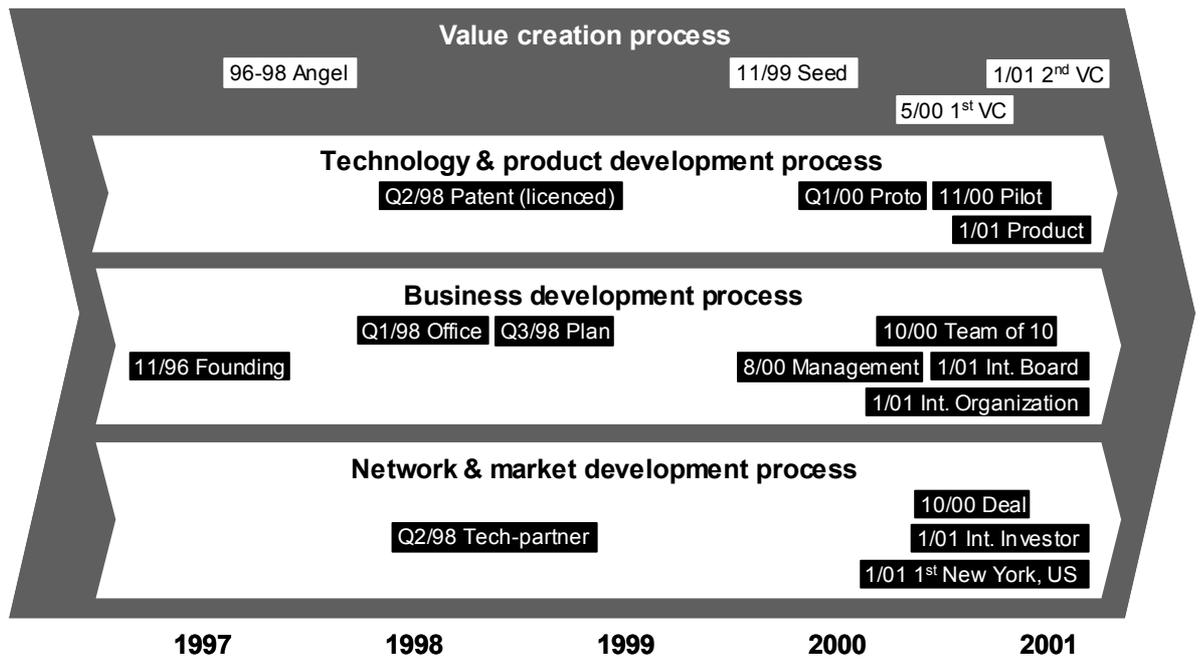


Figure 12 AVS Technologies, mapping of milestones

7.1.4 Observations and end notes 2007

With the vast financial resources raised in 2001, AVS Technologies started rapidly expanding its international operations. The name of the company was changed to a more appealing Oplayo Oy. In late 2001 together with Akamai Technologies Ltd. Oplayo presented live streaming video through internet in handheld Java devices. During the summer 2002 Oplayo expanded its technology on mobile networks as live video streaming over the GPRS mobile network was pioneered by the company. By the end of 2002 under the direction of a new CEO, Teppo Paavola Oplayo had offices in London and Munich in addition to the Helsinki headquarters with head-count of 70 employees. Clients included names such as CNN, NBC, Universal Pictures, but yet the sales remained at modest level.

To break through on the mass market new financing was raised in February 2004. Siemens Mobile Acceleration SMAC made its first investment to a Finnish technology company. Oplayo raised 4,4 M euros from SMAC and its former investors Nokia Ventures, Zouk Ventures and Holtron. Despite the hard work major deals were hard to pull in and the sales lagged behind the targets. In January 2005 the company had fired more than half of its employees. In August 2008 only 12 employees remained with the

company. The once broad product portfolio was focused on only on the mobile. The slow transition to new 3G mobile networks and adaptation of new services by the consumers had hindered seriously the business.

In April 2006 Oplayo Oy was acquired by Australian Slice Wireless Group and its partner U-turn Media Group. Slice Wireless Group started using the Oplayo technology already in the end of 2004 in streaming clips of cable TV shows. At first Slice Wireless Group considered buying the technology from Oplayo, but ended up acquiring the whole company. In 2007 Oplayo has an office in Helsinki focusing on licensing the content management technology. The purchase price by Slice Wireless Group was not published, but obviously the value of the company had decreased during the downsizing in 2004 - 2005.

Oplayo is an excellent example of a cutting edge technology company struggling to make a break through to the mass market. As it is very easy to see now, Oplayo was all the time ahead of its time. The financial resources run out before the sales started to increase. However, the technology of Oplayo seems to survive as it was just recently acquired by a group of companies most likely capable of commercializing the technology.

7.2 Bitboys

Bitboys is about to launch a revolutionary 3D graphics solution, based on unique processor architecture. Bitboys is a chip design company, using subcontractors for chip manufacturing. PC-card manufacturers, who distribute the commercial boards to consumers, are the targeted customers of Bitboys.

Key Facts of Bitboys Oy (2/2001)

Website:	www.bitboys.com
Headquarters:	Espoo, Finland
Founded:	1997
CEO:	Shane Long
Industry segment:	Semiconductors
Employees (2/2001):	25
Owners:	Management team and investors

Investors

Seed round:	7/1999 € 3,0 M Infineon Technologies AG (Germany) and other industrial partners
1st VC round, step 1:	8/2000 € 3,7 M Conventum
step 2:	11/2000 € 1,6 M Aboa Ventures II, Karhu Pääomarahasto II, and others
Subsidies:	€ 1,7 M TEKES, 1999-2000

7.2.1 The start

The original development team, the first 'bitboys', has its roots in a 3D processor and software development project started in 1991. The project was funded by industrial partners involved in the development work. Among other innovations the team developed an algorithm, which was later licensed to Microsoft to be a part of the DirectX standard. Bitboys Oy, in its current form, was founded in 1997, as the idea of launching a revolutionary 3D processor emerged. The unique processor design was based on an architecture that combines a compact and powerful 3D core with an embedded DRAM memory on the same microchip. This architecture, Bitboys Xtreme Bandwidth Architecture, enables the use of wide memory bandwidth between the core and the embedded memory, enabling dramatic performance improvement on the traditional 3D graphics technologies.

Until the seed financing received in July 1999, the company had been funded by the management team and revenues generated from project work for clients. As the company focused increasingly on developing a new 3D processor for OEM markets, the project business was run down during 1999. Bitboys received seed financing from its manufacturing partner *Infineon Technologies* and some other industrial investors. Professional venture capitalists were taken aboard rather late, in fall 2000.

7.2.2 Observations 2001

Bitboys is well on track to provide a functioning chip for the first pilot users at the end of 2001. A capacity of 3 gigapixels per second will be reached and, with the increased memory bandwidth, a notable performance improvement on traditional 3D graphics technologies will be achieved. To date, no competitor has announced any intentions of developing a product that would match Bitboys' processor in performance in the near future. Presently, Bitboys holds two patents and has applied for several more, which are related to solutions for managing the embedded memory and the 3D core.

Ultimately, the products will be also used in OEM markets, once the technology has been proven in the high-end gaming market. The total market for display adapters is in the range of 150 million units per year, of which the performance board market is roughly 5 million units. At the initial product launch, Bitboys aims at acquiring a 10-20 % market share of the performance board market, and later, extending to the whole display adapter market, and strengthening its position in the high performance market. The company expects to reach profitability during the first quarter of 2002.

7.2.3 Conclusions 2001

Designing a new processor, especially a large 3D processor, is a risky business. Although Bitboys is already close to the final phase, i.e., the processor's integration to the 3D-accelerator card, delays are always possible. Even a 6-month delay can be fatal as products go out of date extremely quickly. The possibility of a total failure in the design phase can never be eliminated either. On the other hand, once the chip's core functions in the desired way, it can give a competitive edge for years. For example, the current market leader *Nvidia* is still using basically the same processor core than the one designed in 1995, which is improved and tuned each time for a new product.

Bitboys and other challengers might soon have a chance to penetrate the market because there is likely to be a break in the current market leader's product line as the current core will eventually become obsolete. Even without technological discontinuity it is possible to reach quickly a market share of 10 % or even more, since high-end users, the gamers, are very active in upgrading their computers. However, to penetrate the mass market Nvidia has to be challenged. Nvidia acquired its former rival *3dfx* for more than USD 100 million worth of cash and shares in December 2000, which indicates that trade sale is a possible exit alternative in the 3D processor business.

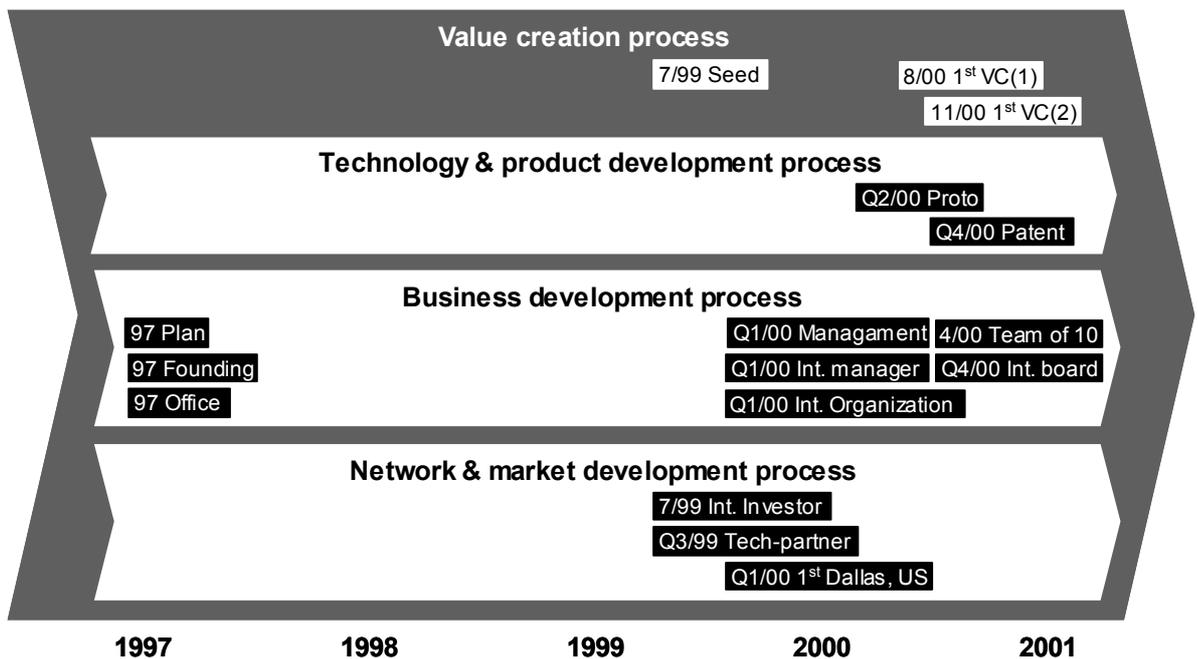


Figure 13 Bitboys, mapping of milestones

7.2.4 Observations and end notes 2007

As Bitboys were preparing to take their 3D chip design on silicon in fall 2001 problems arose. It turned out that the design had several bugs, which took considerable time to fix. More bad news came in as the fab partner of Bitboys suffered on price erosion in their products and decided to close down the business unit which was working on the Bitboys design. Eventually the new retail product was cancelled and Bitboys was left with a demonstration version of their grand design on which they had worked for years.

Despite the misfortune, Bitboys started a new 3D chip project with a new fab partner. However, due to the delays money started to run out and Bitboys was forced to lay off people and shut down their Dallas office. New funding was sought after through various routes. Bitboys even tried to sell out their design tools and technologies with no luck.

In 2002 Bitboys decided on major strategic chance. They shifted their focus from high end 3D chips to chips designed for mobile devices and this time they decided to license the GPU designs rather than produce it their selves. The new strategy turned out very successful. Despite the scarce resources, Bitboys was able to present a new chip family, Acceleon, designed for mobile devices in July 2003. Customers for the new chips included companies such as NEC Electronics. Profitable business continued with new chip releases on the following years.

As profitable growth was demonstrated for a while Nokia Growth Partners decided to invest 4 million euros to Bitboys in February 2006. Although this time Bitboys could have managed without new funds, the financing enabled Bitboys to perform larger investments and strengthen their patents. Shortly after the Nokia investment, in May 2005 Bitboys was bought by ATI at a sales price of 35,2 million euros. ATI acquired Bitboys to strengthen its handheld business unit. Bitboys was turned into ATI Research Finland and all 43 former Bitboys employees continued to work with the ATI mobile graphics team.

The story of Bitboys is truly about survival. Although very few expected Bitboys to survive the misfortune during the years 2000-2001, Bitboys was able to recover through a smart strategic decision. With the leverage of the multinational ATI group Bitboys technology is finally most likely to widely penetrate in the mass markets through mobile devices.

7.3 Jippii Group Oyj

Jippii Group is a multiservice operator, having operations currently in fourteen countries. The service offering includes: Internet access services, mobile and fixed-line telecommunications services, content and value-added services to both businesses and consumers, as well as mobile and Internet portals. Jippii is also advancing in the development of mobile Java gaming and wireless Internet services.

Key Facts of Jippii Group Oyj (01/2001, former names Saunalahden Serveri Oy and Nettilinja Oy)

Website:	www.jippii.com
Headquarters:	Helsinki, Finland
Founded:	8/1996 (Nettilinja Oy)
CEO:	Harri Johannesdahl
Industry segment:	Network and service operator
Employees (1/2001):	450
Owners:	Publicly listed company

Pre-IPO investors

Seed round:	Q3/1996 € 0,84 M Auratum
further VC rounds:	undisclosed Auratum, Turun Puhelin
IPO	4/2000 market cap € 280 M of which 22,8% were offered for subscription

7.3.1 The Start

The roots of Jippii Group go back to one of the early Finnish Internet service providers (ISP), *Nettilinja*, which was founded in August 1996 by Mr. Ilpo Kuokkanen. Mr. Kuokkanen saw a business opportunity as the Internet was gaining popularity during the 1990's. Nettilinja started offering Internet connections through *Telia's*, a Swedish telecom operator's local network in January 1997. The nationwide sales organization was set up in co-operation with *Expert*, a home appliance chain. Despite the fast start, Nettilinja was able to gain only 5 % of the market by year-end.

During 1997, the management of Nettilinja realized that small ISPs had to merge in order to challenge the market leaders, *Kolumbus* and *Sonera* (then Telecom Finland). In March 1998, Nettilinja merged with *DLC Data Link Connections* and *SciFi Communications*

International. A New CEO, Mr. Harri Johannesdahl, joined the company upon the merger. The name of the company was changed to *Saunalahden Serveri* soon after. Acquisitions continued during the same year, totaling seven other ISPs. The transactions were funded by *Auratum*.

During 1999, Saunalahden Serveri extended its operations to other complementary business areas: telecommunications, wireless Internet, mobile and Internet portals. At the end of 1999, the company searched for a strategic partner for internationalization. As a suitable partner with complementary knowledge was not found, the management decided to seek public listing of the company.

Setting up of international activities started in March 2000, when a subsidiary was opened in Norway. Saunalahden Serveri was listed on the NM List of Helsinki Exchange in April with a market capitalization of EUR 280 million. Aggressive acquisitions continued after the IPO as operations were started in major European markets: Netherlands in May, Switzerland in June, UK in August and Germany in October. In October, the company changed its name to Jippii Group to better fit the internationalizing company. The name Jippii had already been used as a brand name for the mobile portal.

7.3.2 Observations 2001 (January)

Jippii is today a fast growing European multiservice provider with a wide range of products and operations in 14 countries. After the IPO the company has acquired either the majority of the capital stock or purchased the business operations of the following operators: *Gigabell AG*, *MagicNet* and *Cross Telecom AG* in Germany, *Gigabell Ltd* and *Webleicester* in UK, *Mopos Sro* in the Czech Republic, *Gigabell Ibérica SL* in Spain, and *Supertel* with operations in Finland, Sweden, Denmark and UK. Major acquisitions in Finland include *NIC Tietoverkot* and *Cabinet Group*, which included the major domain name business, *THK.net*.

In 2000, the turnover of the Group was EUR 34,6 million with an operating profit of EUR 0,7 million. Since international operations were set up only recently, the majority (71 %) of the turnover still comes from Finland. At the end of the year 2000, Jippii was the second largest ISP in Finland with its 230 000 private and 35 000 corporate customers. In addition, by the end of February 2001, Jippii had already 35 000 GSM

subscribers to its service opened just few months earlier. Jippii's Internet portal came (in early 2001) second in average page impressions, already ahead of *MTV3*, and just after *SoneraPlaza*.⁴²

7.3.3 Conclusions 2001 (January)

Jippii is a very interesting mix of different communications businesses. Since the beginning, the company has been on a very fast growth track. Successful acquisitions have followed each other at a fast pace, first in Finland, and then in Europe. The Group plans to make half of its turnover abroad already in 2002. Jippii might be able to reach this goal, since its internationalization model seems to work well: a new market is entered by first setting up portal services for Internet and mobile users, and later, the business is extended to Internet service provision and GSM services over leased network capacity. More capital-intensive telecom and access services are offered once the brand is recognized in the market.

Although Jippii's share price fell soon after the IPO below the listing price, it has survived better than technology companies in general, thanks to the many growing business areas Jippii is involved in. The critique towards the company usually focuses on its "octopus like" organization: there appears to be no clear focus, and almost all new businesses are entered seemingly without hesitation. One of the recent projects, setting up an access network based on WLAN technology, was however spun off from other operations in February 2001. According to the management, Jippii Group's strategy is to offer a complete range of affordably- priced telecommunications services to consumers and corporate customers.

⁴² SoneraPlaza, the portal of the incumbent telecommunications company and MTV3, the portal of a major television channel have for long been the two most popular Internet portals in Finland.

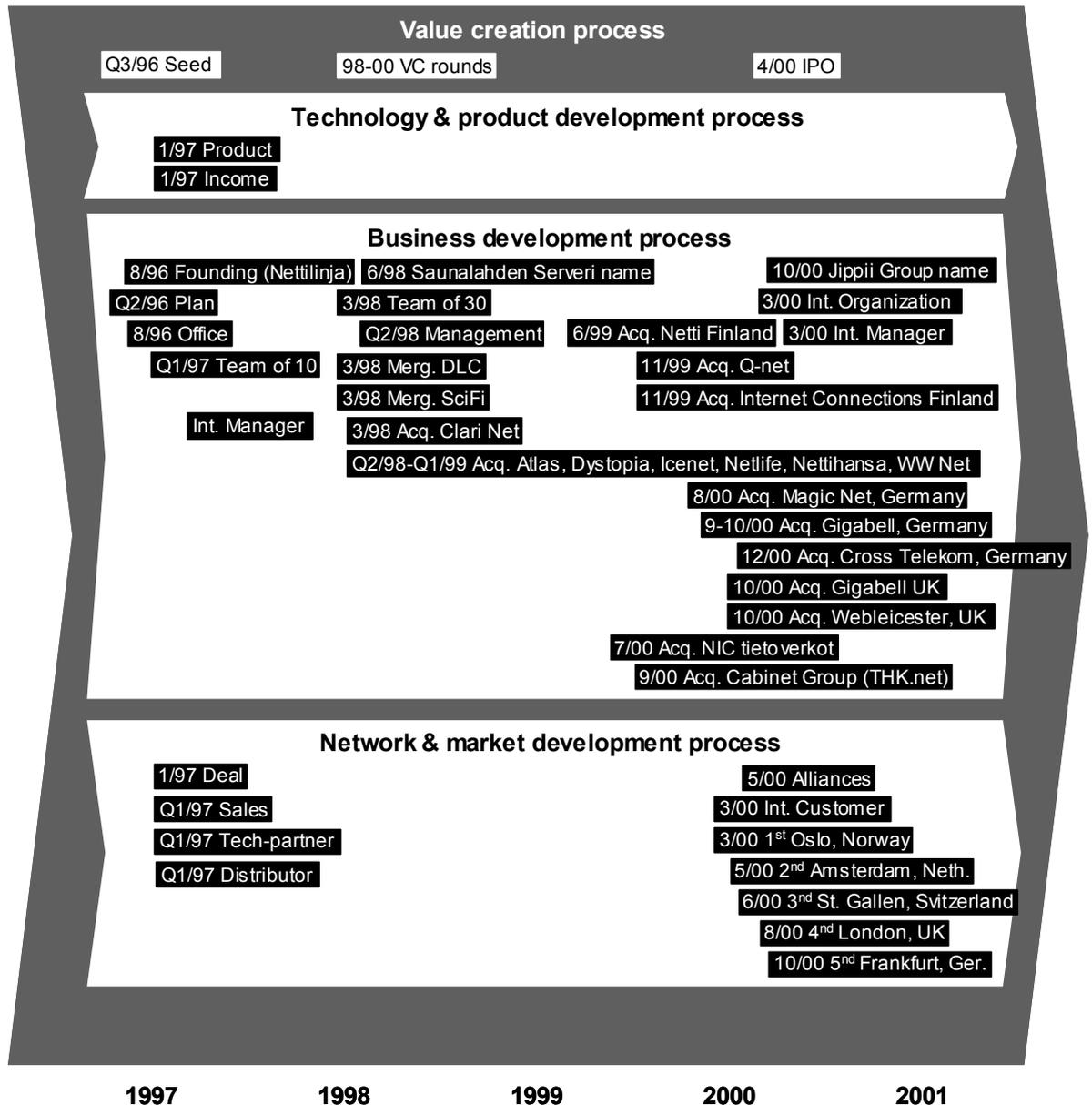


Figure 14 Jippii Group, mapping of milestones

7.3.4 Observations and end notes 2007

In the beginning of the year 2001 the management of Jippii Group was still very enthusiastic to continue on the rapid growth path and operations in new European markets were still being started. However, in the latter part of the same year dramatic problems arose. The company run into serious financial crisis as the whole business environment was in global decline. It became evident that the rapid internationalization phase had been too much and it had drawn all the financial resources of the company.

The business strategy of the company was changed entirely during the fall 2001 along dramatic changes in the management. Telecom operator activities in all European countries except the home market were discontinued. The new strategy focused in versatile operator activities in Finland and mobile entertainment services in other European markets. While focusing more on the home market the old Saunalahti name was reintroduced to market the operator services in Finland.

The year 2002 involved even more serious downsizing and cost cuts, which enabled the company to survive the threatening liquidation. In the end of the year 2002 there were less than 200 employees left from the record of 600 in 2000. Due to downsizing the turnover fell to EUR 61,6 million from the EUR 87,3 million in 2001, but in the same time the losses were only EUR 5,1 million compared to the EUR 53,0 million in 2001. The domestic business accounted 70% of the turnover, while in 2001 the figure was 60%.

In 2003 the downsizing and restructuring of the company carried fruit. The company made profit of EUR 5,0 million, while the turnover grew to EUR 74,8 million of which 86% came from the Finnish market. Although the mobile entertainment accounted for a minor fraction of the turnover, it also reached profitability. The new law in Finland, ensuring the retention of the same mobile number when switching mobile operator was a major boost for the number of mobile phone customers for Saunalahti. During the year 2003 Saunalahti acquired 115 000 new mobile customers, having total of 144 000 mobile (GSM) customers in the year end. The internationally oriented name Jippii Group Oyj was changed to Saunalahti Group Oyj.

The growth continued and accelerated in 2004. The focus was now clearly in mobile and internet operator services in the Finnish home market. The rest of the European mobile entertainment business was sold to a UK company, iTouch plc. at a price of EUR 12 million with additional earn-out profits. By the end of the year 2004 Saunalahti had more than 28 000 broadband internet customers and 419 000 GSM customers, resulting to a market share of 9% of all GSM customers in Finland. The turnover grew to EUR 160,9 million, leaving EUR 19,0 million profit. The rapid growth was the result of the successful migration to the mobile virtual network operator business model. Attractively

priced comprehensive GSM services were offered by Saunalahti using the leading GSM network in Finland, operated by Sonera Mobile Networks Oy.

As Saunalahti became a serious player in the GSM and broadband internet operation it was acquired in July 2005 by Finland's second largest GSM operator, Elisa Oyj. The transaction was conducted through exchange of shares. The calculated value of the Saunalahti Group Oyj was EUR 320 million. After the acquisition Saunalahti still continues as a strong consumer brand and virtual operator in the Finnish GSM and internet operator market. The largest owners of Saunalahti also became the largest owners of Elisa after the transaction.

Although Jippii, later Saunalahti failed to conquer the European mobile markets, it became a major player in its home market. The company has gone through number of major turnarounds and has been able to survive in tough situations. During the years 2002-2005 the company has provided significant profits to its shareholders.

7.4 MadOnion.com

MadOnion.com is a leading provider of PC performance information and related Web services, including the hardware upgrade recommendations wizard. The company is known for its leading-edge benchmark products, such as 3DMark 2000, and Video2000. In strategic alliance with BAPCo, MadOnion.com serves as the distribution partner for SYSmark2000 and as a co-developer of WebMark2001.

Key Facts of MadOnion.com Oy (former Futuremark Oy)

Website:	www.madonion.com
Headquarters:	Espoo, Finland
Founded:	11/1997
CEO:	Aki Järvilehto
Industry segment:	3D PC gaming software and Internet services
Employees (2/2001):	58
Owners:	Management team, Remedy Entertainment and investors

Investors

Business angel round:	3/1999 € 0,13 M	Risto Siilasmaa, Artturi Tarjanne, Antti Hannula
	11/1999 € 0,2 M	Scott Miller (US)
1st VC round:	8/1999 € 2,1 M	Conventum
2nd VC round:	7/2000 € 1,7 M	Nexit Ventures
Subsidies:	€ 0,3 M	TEKES, 1998-1999

7.4.1 The Start

The history of MadOnion.com dates back to the summer of 1997. *Remedy Entertainment*, a Finnish game development company was contacted by *VNU Business Publications*, the largest computer magazine publisher in Europe, and asked to create a 3D accelerator benchmark program. The company regarded the project as a good opportunity to get some PR and try out their new 3D engine, MAX-FX, thus, a development contract was signed. A benchmark program, named Final Reality, was released in November 1997, and it became quickly a widely used standard in 3D accelerator benchmarking.

Although Final Reality was an instant success, it did not fit into Remedy's business focus of creating computer games. Therefore, in November 1997, *Futuremark* was founded to

pursue the business opportunity in benchmark software development. Building on the success of Final Reality, a new benchmark software, 3DMark, was released in October 1998. Revenues were generated from sales to 3D card manufacturers who wanted to bundle the benchmark software with their 3D cards. Millions of copies were distributed worldwide in a short time. To date, with the sales exceeding 20 million copies, 3DMark has become the global de facto standard and a market leader in benchmarking 3D technologies. 3DMark is also used by hardware manufacturers as well as some 500 PC magazines and online publications.

Despite the vast amount of users, sales to hardware manufacturers did not grow as fast as expected. During 1999, Futuremark changed its name to MadOnion.com, and reshaped its strategy to pursue the Internet opportunity. External funding was sought, first from business angels, and later from venture capitalists. MadOnion's benchmark software was accompanied by portal services offering access to an online performance database assisting users in upgrading their computers. New revenue streams, in addition to business-to-business and business-to-consumer software sales, included commissions from linking users to vendors' pages and resulting sales, as well as online advertising and sponsoring. Later in 1999 MadOnion formed a strategic alliance with BAPCo to extend to business application benchmarks. In December 1999, Internet-enabled 3DMark2000 was introduced.

7.4.2 Observations 2001

To extend its pure business-to-consumer Internet strategy, MadOnion is currently licensing its technology to online retailers. MadOnion's PC performance comparison shop and upgrade wizard are directed to online hardware stores and equipment manufacturers. MadOnion also coordinates a leading industry-wide PC performance benchmark development beta program. Through the program MadOnion is able to keep up with the development in new hardware, and to produce up-to-date benchmarking software.

Today, MadOnion's competitive advantage lies in its world's largest PC performance database, which is used to analyze the performance data, and to give customers recommendations in PC-hardware purchases. MadOnion's revenue comes from the online PC hardware retailing market, which is expected to grow from the current USD 11

billion to USD 150 billion by the year 2005. The company plans to reach profitability during 2001. MadOnion has offices in Toronto, Canada and San Jose, California in addition to the headquarters in Espoo.

7.4.3 Conclusions 2001

Due to easy redistribution and illicit copying of the benchmark software, MadOnion has not yet had a chance to fully capitalize the great success that its software products have received. MadOnion has been constantly forced, but also able to refocus its distribution strategy and revenue model. The current model includes multiple revenue streams and is focused on business-to-business markets. As MadOnion has been able to form strong partnerships with hardware manufacturers through its own beta development program, it is likely that MadOnion will continue to dominate the 3D benchmarking software market with its US-based ally BAPCo. It will be interesting to see if MadOnion will be able to capitalize the success of its products with its current revenue model.

MadOnion has been growing rapidly since the flying start as a spin-off of Remedy Entertainment. The internationalization of MadOnion has been notably fast. Operations were started simultaneously in Finland and the UK upon founding of the company, although the UK operations were later transferred to Canada. The successful early international rollout has clearly benefited from the international team of three founders with valuable industry connections. The fast internationalization has, however, been cash consuming, while revenues have remained modest. Success of the new business model in generating revenue will be critical for the future of MadOnion.

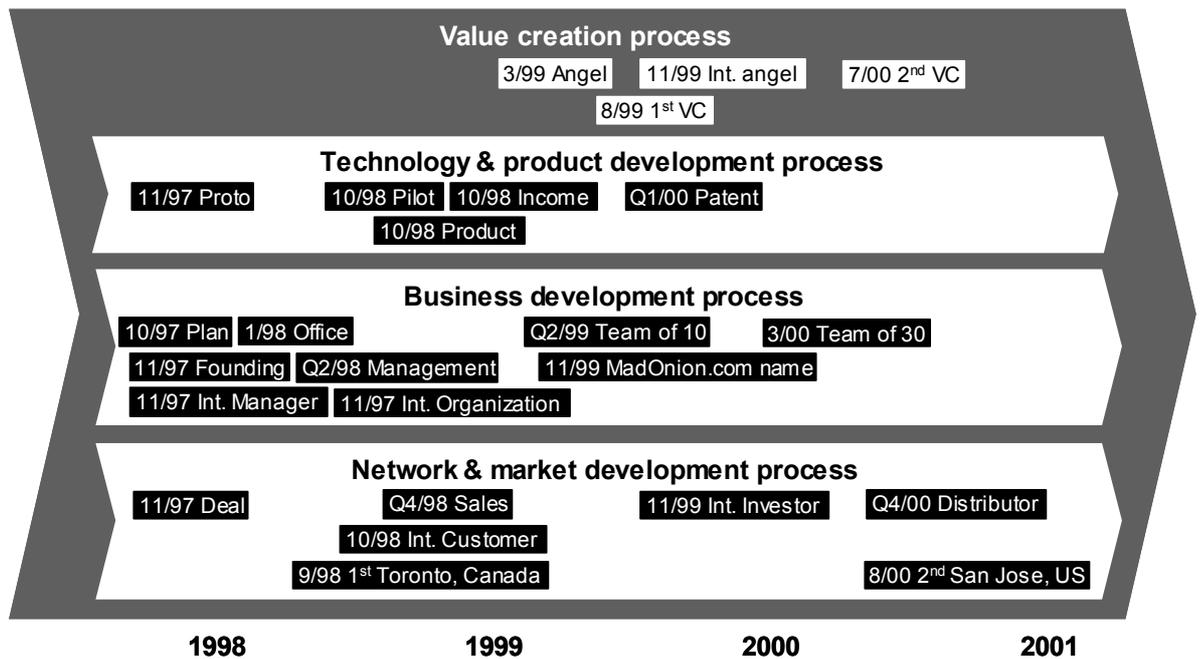


Figure 15 MadOnion, mapping of milestones

7.4.4 Observations and end notes 2007

MadOnion changed its name back to the original Futuremark Oy in 2002 to be better in line with its key products 3DMark and PCMark. The product portfolio was extended to mobile benchmarking software along the PC benchmarking. The business model of the company was also changed back to the traditional software vending, where more advanced versions of the software were offered to consumers and professionals as upgrades from the free limited versions.

Currently Futuremark is a leading provider of PC and handheld device performance information and services. Futuremark's products are powered by the unique database of 30 million real-life benchmarking results. The company has distributed a total of more than 30 million copies of its software, including 3DMark, PCMark, SPMark directed for hand held devices and other products. Futuremark's products are being used by most of the major PC hardware and mobile device manufacturers, such as AMD, ATI, Intel.

Lately Futuremark has decided to leverage its technology knowledge and extend its business to games development. Futuremark Games Studio is currently working on its first game.

Since the start Futuremark has build its business on strong technological expertise. The products have been widely adopted and recognized by the gamers and industry. Although surviving the .com hype and fall is a merit, Futuremark has not yet been able to fully capitalize on its undoubted technological expertise. Hopefully the games development will provide a path to financial success.

7.5 Nixu

Nixu has solid technology know-how in network platforms and network security. Nixu focuses on products and solutions for the management of global mobile Internet infrastructure. Currently, Nixu is reshaping its offering to a more product oriented direction with its flagship product NameSurfer, used to manage DNS data in large system along the Content Billing Gateway products.

Key Facts of Nixu Oy

Website:	www.nixu.fi
Headquarters:	Helsinki, Finland
Founded:	11/1988
CEO:	Oiva Karppinen
Industry segment:	Internet / mobile Internet and data security services and software
Employees (1/2001):	85
Owners:	Personnel and investors

Investors

Early emissions:	1988-1996 € 0,02 M Employees
Business angel rounds:	1997-1999 € 0,4 M Arto Karila, other private individuals and employees
1st VC round:	10/2000 € 1,2 M Stratos Ventures
Subsidies:	€ 0,14 M TEKES for NameSurfer since 1996

7.5.1 The start

Mr. Pekka Nikander, a student at the Helsinki University of Technology, founded Nixu in 1988. Operations were started by offering anti-virus training. TCP/IP based Internet technologies were adopted as early as in 1990-91 as the first customer projects started. Although the company has been profitable since the beginning, its growth was relatively slow during the early years. The turnover of the company increased from EUR 0,2 million in 1993 to EUR 1 million in 1997. Mr. Oiva Karppinen was appointed CEO in March 1996.

During the 1990's, Nixu acted as a technology-consulting agency, offering custom-made solutions. The company has been closely monitoring the research and development activities and participating in the Internet standardization process. For example, Nixu has

been involved in the Internet transport level cryptography development and standardization process (IPSEC). In 1996, Nixu founded NameSurfer, as a joint venture with Akumiitti and Araneus, and was planning to spin off its first product innovation, used to automate the DNS data management. F-Secure (then Data Fellows) took on the marketing of the new product.

In the early years, sales to *Sonera*, then Telecom Finland, generated most of the revenues, but towards the mid-1990's, the number of customers increased steadily. A breakthrough was made finally in 1998, when Nixu closed a deal of EUR 7.2 million to set up a religiously and politically correct Internet in Saudi-Arabia. Important deals with Nokia and *Ericsson* were made in the same year. The turnover of the company grew to EUR 2,3 million already in 1998, and to EUR 3,8 million in 1999.

7.5.2 Observations 2001

Nixu, by applying open source software, offers its customers reliable, low-cost, free-of-license software solutions that are independent of proprietary systems. However, Nixu is now stepping aside from the service business: in 2000, Nixu bought back the shares of NameSurfer from the other owners. The current plan is to merge NameSurfer to the parent company, and refocus the offering to a more product oriented direction. The share of product sales, 15 % in 2000, is targeted at 60 % in 2002.

Nixu opened an office in Hong Kong in the fall of 2000 to develop partnerships in Far East. The plan is to offer infrastructure projects to customers in the Middle Eastern and European markets once local partners have put the product-based business model in operation. There are a few R&D projects in progress to complement the product offering. New service deals are signed selectively with key customers in order to maintain profitability also during the product development period.

7.5.3 Conclusions 2001

Apart from the leap in 1998, Nixu's growth has been organic and stable since the beginning. The acquisition of *Net People*, made in late-1999, was followed by those of *Datatieto* and *Magic Cookie* in summer 2000. The growing number of staff along with intensifying internationalization have had their implications for Nixu's informal and democratic corporate policy, characteristic to the company's culture in its early years. The growth together with the undergoing change in the business strategy has called for

restructuring of the organization. As the company is simultaneously aiming at a product based business model, restructuring has been needed. A management team of dedicated managers was appointed rather late, at the end of 2001.

Nixu's first product, NameSurfer, is very competitive in dealing with DNS management data. Thus, the future success of Nixu's product-based strategy depends rather on the organization's capability to reshape itself. Challenges lie in setting up an effective sales and marketing team as well as other functions supporting product sales.

In general, the evolution of Nixu differs from that of the other case companies. In the past, Nixu was a pure service company, while today, it is strengthening its product-based operations. However, the small size of the recent financing round, in comparison to Nixu's turnover, indicates that a turnaround in the business focus is likely to be slow.

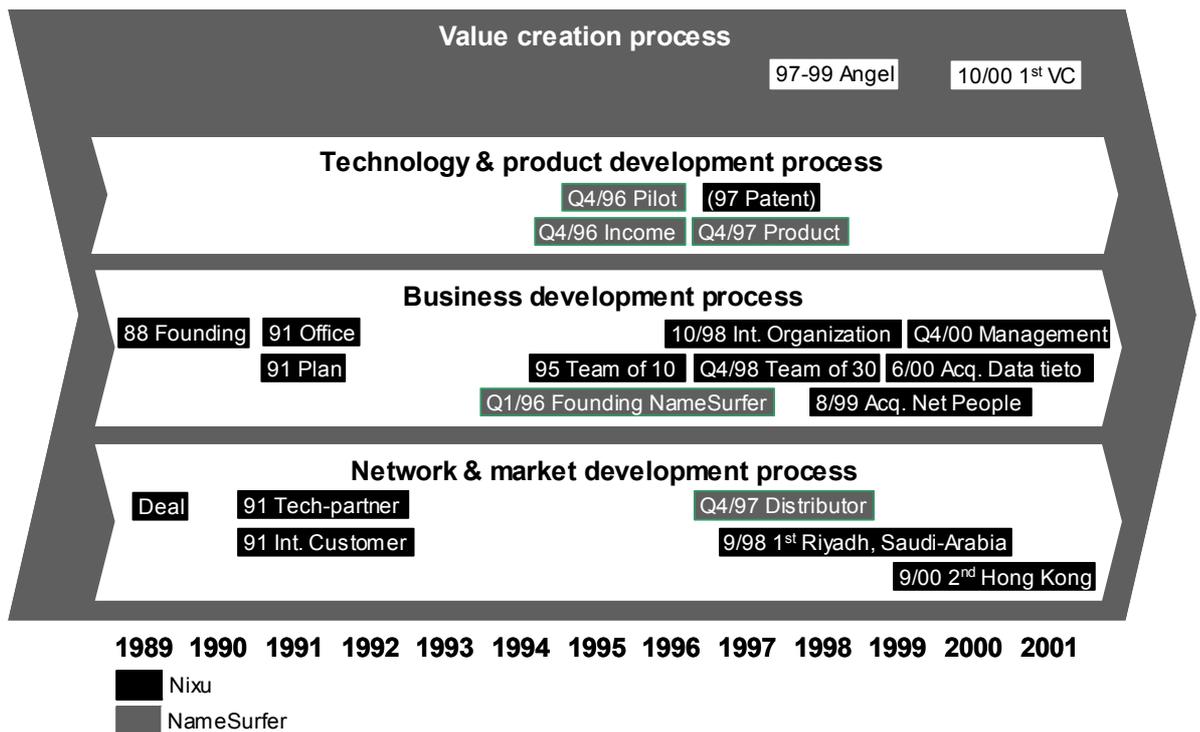


Figure 16 Nixu, mapping of milestones

7.5.4 Observations and end notes 2007

Nixu has continued through the years on its steady growth path. Services focusing on data security consulting and auditing, software development and network integration form the basis of the business. Turnover of the company in 2007 was EUR 6,1 million,

generating a profit of EUR 0,58 million. In 2006 the software business unit providing DNS management software was spun off as Nixu Software Oy.

Although Nixu has not reached its prior targets of significantly growing its software products business, the company has been able to continue both its service and product businesses profitably. Currently Nixu has a strong position in Finland, Baltics and Middle East as a specialist of its expert areas. As the expert services will prevail the core business of Nixu the future growth is will most likely remain modest. However, Nixu will most likely continue on its steady growth path for years to come.

7.6 Printeurope.com (Printing Network of Europe Oy)

Printeurope acts as an intermediary between print buyers and printing houses. Solutions of Printeurope enhance communication between the two parties and simplify the traditionally complicated printing processes. By streamlining the process, the products of Printeurope save time and money, as well as increase accuracy by storing all print job information in a centralized location.

Key Facts of Printing Network of Europe Oy

Website:	www.printeurope.com
Headquarters:	Espoo, Finland
Founded:	12/1999
CEO:	Teppo Paavola
Industry segment:	Business-to-business Internet intermediary
Employees (2/2001):	21
Owners:	Management team and investors

Investors

Seed round:	1/2000 € 0,4 M Holtron, Portal Equity and private individuals
1st VC round:	3/2000 € 1,4 M TransConnect (Germany), Innovations Capital (Sweden) and Conventum
2nd VC round:	1/2001 € 3,0 M Digital Mountain (Germany), BureEquity (Sweden) and existing investors.
Subsidies:	€ 0,3 M TEKES 4/2000

7.6.1 The start

Printeurope.com was founded by an experienced management team in December 1999 in response to the growing need for a centralized co-operation network for the European printing industry. Printeurope aimed at offering a complete set of services for print buyers and printing houses, including collaboration applications and a market place for print jobs. Printeurope was set up to pursue fast and aggressive internationalization. The seed round and the first venture capital round were raised in the early stage to support rapid growth. In May 2000, Printeurope was chosen as the best European non-listed Internet intermediary out of 700 applicants in the e-challenge competition, the world's largest competition for Internet and wireless companies. In May 2000, Printeurope

launched its service offering simultaneously in four countries (Finland, the Netherlands, Sweden and the UK), and opened offices in Stockholm and Amsterdam.

The next financing round, considerably bigger than the previous, was planned to be completed during the summer 2000. Despite the flying start of their business activities, Printeurope faced major difficulties in negotiating the second venture capital round. The valuations of Internet start-ups had plummeted from their early-year levels. At the same time, attitudes had changed: what was considered a viable service launch in the beginning of the year was now, a few months later, considered draining of resources. Thus, Printeurope, unable to gather additional financing at the end of 2000, was forced to reformulate its business model and delay its rollout plans. Planned opening of new offices in European cities was postponed, respectively. While the previously more Internet-centric business approach was redirected to a more software-centric model, the market place service was laid aside.

To date, Printeurope has entered into strategic alliances or co-operation with F-Secure, *Enfocus*, a PDF-software solution provider, and VTT (Technical Research Centre of Finland) in order to gain proprietary technology in addition to building its own technology team. So far, two patent applications have been filed.

7.6.2 Observations 2001

Currently, Printeurope focuses on capitalizing on an end-to-end solution for the printing industry, aiming at enhancing effectiveness and productiveness at both ends of the printing process. Rather than providing a market place, or acting as an intermediary, as previously, the focus of the company is now on the existing customer-vendor relationships between print buyers and printing houses.

Although customers are sometimes slow in adopting new services, Printeurope has succeeded in attracting a relatively large number of customers. The challenge, however, is to convert the transactions into profitable business as the revenues so far have been very modest. At the moment, Printeurope enjoys at least a slight first-mover advantage over most of its competitors in Europe that still offer a market place-based solution. The US based rivals have been faster in moving towards the collaboration software business. Depending on the definition of the business, there are tens of competitors in the

electronic printing business, in which competition is fierce owing to the large size (EUR 160 billion in Europe), and traditionally inefficient functioning of the printing market.

7.6.3 Conclusions 2001

Printeuropa.com is a perfect example of the sudden collapse of booming Internet businesses in the late-2000. The prospects for the Internet-business were first overvalued and, soon after, devalued as the reality fell short of expectations. Printeuropa was abandoned by investors when seeking additional financing in the summer of 2000. The importance of timing in acquiring financing could not be demonstrated more clearly. For example, a bigger first round financing in March 2000, when it was readily available, could have helped the company over the summer.

Because of the strong, skilled management team Printeuropa was however, able to restructure the business and acquire further financing in the beginning of year 2001. On this context it is easy to see why investors put such a high value on the management team's talents. In a changing environment, the management team is one of the most important success factors for a new venture.

At the moment, Printeuropa's future is heavily dependent on customer adoption. If the services are welcomed by customers, the company may be able to make profits in the near future. If the adoption is slow, the company might again be in a tough situation. It should be noted that the current situation is already imminent, since milestone achievement has been extremely slow in the past few months.

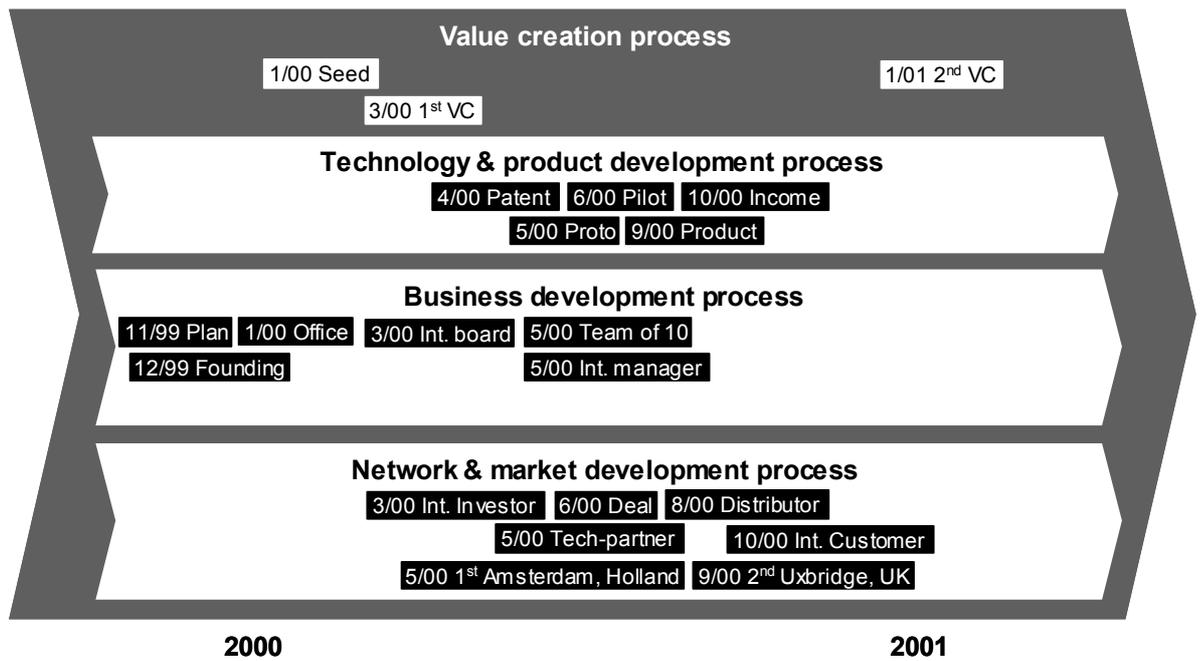


Figure 17 Printing Network of Europe Oy, mapping of milestones

7.6.4 Observations and end notes 2007

Printeuropa continued to struggle for more financing and business during the year 2001 with no significant results. In February 2002 the company filed a bankruptcy.

Ambitious goals, extremely fast growth strategy and simultaneously the downfall of the .com businesses brought the business of Printeuropa to sudden death. Despite the strong management the streamlining of the printing industry did not succeed in this case.

7.7 Synera Oy

Synera is a software company that helps business service providers to expand their business with easy-to-use online applications directed to small businesses. By using Synera's products business service providers, such as ISPs (Internet Service Providers), accounting agencies, insurance companies, banks, and business portals can provide their small business customers with applications that can be easily and safely used via Internet terminals and smart phones.

Key Facts of Synera Oy

Website:	www.synera.com
Headquarters:	Helsinki, Finland
Founded:	1990
CEO:	Markus Tarkiainen
Industry segment:	business application software
Employees (2/2001):	14
Owners:	Management team, board members and Holtron.

Investors

Seed round:	4/2000 € 0,25 M Holtron
Subsidies:	€ 0,22 M TEKES 5/2000

7.7.1 The start

Mr. Markus Tarkiainen, the founder of Synera has been working on business process modeling since 1997. Although the company was registered already in 1990, the business idea of Synera clarified in late 1999. In May 2000, Synera received seed financing from Holtron to fund product development and starting of operations.

Since May 2000, Synera has been focusing on providing small companies with business applications delivered via ASPs (Application Service Providers), which host the service logic in their servers. The end customers use the services via Internet terminals and smart phones. In order to provide a complete offering, Synera started simultaneous development of its service platform and the first set of applications. The first applications include time tracking, invoicing, and catalogue software. At a later stage, ledger, e-payment, workforce management, and eCRM (electronic Customer

Relationships Management) applications will be added into the service palette in cooperation with third party application providers.

In addition to Synera's own applications, third party application providers are encouraged to use Synera's platform. Synera has already attracted a few application developers to use its platform in offering their solutions through the ASP business model. In the future, Synera's goal is to focus entirely on the development of the platform, and let third party developers take care of application development.

7.7.2 Observations 2001

To distribute its services Synera needs to partner with ASPs (e.g., ISPs, accounting agencies, and business portals), which are needed in providing servers for application hosting. Consequently, right kind of ASP partners are essential in attracting end customers. In spite of high expectations, the ASP business has taken off slowly so far.

However, once customers become familiar with the ASP concept the market is expected to pick up fast, especially in the small business segment. It is far more cost-efficient for a small company to pay per use or per month for application software, rather than acquire costly licenses.

At the moment, Synera is piloting its first applications. As negotiations for distribution agreements are in progress, the first payments for products are in view. Synera is also moving to the wireless space: Synera's first application, the time tracker, is already able to combine the use of the Internet and mobile devices. For example, after a client-meeting working hours are being input to the time tracker via a mobile phone. The data can be then viewed and processed by browser-based tools.

7.7.3 Conclusions 2001

Synera has been able to come out with the proposed services in schedule. Synera's know-how in its field of technology is strong. A few third party applications developers are working on services utilizing Synera's platform. These are for example *Rex Partners* working on workforce management, *Fivetec Solutions* developing an Internet based Customer Relationship Management (eCRM) software, and *Done Logistics*, working on a financial administration application.

The main challenge for Synera is to justify use of ASPs as its product distribution channels. Potential service providers, end customers, and even future investors have to be convinced of the business model since it has not yet been widely adopted. If/when the ASP business takes off, it is most likely that Synera will have a place in the market.

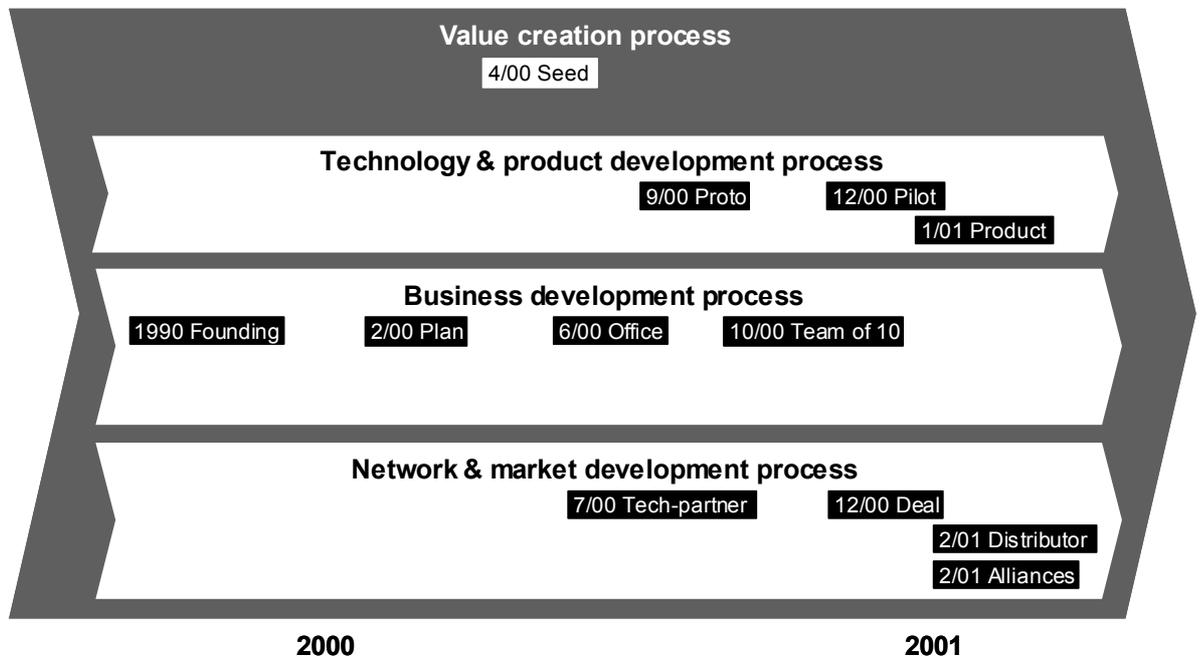


Figure 18 Synera, mapping of milestones

7.7.4 Observations and end notes 2007

Slow adoption of the ASP services by the clients and the lack of popular applications on the Synera platform hindered the business during 2001 and 2002. In October 2002 the company filed a bankruptcy.

In 2007 the ASP business model is widely adapted. However, most successful ASP businesses rely on popular applications and brands. Apparently Synera was too much technology oriented and too keen on building just a platform. A different application driven strategy could have saved Synera.

7.8 VDSL Systems

VDSL Systems specializes in developing VDSL products for IP networks. The product range includes VDSL office routers and modem interface cards. These products allow fast (up to 29 Mbps) Internet and other IP-based connections over ordinary (copper pair) telephone lines. VDSL Systems' products and solutions are flexible, easy-to-manage and based on the industry standard VDSL technologies.

Key Facts of VDSL Systems Oy

Website:	www.vdslsystems.com
Headquarters:	Espoo, Finland
Founded:	1/1999
CEO:	Jussi Autere
Industry segment:	Access network hardware
Employees (2/2001):	48
Owners:	Management team, Applied Computing Research ACR Oy and investors.

Investors

Seed round:	2/2000 € 1,1 M 3i Finland (former SFK finance)
1st VC round:	6/2000 € 1,5 M Kenneth Capital (UK), 3i Finland
Subsidies:	€ 0,45 M TEKES 2/1999

7.8.1 The start

Clinet, one of the small Finnish Internet operators, pioneered Internet connections, based on the ADSL (Asynchronous Digital Subscriber Line) technology in the early 1990s. Soon after the initial ADSL project, Mr. Heikki Suonsivu, chairman of the board and Chief Technology Officer of Clinet, was working on new fast-access technologies. Because developing communications equipment was not a part of Clinet's core business, Mr. Suonsivu decided to start a separate company to pursue the opportunity in developing products based on VDSL (Very high speed Digital Subscriber Line) technology

Together with the main software architect of the VDSL products, Mr. Tatu Ylönen (owner of *Applied Computing Research*), and Mr. Juri Sipilä (current manager for hardware design in VDSL Systems), and Mr. Suonsivu founded VDSL Systems in January 1999.

During the next fall, VDSL Systems introduced prototypes of VDSL modems and routers for the new product line, named as Ivalo Rapid. VDSL Systems was the first company to offer pure IP based VDSL hardware that supports traditional phone lines and integrates into IP, ATM, Ethernet and Optical networks. The VDSL technology offers the fastest possible data transmission speeds (3 – 29 Mbps) over existing copper telephone lines without the need for rewiring. With an effective range of 4 kilometers, VDSL Systems' products offer the most flexible approach to new network design and existing network upgrading. Using pure IP traffic simplifies both the hardware and software architectures, and lowers overall costs.

7.8.2 Observations 2001

VDSL Systems was ready to pilot its products in the summer of 2000, and shortly after, it received further financing. Since then, the company has been growing rapidly; and the company has acquired its first customers. The current product line is targeted to business customers, while a low-cost version is under development to penetrate the consumer markets later on. VDSL Systems aims at serving telecom, Internet, and cable service providers in Europe, Asia and the US.

The company also expanded its operations to Korea in order to manage more effectively its contract manufacturers. Sales offices have been opened in Denmark and the US. The company plans to reach profitability during year 2002, and is currently looking for further financing to support its international rollout.

7.8.3 Conclusions 2001

Use of the ADSL technology has already proven the business concept for using other DSL technologies. Although the VDSL data business is expected to grow rapidly during the following years, the market (estimated to grow to EUR 10 billion by 2003) is not very attractive. Margins of fairly standard hardware are relatively low, and existing producers of ADSL solutions are eventually extending to VDSL and other DSL technologies.

Yet, there is a good chance for VDSL Systems to achieve significant revenues: the company is one of the pioneers in VDSL solutions with solid know-how and several patented innovations. However, gaining and maintaining a share of the rapidly growing market demands effort. To date, VDSL Systems has shown well-managed, fast growth,

and has been able to make agreements for co-operation with major industry players, such as *Flextronics* for manufacturing.

Ability to acquire the first foreign customers and extend operations to several foreign countries during its second year of operation is a remarkable achievement for any start-up company. The future of VDSL Systems is, however, strongly dependent on the prevalence of the VDSL technology. VDSL is the fastest DSL-based technology, but not yet widely adopted.

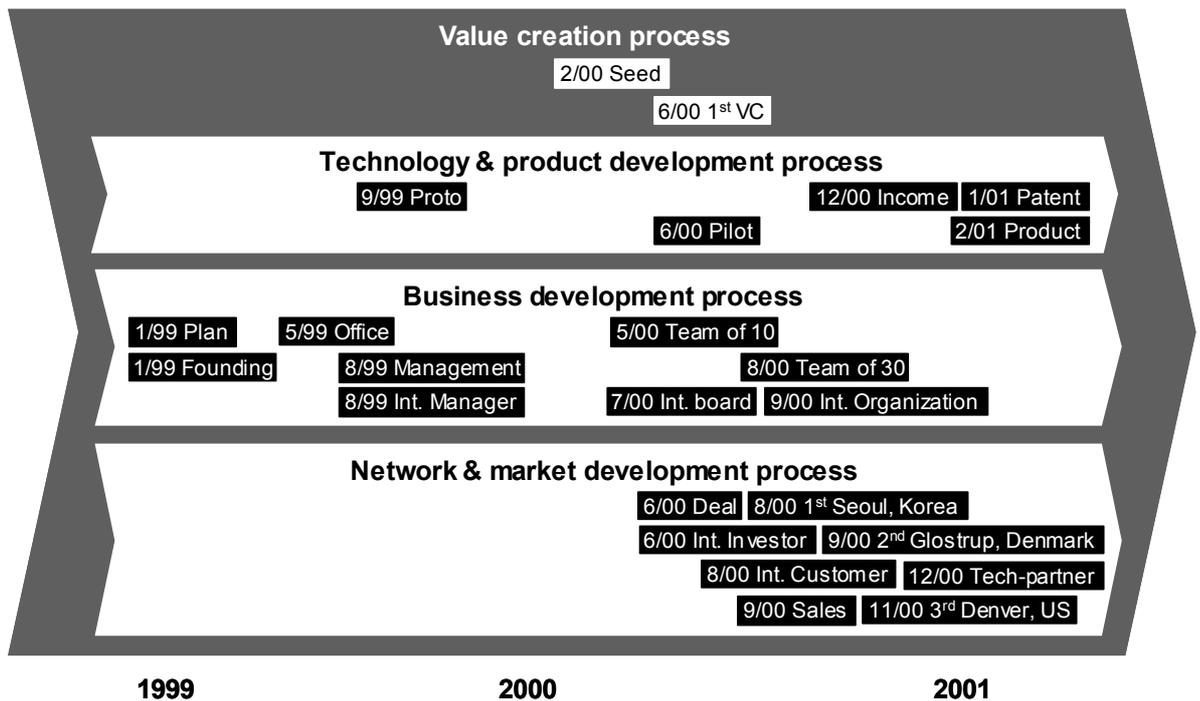


Figure 19 VDSL Systems, mapping of milestones

7.8.4 Observations and end notes 2007

VDSL Systems announced its first complete Generation 1 IP VDSL product line in August 2001. However the sales proved out to be very modest and the company was facing serious cost cuttings through 2002. After having spent a total of 18 million euros of Venture Capital financing, VDSL Systems filed a bankruptcy in April 2003.

In February 2004 Mr Suonsivu, the founder of VDSL Systems, announced that VDSL Systems is back in business. Wireless LAN Systems Ltd., a new company by Mr.

Suonsivu, was going to continue the development work done by VDSL Systems as the patents and other intellectual property was bought in to the new company. In November 2006 Wireless LAN Systems announced a launch of a public Wireless Network in Helsinki.

As projected already early on by VDSL Systems, the markets for VDSL equipment were rapidly expanding during the years 2002 – 2003. However, the market became so attractive that in addition to the early starters, like VDSL Systems, among many others, also large companies such as Samsung Electronics and LG Electronics and network equipment makers, including Hyundai Networks, DASAN Networks, and Corecess, decided to advance into the VDSL market, heralding a fierce competition.

Looking back it is now obvious that breaking into a large supplier of VDSL equipment was an impossible task for a Finnish start-up with scarce resources when compared to the large existing ADSL equipment providers.

8 KEY FINDINGS AND PRESENTATION OF THE FINAL MODEL

This chapter focuses on presenting the key findings of the case analyses: (1) the discovery of different patterns of evolution and (2) the role of venture capital investors in accelerating milestone achievement as well as presenting the final model with modifications and additions rising from the case analyses.

8.1 Patterns of evolution

Once comparing the patterns of the evolution, it can be clearly seen that each of the case companies has followed its unique development path. However, rough generalizations of the patterns of evolution can be made. Rather than comparing the achievement of specific milestones, different evolution patterns can be detected by focusing on the overall development speed of the companies and their main processes, i.e., milestone density, over a given time period. While looking at the development paths of the case companies as mapped in the evolution model side by side, Figure 20, two groups can be distinguished: a group of more technology-driven companies, and that of more market and/or business concept driven companies.

The group of technology-driven companies, focusing mostly on product development, consists of AVS Technologies, Bitboys, Synera and VDSL Systems, while the companies regarded as more market and business concept oriented are Jippii Group, MadOnion and Nixu. Although it is a bit hard to categorize Nixu due to its long history in the service business, and the recent turn towards a product-based business. Printeurope, however, seems to have traits from both breeds.

While going a bit deeper in the cross-case analysis and looking at the evolution patterns of the technology-driven companies, similarities can be found: the milestone achievement density in the technology and product development process is relatively low, and milestones are achieved during a short period in the late stages of the process. This is a sign of the long time required in the development of technology.

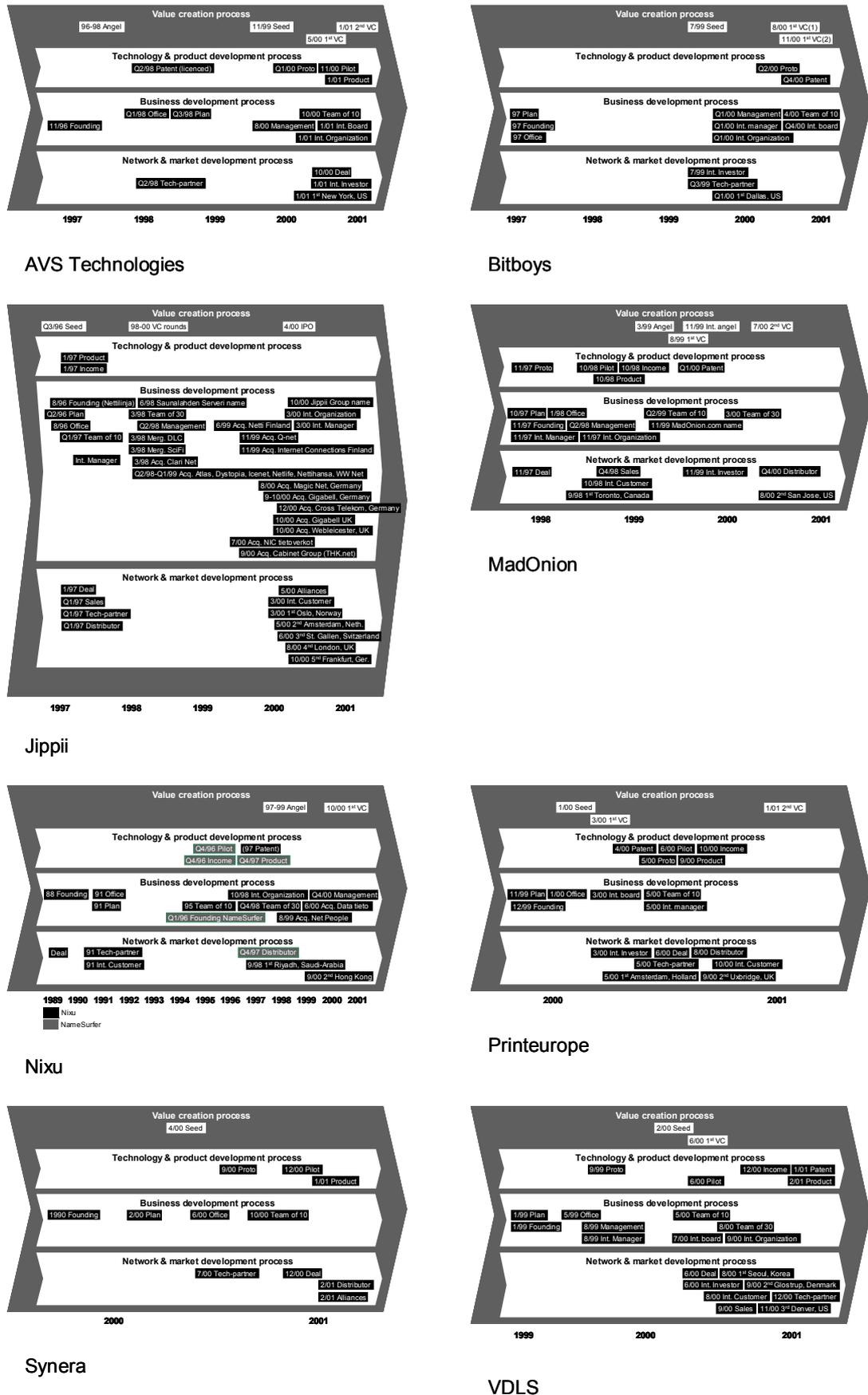


Figure 20 Comparison of development paths of the case companies

Another notable characteristic is the delayed progress in the network and market development process, accompanied by gradual progress in the business development process. This, in turn, is explained by the need to develop the organization piecemeal, along with the product development process. Network and market development is delayed in order to minimize overhead costs.

In the case of AVS and VDSL, the eve of a full-scale product launch is distinguished by intensifying the market development process by extending operations to foreign markets. The case of Synera is clear. Since the company is rather young, most of the milestones loom in the future. However, the company is approaching the expansion stage as indicated by the constantly rising density of milestone achievement. Bitboys, in turn, due to an exceptionally long product development cycle, is not yet close to its product launch. However, Bitboys has already started network and organization building with the help of venture capital backing.

The principal characteristic of the market and business driven companies is the fast introduction of their products, combined with simultaneous, quick progress in other processes. In short, all processes are aggressively pushed on with strong venture capital backing. Business concept-centric companies benefit usually from being the first in the market. For example, MadOnion and Printeurope both raced against time, yet, their speed slowed down considerably with the cooling off of the Internet boom. Jippii Group had a similar flying start for its business. In this case, the development of the business took place first in the domestic market. Internationalization was scheduled for the time of the initial public offering of the company. Despite its courageous acquisition strategy, the speed of internationalization was modest until the IPO, after which, the pace of acquisitions of European operators, and starting of operations in foreign markets has been fast.

8.2 Venture capital accelerates milestone achievement

In all cases milestone achievement has intensified after the initial external funding, and, similarly, additional financing has further accelerated the pace of development in the majority of the cases. Obviously, the enhanced financial situation of the externally funded companies has aided the milestone achievement, but according to the case evidence there

is more to the venture capital than just the money. Some of the central aspects concerning the development of a venture capital-backed company will be discussed next.

8.2.1 Venture capitalist as a change agent

Companies are every once in a while faced with situations where radical changes are needed. The most common changes are: 1) from an R&D-driven mode of operation to a business and marketing driven mode (AVS Technologies, Bitboys and VDSL), 2) from a project-based service business to a scalable product-based business (Nixu), and 3) from domestic sales to international sales and operations (AVS Technologies, Bitboys, Jippii, MadOnion and VDSL). Most of the time, these changes are hard to implement since they demand changes in the whole organization, including the top management. In order to implement radical changes a change agent is needed. A venture capitalist with a fresh outside view and proper authority in the company, usually through a board seat, could serve as a good change agent. The active role of a venture capital investor as a change agent can be clearly seen in the cases of AVS Technologies, Bitboys and VDSL. Obviously, the venture capital investors have had strategic influence in all of the case companies at least to some extent.

The primary interest of venture capitalists is to increase the value of the company by developing it further. Thus, to arrive at this goal, it is sometimes necessary to change the top management, rather than risk the future development of the target company.

AVS Technologies is a perfect example of using venture capitalists as a change agent. At first a seed investor was brought in to turn the company from an R&D focused organization into a product-based business. Soon after, further financing was raised from an international investor, Nokia Ventures, to help the company in internationalization. The case of Nixu, in turn, is an example of a turnaround from a project business to a product business. A venture capitalist was taken aboard after a long track record without a need for external financing. Similar strategic changes taking place shortly after a new investor has entered the company can be identified in most of the cases.

8.2.2 Credibility through venture backing

Most start-up ventures carry high risk, and have a relatively short track record as an individual company. From this perspective, it is obvious that there are potential customers hesitating to count on start-ups as critical suppliers of products or services.

Similarly, potential employees may also doubt applying for a job in a young company operating in a volatile market. Trustworthy, globally acknowledged investors backing a start-up can, in many cases, improve the situation. For example, after receiving financing from Nokia Ventures, AVS Technologies started attracting new jobseekers in an entirely new manner. The increased credibility of AVS Technologies was noted by investors, as well: many international investors started showing considerable interest towards AVS Technologies right after Nokia Ventures' investment. In short, a well-known venture capitalist backing a start-up improves the company's credibility when it approaches partners of any kind.

8.2.3 Venture capitalist mindset

Obviously the sole underlying purpose of a venture capitalist is to earn return on an investment. In other words, venture capitalists look for businesses with high potential for value creation. The key issues contributing to the value creation potential of a firm include:

- 1) The company operates in, or plans to move into fast growing markets.
- 2) The company has sustainable competitive advantage over its rivals, for example unique technology, a patented solution, and/or proprietary knowledge.
- 3) The business model of the company is scalable and the company has a clear growth path.
- 4) The management of the company is capable of delivering results.

When considering the case companies, it is rather easy to pinpoint the factors that have attracted venture capitalists. For example, in the case of Bitboys, the company had unique technological solutions that could be applied in building products for a fast growing market. In the case of Jippii, it was the vision and growth objectives of the management team that assured the investor.

Many businesses do not have the characteristics venture capitalists are looking for. On the other hand, businesses generating revenues may be able to grow organically, and thus do not necessarily need external funding. Nixu, for example, had been able to operate with its sales revenues for seven years. It could have continued the same way, but the strategic decision to move to a product-based business was coupled with venture capital financing.

8.2.4 Pitfalls of venture capital

Sometimes venture capital can work against the timely realization of sales revenues of an R&D-intensive product. When a company focuses on product or service development under venture capital funding, the pressure to close deals and generate revenues may be actually decreased. If the entrepreneur decides to extend the product development phase to fine-tune the product, rather than aggressively go after sales with the already functioning product, the company is on dangerous track. Although external financing can be of great help for a company in funding product development, it is the sales revenue, not external financing, that is the fuel of a company in the long run. Printeurope, as an example, has been built entirely on venture financing from the start of business to 2/2001 and has not reached significant sales during the time period. Closing major deals in the future is the most crucial factor defining the success of the company.

8.3 Presentation of the final model

While mapping the milestones into the model presented in chapter 5, the overall expression was that the model proved to be a handy tool in describing the history of the case companies in a nutshell. It was also discovered that the model provided means to compare and classify the evolution paths of the case companies as discussed in the beginning of this chapter. The snap-shot view, provided by the model, also draws the attention to the possible interdependence of some of the milestones. Based on the case material it was discovered that venture capital financing increased the overall milestone achievement as discussed in this chapter. However, more detailed analysis of the interdependence of the milestones would most likely demand a larger sample of case companies.

As no major short-comings of the model was discovered, some adjustments and additions will be suggested in the following. The final evolution model for technology-based new companies shall thus consist of the model described in the chapter 5 with the following adjustments and additions.

8.3.1 Recording the time of the milestone achievement

It was discovered during the collection of the case data, that the exact to date mapping of the milestone achievement was not always possible or not even meaningful as some of the milestones were achieved gradually. A good example is the signing the first customer

deal (milestone referred as DEAL). Although in some cases the signing would actually mean a signing of a contract (with precise signing date), in the most cases the deal was closed in a series of meetings where the final deal could be much different from the initially agreed. In addition there are many milestones, like completing the initial business plan (PLAN), which are almost impossible to map to a specified date. Thus it was decided by the author that the mapping should be done at month or quarter precision, rather than per day precision. As seen from the case mappings, both monthly and quarterly mappings were used, depending on the preciseness of the information.

8.3.2 Addition of the CEO change milestone

A change of direction in the strategy of a company is always an interesting moment. Understanding the changes and the reasons behind the changes is actually the very essence of understanding and building a company case. It could be argued that the change of direction in the strategy of a company as such could and should be a milestone in the model. However, such milestones would be extremely hard to map and even discover in most cases. Thus the focus should be in adding and focusing on the milestones that could indicate the change of direction in the strategy. Although the model as such already includes quite a few milestones helpful in determining the change of direction in the strategy, some could be added. Change of the CEO turned out to be an important event in some cases, which deserves to be appointed as a milestone in the final model. The change of CEO milestone shall be referred as “NEW CEO” in the final model.

8.3.3 Inclusion of external factors

As the model focuses on mapping milestones achievement of the company itself, it leaves out the external factors affecting the operational environment of the company. The case material points out that there were number of external factors and events which sometimes even very dramatically shaped the path of the company. Examples of such external factors and events include:

- phase of the technology adaption lifecycle - maturity of the technology
(e.g. adaption of VDSL technology, VDSL Systems)
- emergence of a new competing technology and/or
inception or spurt of major competitor
(e.g. success of Real Player and Quicktime, AVS Technologies)

- the mood and changing focus of VC investors
(e.g. collapse of .com's – sudden end of further financing, Printeurope and Synera)
- changes in the laws and regulation
(e.g. law ensuring the retention of the existing mobile number, Jippii)

As the throughout analysis and development of mapping tools of various external factors is a demanding task which most likely demands for further research, the final model includes a streamlined suggestive version of mapping the outside factors. Figure 21 describes the final model.

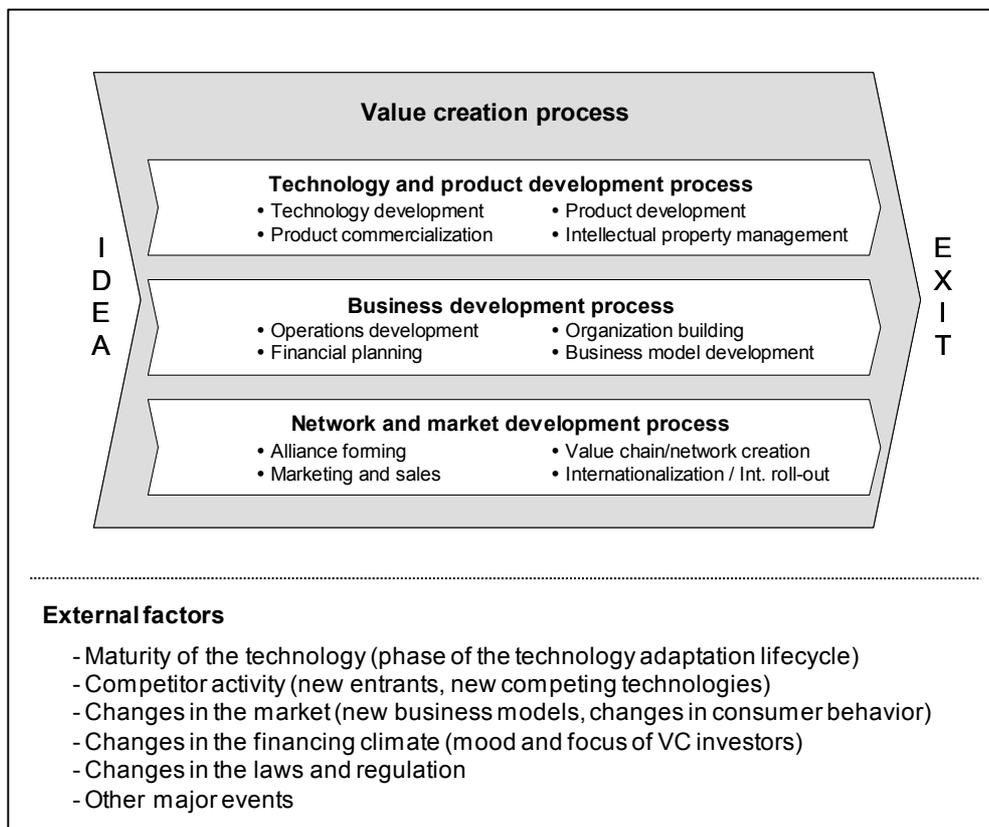


Figure 21 The evolution model for a technology-based new company, final model

In author's opinion, at least the following items should be covered in the external factors mapping and/or analysis: 1) Maturity of the technology; one of the key methods could be assessing the stage of technology adaptation through the popular technology adaptation

lifecycle, originally developed by J. M. Bohlen and G. M. Beal.⁴³ 2) Competitor activity; at least power and number of competing companies, new entrants and also role of competing technologies should be understood. 3) Changes in the market; dramatic changes in the market, such as new business models and changes in consumer behavior should be noted. 4) Changes in the financing climate; as venture capitalists follow each other to some extent, the mood and focus of venture capital investors plays an important role and affects the availability of further financing. 5) Changes in the laws and regulation; new regulation may have significant role on the development of companies and the success of particular technology compared to the competing alternatives. 6) Other major events; any other fundamental changes and events should be naturally monitored as well.

⁴³ Bohlen, J. M. and Beal, G. M. (1957) "The Diffusion Process", Special Report No. 18., Iowa State College, Pages 56-57.

9 CONCLUSIONS

9.1 Discussion

As discussed in the previous chapter, the model developed in this study, turned out to be a useful tool in offering a compact view of the history of a technology-based company. In particular it is useful in mapping the growth, internationalization and value generation of a technology-based new company. Viewing a company through the model and the key milestones discovered also helps to better understand the complexity of the processes involved in the growth and internationalization of a technology-based new company. A clear dependence of the milestone achievement and value creation was also monitored. It was also shown that the model presented in this study was much better applicable to empirical case data than models based on the idea where consecutive development stages follow each other as the company grows.

The key contribution of this study is that it challenges the thinking behind the stages models and offers a different process based view on which to build the growth model. As the initial model was modified after the case work in this study, the presented final evolution model for technology-based new companies is already as such a well working model to describe the growth of technology-based companies. However, the model does not help to predict the future of a company as the deterministic stages models seek to do.

9.2 Implications

A model offering a useful mapping tool of technology-based new companies may be used by venture capitalists, policy makers and researchers to illustrate and analyze development paths of different companies. In the same time, with representative sample, the model may also help to pinpoint the development areas on which the financiers or policy makers should focus on when trying to help the development of technology-based new companies. In the following, the implications are drawn more specific for entrepreneurs.

9.2.1 Implications for entrepreneurs

The model provides a tool for analyzing and presenting the status of a company. This as such may be a useful and valuable tool for an entrepreneur. In addition the model may

serve as a planning tool in assessing the balance between the technology and product development, business development and network & market development work. Further, the model can be used as goal setting tool and help the managers to focus on the balance of achieving various milestones in the future.

In addition to the above mentioned implications, the expert interviews and case data accumulated experience which can be put to a form of advice or lessons learned for new entrepreneurs. Building a start-up company is a complex and demanding task, the critical concerns of which are mostly case specific. However, a few general pieces of advice for future entrepreneurs can be given. The rest is learning by doing.

Key lessons learned:

Keep a tight focus

A start-up has always limited resources. Keeping the focus on the most mission critical issues increases the probability of attaining the set goals.

Stick to your plans and visions

Business prospects in a technology market can be very fluctuating. Do not always believe the hype. Things that are hot today may freeze almost the day after. It is worthwhile to stay alert, but it is important to let your own plans and visions, rather than the latest trends, guide you.

Revisit your revenue model

As your target markets change, the business and revenue models should be thought out again. The ability to change the business model along with changing markets is vital.

Push the sales

Venture capital funding is not the only source of cash for a start-up company. Being able to generate sales in the early stage of development provides extra revenues, but more importantly gives a signal of future success. It is far easier to attract further financing once your business concept has been proven by paying customers.

Build the network

Try to network with as many other companies as possible. According to the entrepreneurs the benefits do not necessarily always show up immediately. But wait for the day when you realize that your classmate from start-up crammer is your best customer. When building your network, remember that individuals are more important than organizations.

Prepare for failures and delays

Everything will not go as planned. Always be prepared for failures and delays. It is important to be able to fail in the best possible way, once the failure is inevitable. All agreements are possible failures. Make contingency plans once the primary plan is ready.

Timing is crucial

As markets for new technology are prone to sudden changes, it is important to be in the right place at the right time. For example, the fund raising during the Internet hype was a lot easier than just a few months later. Taking advantage of the situation makes huge differences.

Make an exit plan for the investors

When seeking investors, it is important to have a ready exit plan for the investors. The companies that are able to convince the investors with realistic exit plans are at the top of the investors' deal-flow lists.

Be persistent

Regardless of the situation, it always pays to be persistent. If you keep your faith in a better future, it is easier for others to believe in the company as well.

9.3 Limitations

The degree of utilization of the results is dependent on the possible limitations in research setting, methods, or techniques. Thus, the potential limitations of the study need to be discussed in detail.

The sample of the study consisted of eight case companies, which were selected to as described in Chapter 6, to present different fields of the Finnish ICT cluster. However, the case material was collected for all case companies during a period February 2000 to February 2001. In addition the cases were updated in 2007 to review the development after the initial case work. As the records for analyzing the milestone achievement were developed among other means by going back in time in the form of interviews there may be bias to embellish the history of the company. Thus, it would have been better to continuously monitor the case companies from the founding of the company.

As the case material has been collected in 2000 – 2001 and 2007 it allows a long perspective view covering e.g. different cycles in valuing technology start-ups and specifically pre-revenue .com companies. However, all the case companies represent a generation of companies founded roughly in the same time, late 1990's, when the bubble in technology company valuations was building up. An ideal sample should include companies of different generations. Such sample would however, prove impractical from the research perspective as it would demand very long research period.

9.4 Suggestions for further research

As this study focuses on mapping the milestone achievement by the company, it does not extensively link the external factors influence on the company development and value creation. Developing techniques to better link the external factors to the value creation process of a technology-based new company demands most likely for further research.

The snap-shot view, provided by the model, also draws the attention to the possible interdependence of some of the milestones. Based on the case material it was discovered that venture capital financing increased the overall milestone achievement as discussed in this chapter. However, more detailed analysis of the interdependence of the milestones would most likely demand a larger sample of case companies.

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11 APPENDIX I

BACKGROUND: VENTURE CAPITAL IN BRIEF⁴⁴

Private equity investors provide equity capital to enterprises not quoted on a stock exchange. The equity is usually used to develop new products and technologies, to expand working capital, to make acquisitions, or to strengthen the balance sheet. Buy-out or buy-in of a business by experienced managers may be achieved using private equity funding, as well.

Venture capital is, strictly speaking, a subset of private equity and refers to equity investments made for the launch, early development, or expansion of a business. Among different countries, there are variations in what is meant by venture capital and private equity. In Europe, these terms are generally used interchangeably, and venture capital thus includes management buy-outs and buy-ins (MBO/MBIs). This is in contrast to the US, where MBO/MBIs are not classified as venture capital. This report adopts the European usage, which views venture capital and private equity as the same.

Venture Capital Process

The actual venture capital investment made in a company is preceded by a thorough and selective assessment of potential investment targets made by the venture capital investor. At the first stage, the assessment of the investment request is based on a business plan made by the company. This is the stage where most projects (typically about 90 %) are rejected. The initial assessment is made relatively rapidly, and therefore, the company should pay attention to two aspects: the business plan should be carefully prepared, and the contact targeted to the correct investors. A well-prepared business plan summary is the best means of attracting and convincing the investor.

The central issues considered by the venture capital investor at this stage are:

- Is the company able to conduct profitable and growing business operations?
- Do the company executives have the necessary qualities to manage the business in various development stages?

⁴⁴ Finnish Venture Capital Association FVCA www-page, (<http://www.fvca.fi/>), 19.1.2001

- Will the investor be able to obtain the desired return through an increase in the company's net worth?

Besides the company's business plan, the venture capital investor will assess the compatibility of the investment request against its own investment strategy. The decisive investment strategy criteria may be company size, development stage, branch or geographical location. Contacts directed to appropriate investors at an early stage of the process will save time and diminish the probability of negative response. Should the investor decide that the investment request meets his criteria, the following step is a meeting arranged with the company management. Experience has shown that about half of the remaining companies are discarded at the negotiation stage.

The third stage, or the due diligence stage, involves a thorough study of the target company by the venture capital investor who assesses the company on the basis of his own, weighted investment criteria. The preparedness of the company management to launch and develop the business in question is generally seen as the most important criterion. Other vital issues include the size and development of the company's target market, the competitiveness of the company's product and technology, as well as the capital required by the business at the actual investment stage, and the eventual additional investment needs.

During the second and third stage of the assessment process, the investor determines the value of the company. Once the entrepreneur and the investor have agreed on the value, the investor's future share of the company is determined. In the end, the investment is made in about 3 to 4 cases per hundred received investment requests. The parties finally make a shareholder agreement to establish practical operating rules.

After the investment is made, the investor and the entrepreneur start working on the common task, i.e., building the value of the company. Usually soon after the investment, the venture capital process is started all over again in order to acquire further funding for the company. In this process, the investor already onboard is a help to the entrepreneur in negotiating the next agreement.

As the company reaches profitability and/or meets the requirements for public listing, the venture capitalist gets a chance to exit the company. Other common types of exit for the venture capitalist are trade sales of the company, MBO/MBIs, and, potentially, a bankruptcy. The basic logic in the venture capital business is that successful exits make up for the losses from unsuccessful exits.

12 APPENDIX II

SUMMARY OF VARIOUS STAGES MODELS (1951-1992)

YEAR	AUTHOR	REFERENCE	MODEL TITLE	FOCUS	No. OF STAGES	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6	STAGE 7	STAGE 8	STAGE 9	STAGE 10	STAGE 11
1951	Davis	Davis, R. C. (1951) The fundamentals of top management. New York: Harper, Row and Brothers.		Leadership	3	Pioneering stage; Owner/manager	Exploitation; Entrepreneur	Professional; Executive leadership								
1954	Drucker	Drucker, P. (1954) The practice of management. New York: Harper and Brothers.		Size	4	Small	Fair Size	Large size	Very large							
1960	Rostow	Rostow, W. W. (1960) The states of economic growth. Cambridge, England: Cambridge University Press.	Economic stages	Nation / economic	3	Traditional and preconditions for take-off	Take-off and drive to maturity	High mass consumption								
1962	Chandler	Chandler, A. D. (1962) Strategy and structure. Cambridge, MA: MIT Press		Organization strategy	4	Initial expansion	Rationalization of resources	Expansion into new market	Development of new structure							
1966	Katz & Kahn	Katz, D. & Kahn, R. L. (1966) The social psychology of organization. New York: Wiley.	Organizational structure	Environment	3	Primitive system stage	Stable organization stage	Elaborative supportive structures stage								
1967	Downs	Downs, A. (1967) The life cycle of bureaus: Inside Bureaucracy. Little, Brown and Company and Rand Corporation, San Francisco. 296-309			3	Struggle for autonomy	Rapid growth	Deceleration								
1967	Lippitt & Schmidt	Lippitt, G. L. & Schmidt, W. H. (1967) Crises in a developing organization. Harvard Business Review, (Nov/Dec): 102-112.	Crises in a developing organization	Organizational crises	3 /6	Birth; 1. To create a new organization; 2. To survive as a viable system	Youth; 3. To gain stability; 4. To gain reputation and develop pride	Maturity; 5. To achieve uniqueness and adaptability; 6. To contribute to society								

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YEAR	AUTHOR	REFERENCE	MODEL TITLE	FOCUS	No. OF STAGES	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6	STAGE 7	STAGE 8	STAGE 9	STAGE 10	STAGE 11
1968	Salter	Salter, M. S. (1968) Stages of corporate development, implication, for management control. Unpublished doctoral dissertation, Harvard University, Cambridge, MA.		Organization	4	Single unit; Sole proprietor; Single market	Single unit; Team of top managers; Functional approach; Single market	Decentralized operating units; Multiple distribution channels; Centralized operating units	Semi-autonomous units report to corporate headquarters; varied products; Separate markets							
1971	Scott	Scott, B. R. (1971) Stages of Corporate Development - Part 1, Case No. 9-371-294, Intercollegiate Case Clearing House, Boston.			3	Stage 1 - One-man rule...	Stage 2 - Functional specialization...	Stage 3 - Diversified product markets...								
1972	Greiner	Greiner, L. E. (1972) Evolution and revolution as organizations grow. Harvard Business Review, 50(4), 37-46.	Evolution - revolution	Organization growth	5	Creativity (-> leadership crisis)	Direction (-> autonomy crisis)	Delegation (-> control crisis)	Coordination (-> red tape crisis)	Collaboration (-> ?)						
1974	Torbert	Torbert W. R. (1974) Pre-Bureaucratic and Post-Bureaucratic Stages of Organization Development. Interpersonal Development, Vol.5, 1-25	Mentality of members		8	Fantasies stage	Investment stage	Determination stage	Experiments stage	Predefined productivity stage	Openly chosen structure stage	Foundation community stage	Liberating disciplines stage			
1974	Kroeger	Kroeger, C. V. (1974) Managerial development in the small firm. California Management Review, 17(1), 41-46.	Life cycle		5	Initiation	Development	Growth	Maturity	Decline						
1975	Lyden	Lyden, F. J. (1975) Using Parsons' Functional Analysis in the Study of Public Organizations. Administration Science Quarterly, Vol.20, 59-70.	Functional problems		4	1. Emphasis on adaptation to the external environment	2. Emphasis on resource acquisition	3. Emphasis on goal attainment	4. Emphasis on pattern maintenance and institutionalization							
1976	Thompson	Thompson, John D. (1976) How to run a successful business. Canadian Business, 49(7), 56-58, 60-62.	Phases of growth		5	Testing of idea	Development	Growth	Turn about (reorganization)	Takeover, transfer or sharing of ownership						

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YEAR	AUTHOR	REFERENCE	MODEL TITLE	FOCUS	No. OF STAGES	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6	STAGE 7	STAGE 8	STAGE 9	STAGE 10	STAGE 11
1977	Parks	Parks, G. M. (1977) How to climb a growth curve: Eleven hurdles for the entrepreneur-manager. Journal of Small Business Management, 15(1), 25-29.	Hurdless		11	Starting	Cash flow	Delegation	Idea	Leadership	Capitalization	Complacency	Expansion	Management succession	Involvement	Value
1977	Hosmer, Cooper & Vesper	Hosmer, L.T., Cooper A.C. & Vesper K. H. (1977) The entrepreneurial function. Englewood Cliffs, NJ: Prentice-Hall.	Stages of growth		4	Director founder operation	Early growth	One-layered management	Multi-layered management							
1978	Gervais (and Basire)	Gervais, M. (1978) Pour une théorie de l'organisation P.M.E. [Toward organizational theory for small and medium-sized businesses.] Revue Francaise de Gestion, 15, 37-49.	Dynamic 1 to 1000 employees		5	Craft - production	Growth problems - administration - commerce	Service planning & production function - mastering of administrative problems	Quantitative growth of production & stock financing	Mastering of provisional and financial information						
1979	Adizes	Adizes, I. (1979) Organizational passages: Diagnosing and treating life cycle problems in organizations. Organizational Dynamics, (Summer1979), 3-24.	Major organizational activities		6	Courtship	Infant organization	Go-Go organization	Adolescent organization	Prime organization	Maturity					
1979	Kimberly	Kimberly, J. R. (1979) Issues in the creation of organizations: Initiation, Innovation, and Institutionalization. Academy of Management Journal, Vol.22, 437-457.			4	1. Marshalling of resources...	2. Obtaining support for the external environment...	3. Formation of identity...	4. Formalized structure...							
1979	Mintzberg	Mintzberg, H. (1979) The structuring of organizations. Englewood Cliffs, NJ: Prentice-Hall.		Structure	4	Entrepreneurial; Informally organized	Bureaucratic structure; Formal policies; Standardization	Divisionalized structure; Focus on Internal efficiency; Diversified product line	Matrix organization; Dual reporting; Project focus							

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YEAR	AUTHOR	REFERENCE	MODEL TITLE	FOCUS	No. OF STAGES	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6	STAGE 7	STAGE 8	STAGE 9	STAGE 10	STAGE 11
1980	Filley & Aldag	Filley, A. C. & Aldag, R. J. (1980) Organizational growth and types: Lessons from small institutions. In B. M. Staw & L. L. Cummings (Eds.), Research in Organizational behavior (Vol. 2, pp. 279-321). Greenwich, CT: JAI Press.		Organization growth	3	Owner-manager; Simple operation; Loose policies, structure; Certain environment	Dynamic growth; Technical specialization; Uncertain	Rational administration; Efficiency								
1980	Robidoux	Robidoux, J. (1980) Les crises administratives dans les P.M.E. en croissance [Administrative crises in growing small and medium-sized businesses]. Chicoutimi: Gaétan Morin éd.	Crises		7	Start up	Liquidity	Delegation	Leadership	Financing	Prosperity	Continuity				
1981	Naoum	Naoum, N. (1981) Bien connaitre la P.M.E. [Knowing small and medium-sized business well]. Revue Commerce, 82(1), 54-56.	Stages of growth		5	Start up	High growth	Delegation	Leadership affirmation	Prosperity (complacency)						
1983	Tyebjee et al.	Tyebjee, T. T., Bruno, A. B. & McIntyre, S. H. (1983) Growing venture can anticipate marketing stages. Harvard Business Review, 61(1), 62-66.		Marketing	4	Entrepreneurial; Simple; Small customer base	Opportunistic; Standard product	Responsive; Product management; Market research; Driven by customer	Diversified; complex; Integrated							
1983	Churchill & Lewis	Churchill, N. & Lewis, V. (1983) The five stages of small business growth. Harvard Business Review, 61(3), 30-50.	Stage model	Small business	5	Existence	Survival	Success	Take-off	Resource maturity						
1983	Quinn & Cameron	Quinn, R. E. & Cameron, K. (1983) Organizational life cycles and shifting criteria of effectiveness: some preliminary evidence. Management Science, 29(1):33-51.			4	Entrepreneurial stage	Collectivity stage	Formalization and Control stage	Elaboration of Structure stage							
1984	Robinson, Pearse, & Mescon	Robinson, R. B. Jr., Pearse, J. A. II, Vozikis, G. S. & Mescon, T. S. (1984) The relationship between stage of development and small firm planning and performance. Journal of Small Business Management, 22(2): 45-52.		Small business	3	Start-up	Early-growth	Later-growth								

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YEAR	AUTHOR	REFERENCE	MODEL TITLE	FOCUS	No. OF STAGES	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6	STAGE 7	STAGE 8	STAGE 9	STAGE 10	STAGE 11
1984	Miller & Friesen	Miller, D. & Friesen, P. H. (1984) A longitudinal study of the corporate life cycle. Management Science, 30, 1984a, 1161-1183.			5	Birth	Growth	Maturity	Revival	Decline						
1987	Scott & Bruce	Scott, M. & Bruce, R. (1987) Five stages of growth in small business. Long Range Planning, 20(3): 45-52.	A model for small business growth	Small business	5	Inception	Survival	Growth	Expansion	Maturity						
1987	Smith & Gannon	Smith, K. G. & Gannon M. J. (1987) Organizational effectiveness in entrepreneurial and professionally managed firms. Journal of Small Business Management. 25(3): 14-21.	Organizational development		3	Entrepreneurial stage	High-growth stage	Maturity stage								
1988	Baird & Meshoulam	Baird, L. & Meshoulam, I. (1988) Managing two fits of strategic human resource management. Academy of Management Review, 13(1), 116-128.	Stages of Human Resource Management	Human resource management	5	Initiation	Functional Growth	Controlled Growth	Functional Integration	Strategic Integration						
1988	Kazanjian	Kazanjian, R. K. (1988) Relation of dominant problems to stages of growth in technology based new ventures. Academy of Management Journal, 31(2):257-279.			4	Conception and Development	Commercialization	Growth	Stability							
1992	Dodge & Robbins	Dodge, H. R. & Robbins J. E. (1992) An empirical investigation of the organizational life cycle model for small business development and survival. Journal of Small Business Management, 30(1): 27-37.	The Organizational Life Cycle Model	Small business	4	Formation	Early growth	Later growth	Stability							

13 APPENDIX III

MILESTONES

Milestones: Technology and product development process

Detailed list of common milestones in indicative order:

Product concept / idea

Product specification / demo

Technology / product patented

Platform / technology selection

Prototype / demo publicly announced, Alpha-phase

Starting of commercialization

Dedicated CTO appointed/freed (with solid project management skills)

Trial / pilot with customers, Beta-phase

Product ready for shipping

Income from products, 'proof of concept'

Versioning of products

Optimized production / design for manufacturing (ready for mass production)

Dedicated resources for technical support / help-desk

IPR portfolio analysis

Product profitability (R&D costs covered by sales)

Localized products to a foreign market

Separate R&D and further product development teams

2nd product generation (based on new technologies)

Multiple distinctive products based on distinctive technologies

Milestones: Business development process

Detailed list of common milestones in indicative order:

Business idea

Initial business plan

Founding (establishing legal form of a company)

Own premises

Business model (including revenue model) – including pricing

Value proposition and positioning of offering

Business plan ready (including detailed action plan)

First foreign employee

First outside-company member of board of directors

Management team hired

First foreign member of management team

Business concept publicly announced

Team size of 10 employees

Clear separate roles of operational management and board of directors

First foreign member of board of directors

Option plan for employees

Team size of 30 employees

Operations in multiple countries

Team size of 100 employees

Operations on three or more continents

Profitability (positive monthly cash flow excluding funding and subsidies)

Acquisitions

Mergers

Milestones: Network and market development process

Detailed list of common milestones in indicative order:

First market research

Initial customer segment identified

First appearance to investors and local press coverage

Marketing plan ready

Registered trade marks

Pilot / first customers signed

Platform decisions made / technology partnerships signed

First appearance to international investors and international press coverage

Sales organization ready and launch of marketing campaign

First foreign investor on board

Agreements with distributors / resellers (operators in case of network services)

First foreign customer signed

All crucial business model specific alliances signed in initial market

Deliveries to first foreign customer

1st country manager appointed

2nd country manager appointed

3rd country manager appointed

4th country manager appointed

All crucial business model specific alliances signed in first foreign market

International sales organization ready

Local / regional market leader position

Extension to other (distinctive) customer segments

Foreign sales more than 50 % of sales

Distributors / resellers share more than 50 % of sales

Deliveries to three or more continents

Global market leader position