Classification and management of incubators: aligning strategic objectives and competitive scope for new business facilitation

Maximilian von Zedtwitz

IMD – International Institute for Management Development,
Chemin de Bellerive 23, CH-1007 Lausanne, Switzerland
E-mail: zedtwitz@imd.ch

Abstract: Incubation has recently attracted increased attention as a model of start-up facilitation. Venture capitalists see incubators as a means to diversify risky investment portfolios, and would-be entrepreneurs approach incubators for start-up support. Incubators face the challenge of managing both investment risks and entrepreneurial risks. More than a thousand incubators have been established in the last few years, most of them as regional business incubators. But new types of incubators are emerging. These incubators pursue different strategic objectives, apply different skills and competencies, and serve different markets. As a consequence, they have developed a new understanding of their sources of competitive advantage and business models. Based on 41 interviews with incubation and R&D managers, this paper outlines five incubator archetypes: the university incubator, the independent commercial incubator, the regional business incubator, the company-internal incubator and the virtual incubator. We describe a generic incubator business model, which is refined for different value propositions to customers and other major stakeholders. We conclude that whether an incubator is for profit or not, it should be run as a business. We also summarise some implications for operational and strategic management of incubators, as well as policy and strategy considerations for universities, venture capitalists, municipalities, corporations and other parent institutions of incubators.

Keywords: Incubator; new business facilitation; incubation business model; competitive advantage and scope; risk management; venture capital, industriator.

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Biographical notes: Dr. Maximilian von Zedtwitz is Professor of Technology Management at IMD - International Institute for Management Development, Lausanne, Switzerland. He holds PhD and MBA degrees from the University of St. Gallen, and MSc and B.Sc. degrees from ETH Zurich. As an engineer and scientist, he worked in information system development for Siemens in Florida, and in nucleon simulation research for Advanced Telecommunications Research (ATR)-International in Japan. More recently, he was a research associate at the Institute for Technology Management in Switzerland, and a Visiting Fellow at the Graduate School of Arts and Sciences at Harvard University in Cambridge, Massachusetts. He joined IMD in summer 2000 to teach international innovation strategy, R&D management, and technology-based incubation in MBA and executive education programs. He has published two books and more than 40 papers on international innovation management and R&D.

1 Introduction

Entrepreneurs and successful start-up companies contribute to industrial growth and economic wealth. Since the 1990s, incubators have become an important source of help for entrepreneurs wanting to beat the odds and jump-start their businesses. The National Business Incubation Association (NBIA) found that more than 80% of all start-ups graduating from an incubator were still in business after three years [1]. This ratio is remarkable when compared with the average start-up success rate in this time period of approximately 30%. Encouraged by many success stories and a rise in the entrepreneurial population in the wake of the internet revolution, many private incubators were founded in the late 1990s. At the same time, universities, public organisations and established companies designed programs to support entrepreneurs bringing early-stage technology to market.

Most incubators suffered after the internet shakeout of March 2000, and many disappeared. The incubators that were hardest hit had relied too heavily on a continuing internet boom. They had accumulated too much overhead administration and had invested in projects that were risky but attractive, yet difficult to leverage internally. Many of these incubators simply lacked solid skills in growing companies sensibly – after all, most incubators were start-ups themselves. But is the incubator business model itself flawed?

This article is concerned with what remains of the incubator model. Clearly, some incubators have been managed better than others. Specifically, this article seeks to make the following contributions:

- provide a definition of incubation that differentiates incubators from other entities in the new business facilitation arena.
- develop five principal management models of incubation: the independent commercial incubator, the regional business incubator, the university incubator, the company-internal incubator and the virtual incubator.
- outline the principal challenges and pitfalls for each incubator model, singling out key success factors and some best practices.
- identify potential trends and determinants of competition between these and other forms of incubation.

The findings reported here are based on research focused on management practices of incubators and are part of an ongoing international investigation on sustainable incubation. As the literature on incubation is still relatively limited, the research was mainly exploratory in nature. The study that led to the present contribution was based on 41 interviews with incubator directors, R&D managers, technology transfer officers at universities, technology licensing officers, incubated start-up entrepreneurs, technopark directors, and other experts in the field of new business facilitation. The interviews, carried out between June 2000 and December 2001, were conducted initially in person, using a semi-structured interview guideline, then followed up by telephone and e-mail. This confirmation of our interpreted observations was necessary to guarantee the validity of our interpretations. The organisations investigated were located in the USA, the UK, Switzerland and Germany. Five incubators were studied in greater detail. Literature and internet searches, as well as personal observation, site visits and participation in

incubation meetings (where possible) completed the data collection, as required by Yin's [2] rules of observation triangulation.

2 Sources of competitive advantage in incubation

The concept of incubation is not legally protected or defined and has been used for many different forms of new business facilitation. This has often led to confusion when comparing the incubation efforts of consulting companies, universities, regional governments, law firms and others. In this section we attempt to summarise the services incubators offer to entrepreneurs and identify the role they play in facilitating start-up companies.

2.1 What are incubators?

The first recorded incubators originated in schools and universities in the 1940s to give students and professors the opportunity to commercialise their research ideas [3]. Later, incubators were created based on regional economic support and business facilitation programs. The primary objective of these public-mission driven incubators was to create local small and medium-sized enterprises, and hence a sound base for regional employment and wealth (e.g., [4]).

In the 1980s, a new type of incubator emerged. For-profit incubation was facilitated by the wider availability of venture capital, revised intellectual property rights and the greater financial gains that could be expected from small start-ups. Higher ROIs from start-ups were determined by the greater potential of technology-driven growth as well as the ease of access to global markets, both conditions emerging most prominently in the late 1980s.

By early 2001, there were hundreds of incubators, most of them in the USA, the UK and Western Europe. According to the NBIA, the number of business incubators in the USA rose from 12 in 1980 to 600 in 1997 [5]. In August 2000, *The Economist* put the number at about 1,100, half of them in the USA [6]. With the downturn in the new economy, independent for-profit incubators came under strong pressure from the financial community and their number decreased sharply. However, incubation remained of interest to more established companies, universities and other R&D-intensive organisations able to support incubation in the absence of external venture capital. Regional business incubators are still being set up, more recently also outside the leading industrialised countries. For instance, Deyong Kong, President of the Beijing Business Incubator Association, estimated that the number of business incubators in China had risen to 465 by late 2001, and the establishment of many more was planned (private communication, 2002).

Incubators have changed over time, with consulting firms and other professional service providers offering similar new-business facilitation support. However, there appear to be certain defining characteristics of incubation. What are these fundamental characteristics? Our research revealed that incubators typically offer all or most of the five services outlined below (see also [7]):

Access to physical resources: Incubators offer office space, furniture, sports facilities, a computer network, 24-hour security and other amenities to do with physical infrastructure and real estate. Poorly performing incubators have focused too much on

their role as landlords, neglecting other services described further below. In this field, incubators compete with technology and science parks and, sometimes, real estate companies.

Office support: In addition to infrastructure, incubators also maintain efficient operation of basic office support such as secretarial and reception services, mail handling, fax and copying services, computer network support and bookkeeping. Incoming entrepreneurs want a turnkey set-up: all they need to do is move in and start working. These services are hardly complex or technologically advanced, but they ensure that basic organisational resources are in place and save time and effort for entrepreneurs who want to get going quickly. Although these services may be taken for granted when they are working well, the lack of, for example, proper bookkeeping or timely IT support can be quite a hindrance.

Access to financial resources: Incubators also offer access to venture capital—usually a combination of private funds and outside capital invested by business angels, venture capitalists or local institutions and companies. Venture capital criteria apply for due diligence and in the selection of start-ups. In general, incubators target very early stage, sometimes pre-seed money, start-ups and try to bring them to the next financing round. Natural competitors are business angels as well as early-stage venture capitalist and investment firms.

Entrepreneurial start-up support: Entrepreneurs may be strong in technology and perhaps business vision, but usually lack organisational, management and legal skills. Incubators guide entrepreneurs through the necessary steps that a newly founded company must take, sometimes even helping define the business plan, but more often providing professional services such as accounting, legal advice for incorporation and taxation issues, and formulating ownership and employee option plan structures. In addition, incubators provide valuable management coaching support, helping entrepreneurs develop and apply leadership and management skills. Most entrepreneurs in an incubator are starting a company for the first time, whereas the incubator has gone through the process several times and can pass on the experience of previous start-ups to new entrepreneurs. Many incubator managers, however, have not been able to provide real value added in start-up coaching – competing in this space with law, accountancy and consulting firms.

Access to networks: Good incubators are able to identify and leverage key individuals for the success of their start-ups. Entrepreneurs usually do not have the network that an incubator has taken years to create. Incubators can bring in individuals crucially important to a start-up's business: a potential customer to sit on the advisory board, a leading-edge programmer who will design the core modules of the underpinning computer system, a retired CEO who will grow the fledgling start-up from 5 to 50 employees, a venture capitalist who might be interested in investing further. The central tool is the incubator director's Rolodex, as well as his or her intuition for making the right calls at the right time. Access to these networks is sometimes also provided by human resource firms, consulting companies, business angels or networking organisations (e.g., First Tuesday). However, the importance of these networks has generally been underestimated, as stated for instance by Hansen *et al*. [8], who concluded that access to an organised network of companies was *the* differentiating factor for incubators to succeed.

The actual service mix depends on the focus of the incubator as well as the needs and preferences of the entrepreneur (e.g., [9]). An agreement between the entrepreneur and the incubator outlines this service mix, along with any service fees and the equity position the incubator will hold in the start-up.

Some incubators offer all five of these services: We call them incubators in the strong sense of the term. Organisations that offer only four services are considered incubators in the weak sense of the term. Organisations that offer fewer than four of these services lack too many elements of incubation and should no longer be called incubators. Rather, this is the domain of accelerators, technology-transfer offices or entrepreneur-in-residence programs of consulting and accounting firms.

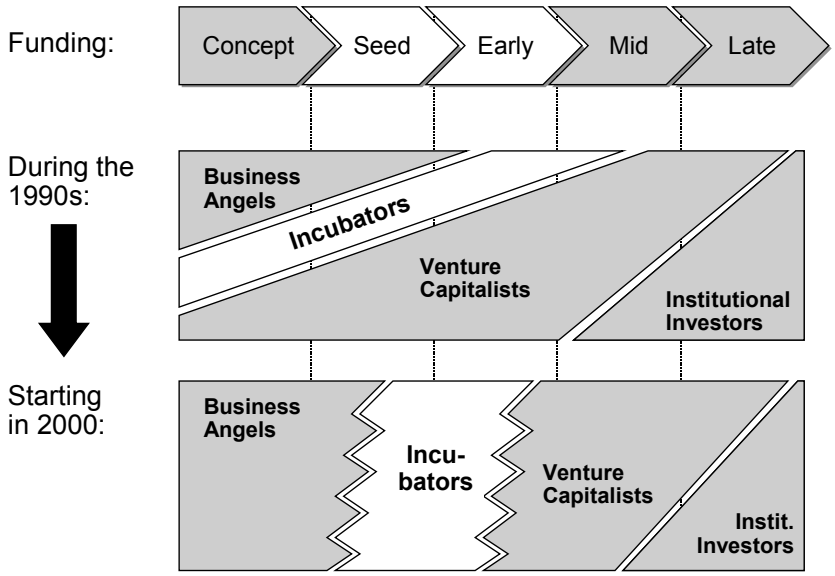
An incubator must know the unique value proposition of the services it combines in one package. If it is unable to define the value of a particular service in the context of the package, it might be better to outsource the service. For instance, some incubators have decided to outsource stock option planning to more specialised accounting firms.

2.2 Competitive scope

Incubators are competing with other incubators and entrepreneurial service providers, such as venture capitalists, consultants, business angels, law firms and real estate agents, over the best entrepreneurs and start-up companies. Porter [10] outlines four dimensions of competitive scope (vertical, segment, geography and industry) as ingredients of competitive advantage. How do these dimensions affect competition in the incubation industry?

Vertical scope: Along with venture capitalists, business angels, consulting companies and institutional investors, incubators are in the business of providing financial and managerial support to start-up companies. The financial and managerial needs of start-ups evolve as the fledgling company matures. This results in a vertical differentiation of the incubation spectrum. The 'vertical' differentiation (horizontal axis in Figure. 1) has become more pronounced for high-tech start-ups in the past few years, as venture capitalists have retreated somewhat from the riskiest start-ups. At the same time, however, they have become more sensitive to early signals and compete for good teams and technologies even in the very early stages. Incubators target early-stage start-ups, but they try to differentiate themselves from business angels in their institutionalisation of coaching and other start-up services, and hence are less likely to concentrate on the first-day entrepreneur. However, more and more business angel clubs also focus on subsequent stages and organise venture capital funds. At the downstream end, venture capitalists are often exit partners or customers of start-ups successfully graduating from incubators. In this respect, incubators serve as start-up clearinghouses for venture capitalists and institutional investors.

Figure 1 During the 1990s, the principal start-up investors focused their funding on specific start-up stages. Now incubators tend to target seed and early-stage start-ups. Nevertheless, venture capitalists and business angels continue to make inroads into these intermediary stages of start-up evolution that incubators consider their primary market



Segment scope: The source of start-ups can provide another competitive factor for incubators. For instance, university incubators typically give preference to faculty and student entrepreneurs from their host university. Corporate-internal incubators prefer employees to external entrepreneurs. For example, Shell's incubator – directed from London – identifies and supports unconventional business ideas from its employees around the world. BT's Brightstar incubator offers its service to BT employees only. Some independent incubators have relied on key people being responsible for generating ideas for new start-ups (e.g., IdeaLab), but this model is extremely dependent on the creative minds behind the incubator. Other incubators tend to keep their doors open to a variety of sources.

Geographical scope: Geographical focus is a natural competitive factor for regional business incubators, since their mission is to support new business locally. Network access is a crucial element of successful incubation, and since networks are usually limited to certain regions, many incubators strive to establish a good local presence. The exceptions here are some company-internal incubators – where the company-internal network is more important than the regional network – and many virtual incubators, which base their business models on the variety of start-ups rather than a particular geographical focus.

Industry focus: The focus on a particular industry – mostly because of the professional preferences or competencies of incubator managers, but also to create synergy among incubating entrepreneurs – is the fourth competitive scope of incubation.

Typical industries are information technology, internet services, software and biotech. Some university incubators also concentrate on a given technology, but their focus is driven by the size of the infrastructure investment or the reputation of certain academic departments. The incubator at Boston University, for instance, focuses on photonics and opto-electronics, and has invested approximately US$100 million installing state-of-the-art research and experimentation infrastructure.

These four dimensions of competitive scope help to explain some of the differences observed in incubator business models. A business model is not evaluated in terms of service focus and competitive scope but, more importantly, by how well it delivers on a strategic objective.

2.3 A classification of incubators

As a central part of our research with 41 incubator managers, we asked about the motivation for facilitating start-up creation. Interestingly, many incubators did not consider profit or financial returns as their primary goals. These incubators considered creating profit-oriented start-ups more as a means to fulfilling other goals, such as employee retention or public image.

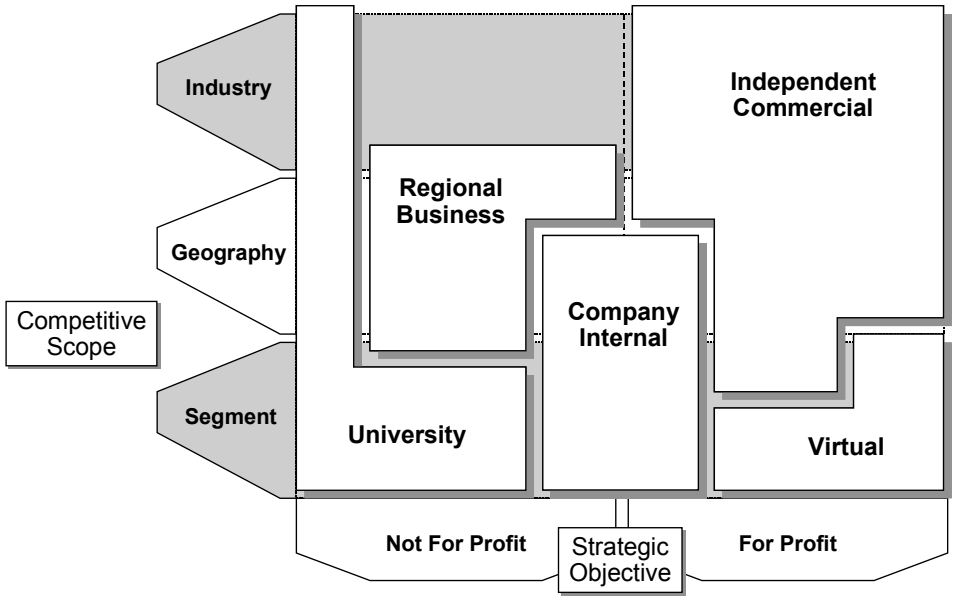
Ideally, companies finance activities in the next period with revenues generated in the previous period. Other forms of financing are dependent on anticipated positive cash flows. The success of a start-up, however, is inherently difficult to predict. Incubators have no constant inflow of revenues, and investments in start-ups take several years to return a sizeable profit. Some incubators understand themselves as risk-brokers and try to develop a portfolio of different revenue generators. Earlier incubator business models that relied solely on exit proceeds were particularly vulnerable. For instance, following the new economy shake-up in March 2000, start-ups developing internet and web applications realised that they would take much longer to (and may never) become profitable. As a consequence, most investors cut back on their financial support of for-profit internet incubators. Start-ups and incubators in biotech have fared much better.

Not-for-profit incubators generally have a strong financial sponsor such as a university or municipality to back losses and potentially long droughts. Not-for-profit incubators outnumber for-profit incubators: Katz-Stone [11] found that only about 10% of incubators were for profit, and the NBIA estimated the number at 25% in May 2000. The risk of investing in for-profit incubators is not necessarily higher, as the study by Molnar *et al*. [1] showed: Survival rates of graduating start-ups were as high as 90% to 95% for for-profit incubators, compared with approximately 80% for incubators with a public mission.

Incubators fall into two basic types: for-profit or not-for-profit. We further identified five basic archetypes, operating with various degrees of competitive focus (segment, industry, geography) [12]:

- independent commercial incubators
- regional business incubators
- university incubators
- company-internal incubators
- virtual incubators.

Figure 2 Different strategic objectives and competitive scopes define five archetypes of incubation



Each of these incubator archetypes is explained in more detail below. Figure 2 illustrates how competitive focus and strategic objective differentiate between incubator archetypes. The competitive focus axis distinguishes between three competitive scopes: industry, geography and segment. The strategic objective axis differentiates incubators according to their profit orientation: For-profit incubators have profitability as their primary strategic objective; not-for-profit incubators usually fulfil a public mission first, such as regional employment and growth, or they serve goals only indirectly related to operational profits, such as employee retention, innovation capacity building or stock market valuations. Although the strategic objectives of a not-for-profit incubator are also economic in the long term, the benefits are often reaped outside the incubator by a parent or sponsoring organisation, and the incubator's contributions are difficult or impossible to measure. Internal sustainability objectives are relatively recent trends for most not-for-profit incubators.

Most incubators can be associated with one of the five archetypical forms, although some incubators incorporate elements of two or even three incubation archetypes. University incubators usually have no financial pressure to return a profit, but they are focused on serving the scientific community at the university. Regional business incubators serve a local community first of all, and their objective is to create jobs and support local commerce and wealth. Independent commercial incubators are profit oriented, and they often focus on a particular technology or industry to achieve this. Virtual incubators are also for-profit, but they focus on particular needs in the entrepreneurial community rather than a particular industry. Company-internal incubators are more difficult to categorise because on the one hand their parent companies have strong commercial objectives, but on the other hand the internal incubator serves (both internal and external) political interests as well as corporate development objectives.

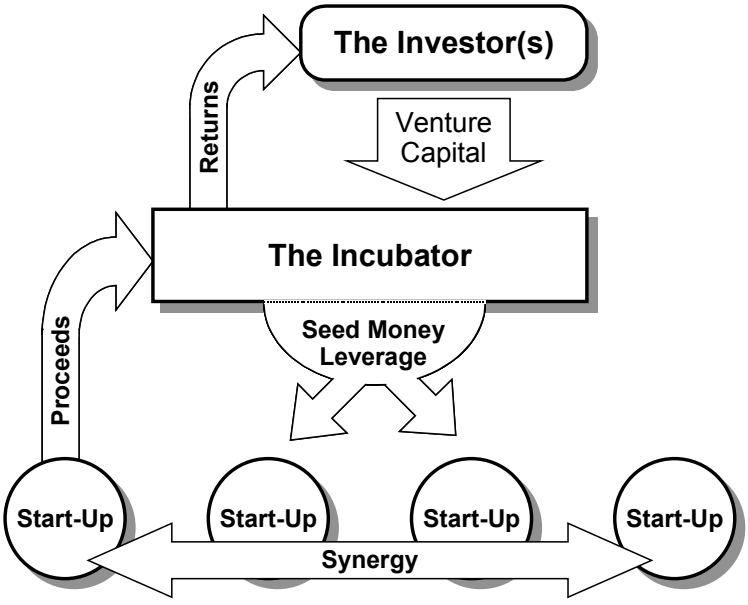
Obviously, these different objectives and sources of competitive advantage must have specific consequences on the business models that the incubators deploy.

2.4 A business model for incubation

Strategy is based on the creation and exploitation of competitive advantage, and the business model is an instrument to achieve this goal. What is a viable and sustainable business model for incubation? Is there a generic business model for all archetypes of incubation?

In our investigation sample, incubators differed in competitive focus as well as strategic objective. However, all incubators depended on a sponsor or investor who supported the incubation activities financially (see Figure 3). The typical incubator was run by a management team, led by an incubator director. This team worked under resource and time constraints, therefore it aimed to exploit economies of scale and scope to leverage its activities over a number of start-ups. How these economies were achieved differed from incubator archetype to archetype. In summary, the generic business model of successful incubation rests on the capability to offer superior leverage – based on the timely and effective deployment of the full range of incubation services – and to create synergy potential among the incubated start-ups through collocation or segmentation of entrepreneurs with similar problems and goals.

Figure 3 The generic business model of incubators



Of the many start-ups in which the incubator invests, only a few will succeed. There are several ways to achieve success: Sell the business to another company (trade sale); grow the start-up and bring it to maturity as an independent company; or even achieve a potentially lucrative initial public offering of the start-up on NASDAQ or a similar stock market. The proceeds of the chosen exit option constitute a profit/loss for the incubator operations, which is then forwarded to the investors as a return on their invested capital based on an agreed-upon distribution scheme.

Successful incubation is thus based on a number of competitive parameters, among which the business model is, of course, critical. To illustrate different business models, the following sections provide examples of incubator archetypes with different sources of competitive advantage, strategic objectives and incubation processes.

3 Independent commercial incubators

Pure, commercial, independent incubators are characterised by a strong profit or commercial objective, although this does not rule out motivations to generate benefits for the local community (see also Figure 2).

Commercial incubators are generally spun off as entrepreneurial boot camps by venture capital firms or started by independent entrepreneurs as a place to help other entrepreneurs. Since commercial incubators are often established without the constraints of having to fit into an existing organisation, there is more freedom to develop an efficient incubation business model. The business model of an independent incubator is based on clear internal competencies and focuses on a given technology or industry (e.g., language recognition software) or target market (e.g., Japan). A set of internal technical competencies attracts a preferred-profile entrepreneur, and the incubator is able not only to create synergy among the incubated start-ups but also to fine-tune its skills in this particular competitive environment. The incubator thus enhances its possibilities to optimally leverage each individual start-up.

Most for-profit incubators in our sample identified risk management as a key success factor (see [7]). External and internal risks were to be managed differently. A rigorous examination and selection process–using venture capitalist review criteria–was in place to reduce *external* risk. In this process, an incubator selected start-ups according to how much they would benefit from subsequent internal leverage and synergy. The 'incubation charter,' which summarised the incubator's vision of its customer value proposition and its core competencies, was central in this process. The resulting synergy was further reinforced through stock cross-holdings between resident start-ups.

Managing *internal*, or residual, risk was an integral part of the subsequent start-up incubation process. Internal risk originated from the day-to-day business activities of start-ups and the decisions and actions taken. Every decision taken in the early start-up phases, e.g. with regard to IT, management and employees, determined the success or failure of the venture and, ultimately, the performance of the investor's portfolio. The key advantage of incubators over venture capitalists or business angels lay in adequate on-site management: allocation of time and resources, quality of management assistance, and distribution of investment funds across the stable of start-up clients.

One of the great challenges in commercial incubation is to keep overheads low and to maintain focus on ventures for which real added value can be provided. Many incubators

have experienced financial troubles because they have overspent on infrastructure and staff. For others, the temptation to invest in very promising start-ups that did not fit with the incubation charter proved to be too strong. Unfortunately, this often meant that the incubator could not assess these ventures appropriately and could not leverage its competencies to their benefit when it was actually needed.

IncTANK: an independent commercial incubator

IncTANK, a small incubator five minutes' walk from MIT in Cambridge, Massachusetts, was founded in March 2000. It was backed by a US$2 million venture fund called IncBANK. IncTANK focused on ventures based on internet software technologies invented by MIT graduate students. An additional focus was the New England-Japan axis, based on the professional network of IncTANK management partners. Overheads were kept low from the beginning: the incubator first set up in a residential building, then opened a second location in the basement of an office building next door. Entrepreneurs were offered seed funding in exchange for equity. From this funding, start-ups also had to pay a small service fee, which created an accounting history early on. IncTANK preferred to concentrate on one or two start-ups at a time, in order to prevent dilution of attention and resources. Seven start-ups had been launched by late 2001, of which five were successful. One of these companies, Fire Spout, had entered IncTANK as a team of three and left after three months as a fully-fledged company with 33 employees. A third IncTANK office has been set up in Tokyo, Japan, to support start-up businesses locally and strengthen links with New England.

4 Regional business incubators

Regional business incubators are established by local governments or organisations with similar regional political and economic interests, to provide office space and start-up support for the local community. Their main objectives are public: to generate employment, improve local industry or improve public image. Commercial results, at least for the initiator of the regional incubator, are a secondary factor, the public mission is stronger than the profit objective (see also Figure 2).

Typically, a government agency is a principal investor in and sponsor of the incubator. Since funding is comparatively secure, this type of incubation provides a relatively safe haven for fledgling start-ups. With their geographical focus, regional incubators are on the short-list of international companies seeking partners to develop a local presence and a local industry network – all good news for start-ups looking for large customers with potential global market access. Furthermore, heavy investment in a given geographical area may well attract more industry and, eventually, generate a regional centre of innovation. One of the best examples in this respect is Silicon Valley.

The regional incubators in our sample tended to have no particular industry/technology focus, since they were designed to offer support to entrepreneurs from various backgrounds in the local community. However, companies from local industry were obvious business partners and thus played an important role in determining which start-ups would be supported and would be more likely to succeed. The strongest focus was, of course, the geographical region: The regional incubator was funded and mandated to support the local economy.

With strong governmental support, start-ups in regional incubators were less exposed to competition. The focus of investment in these start-ups was on regional development first; short-term commercial considerations often came second. This long-term perspective helped start-ups through their infant stages, but it also made the necessary screening and weeding out of start-ups with unfit ideas and poor business plans less efficient. Some entrepreneurs may also have felt a little bit too relaxed under the umbrella of a powerful regional sponsor. Most non-profit regional business incubators found it difficult to attract highly qualified managers, since employment conditions (e.g., remuneration) were typically less favourable than in industry.

OIT: a regional incubator in Israel

The Ofakim Innovative Technologies (OIT) incubator was founded in 1991 as a centre for the development of high-tech enterprises based on individual entrepreneurs. Its stated goals were to attract entrepreneurs and investors to the region of Ofakim, and to support start-ups in turning their R&D projects into successful business ventures. Legally a not-for-profit association, the incubator was 85% financed by the Office of the Chief Scientist of the Ministry of Industry and Trade in Israel, with the remainder coming from outside investors and the entrepreneurs themselves. The incubator set up committees that provided certain incubator management functions, specifically for finance and personnel, project approval, investors and donors, and auditing and reviewing. There was a focus on medical technologies among the incubated projects, but the incubator also included start-ups working on product development of software and mathematical, electromechanical, traffic-related, agrarian and other technologies.

5 University incubators

Naturally, technical universities are hotbeds of new inventions and cutting-edge technologies. Until recently, however, most universities had no intention of capturing some of this value commercially. The first technology-transfer offices were established in the 1970s, amongst much debate about the extent to which academic institutions should ‘soil’ their hands with pecuniary interests. By early 2001, few of these offices had returned profits to their universities and their main mission had remained to support the transfer of technology rather than its commercialisation (see Figure 2).

As a consequence of increased internal demand and some political interest, some universities provide or build office space for entrepreneurial-minded researchers and students. These university incubators often emerge from already existing technology parks – laboratories designed to foster collaboration between scientists in academia and industry. Start-up coaches support resident entrepreneurs, providing links to the venture capital industry, helping with business plans and introducing simple management and business practices. These activities are often carried out in close collaboration with the local technology-transfer office, since the intellectual property typically belongs to the university and has to be licensed by the entrepreneur before commercialisation.

The university incubators we interviewed often found that they could not pursue their own commercial agenda even if the parent university allowed relatively wide operational latitude. Academics were also known for their scientific rather than their entrepreneurial

or industrial strengths. Many scientists viewed the university incubator as an extended workbench, where they could continue to develop their research concepts. Their determination to start a new business was often questioned, which also weakened their negotiating position with serious venture capitalists and potential business partners.

Start-up selection criteria were not as stringent as in independent incubators. University incubators were open to a wide range of disciplines that had little in common. With little technological or industrial focus, synergy among start-ups was more difficult to achieve. Incubator managers found it difficult to leverage networks or experiences focused in one industry or technology, thereby diluting the power of their networking potential. Moreover, they worked mostly with fickle and amateur entrepreneurs on the one side, while facing sceptical venture capitalists and industry partners on the other. University incubators thus focused mostly on start-up coaching, facilitating learning of management processes and practices across different ventures.

USC Columbia technology: a university-based incubator in the US

The University of South Carolina Columbia Technology incubator was officially opened in November 1998. Managed by the South Carolina Research Institute, its mission was "to recruit, build, and develop new technology-driven companies that support the development of a highly skilled workforce, advance technology and research through development of new products and services and enhance the economic development of South Carolina through the creation of wealth and opportunities" [13].

The incubator offered office space of 10,000 square feet in two locations, labs, service provider networks and software networking. Funding came from USC and private donations. Start-up applicants did not have to come from the university, but they had to show that there would be a strong interaction with USC and that they were a technology-based enterprise with a business plan, growth potential and team-building capabilities. There was a three-year target for graduation from the incubator. One start-up had already successfully left the incubator, with five more currently under supervision. There was no specific technology focus, with applications ranging from data management to computer visualisation to silicon carbide crystals. The start-ups received substantial networking support from business professionals, who also acted as low-cost service providers or assisted with referrals or reviews for company boards.

6 Company-internal incubators

Company-internal incubation of new technologies has been a responsibility of corporate R&D for many years. There is plenty of literature on strategy and management concepts of how to improve innovation from R&D departments. Some of the most cited problems of R&D-based innovation include, among others: inability to cope with disruptive technologies, poor communication between technical and business functions, inflexible management and organisational structures, inability to align long-term vision with short-term needs.

In the late 1990s, companies turned to the incubation concept to overcome some of these difficulties. However, they found that promoting radically new ideas often encounters huge resistance. It requires an entrepreneurial culture that challenges existing technical competencies and requires a redefinition of what the company's business is

supposed to be. The R&D pipeline is optimised for ideas that fit into dominant business and technology strategies, so unwanted projects are often eliminated or spun off. Company-internal incubators offer the opportunity to retain and gather projects that do not fit in the company but are still attractive from a profit/revenue point of view (see Figure 2).

The technological focus of the company-internal incubators in our sample was relatively wide. However, since they were often located close to an existing R&D unit, incubator occupants could draw on existing technical expertise. Also, the parent company was able to offer its researchers a career perspective outside science, without having to let them go elsewhere.

Touted as a means to spur slow-moving R&D projects, incubators were given a certain amount of autonomy and were removed from traditional hierarchical lines of command. There were often unpleasant side effects, such as differences in remuneration among employees, or new product lines incompatible with business strategy. Furthermore, the incubated ventures shared little from a technology point of view; the strongest synergy created among them was based on their early stage of company development and lack of business experience. Conversely, the access to a number of corporate functions, such as legal services, accounting, common distribution, marketing knowledge, operations and purchasing helped internal start-ups obtain vital professional and business services under favourable conditions. Some incubator-developed products thus entered in direct competition with existing product lines of the parent company.

The concept of company-internal incubation is still evolving. Corporate-internal incubation only makes sense if there are benefits over internal R&D. In summary, these benefits are early exposure to market and organisational flexibility through separation from the parent in terms of project selection, funding and management. However, few companies would outsource all of their R&D efforts–the fundamental question is how much autonomy one can allow while retaining enough control over any new business potentials created.

Brightstar: the corporate-internal incubator at British Telecom

British Telecom (BT) launched Brightstar in December 2000 after it discovered that many of the technologies developed at BT were not optimally exploited. In one historic example, BT realised that it owned a 14-year-old patent for the hypertext link – software that allowed internet surfers to jump from one web page to another – without sharing any commercial advantages (e.g., royalties) from the worldwide use of web links. Brightstar's mission was thus to look at existing technology with fresh eyes, and it created new companies worth £3.7bn over five years. BT aimed to create up to ten companies based on BT patents, which were filed at a rate of 1,500 a year.

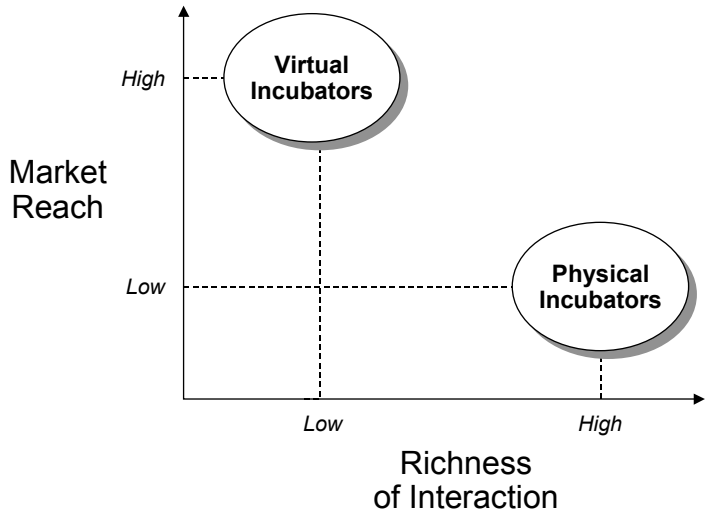
Brightstar encouraged its tenants to "think small, think fast and grow big" [14]. The incubator joined forces with 3i and Generics, two British venture capital groups. Although some ventures certainly supported the current core telecom business, many patents were used to start up companies outside BT's principal industry. BT expected to take about 30% of stock in each venture it created, with the rest being shared by outside investors and managers. By early 2000, 11 companies were being incubated at Brightstar and one had already graduated. In addition to Brightstar, BT entered a partnership with

IncuVest, a US company that specialised in turning corporate technology patents into stand-alone ventures. This put additional pressure on the internal incubator to do well.

7 Virtual incubators

In comparison with traditional incubators, virtual incubators offer no physical workspace or office support. Instead, they offer online access to a network of entrepreneurs, investors and advisors, as well as support to help match other entrepreneurial needs to professional advice (see Figure 4).

Figure 4 Virtual incubators differ from physical incubators in terms of market reach and interaction richness



Virtual incubators do not offer the positive effects of local synergy between similar start-up companies obtained through face-to-face networking and problem-solution sharing. Also, start-ups do not have a running start to their business life, with secretarial or infrastructure support. However, virtual incubators are able to offer a greater advisory network to their incubatees, better matching supply and demand of management and technical talent. This is often left to the initiative of the entrepreneur – the incubator merely provides the platform and the network.

We observed two functions of virtual incubators: online matchmaking and service aggregation. The online matchmaker provided a communication and news platform for entrepreneurs and start-ups, and organised conferences and seminars. Matchmakers also designed online learning groups around special interests, which included advice seeking from professionals as well as experience sharing among peers. Although there was little hands-on coaching from the incubator management, there was certainly a lot of exchange of advice and best practices within the start-up community.

Dedicated service aggregators offered access to professional services or, to some extent, provided them themselves. These services included accounting, access to venture capital, insurance and legal services, marketing and business plan creation support. The

revenues of virtual incubators were based on membership fees, service fees, grants, public support and corporate sponsorship. In summary, however, few virtual incubators really exploited the power of network economics. This type of incubation support was considered to be useful for very early stage start-ups and/or businesses that relied heavily on information technologies.

Venturix: matching talent and capital

Venturix was a Swiss incubator offering management advice, venture capital, access to potential customers and suppliers, news, chat rooms and e-learning capabilities on a B2B matching platform. Founded in September 2000, as a virtual accelerator, Venturix targeted entrepreneurs who needed start-up support without delay. Business ideas and requests could be submitted online, and an experienced team would respond within 48 hours. This team provided a reality check, i.e. initial due diligence, advice on business planning, presentation support, and investment and negotiation connections. An online tool called i-hub served as a guide to match talent, start-ups and capital so that the probability of alignment was as high as possible before there were substantial commitments in resources and time.

Venturix also offered executive search support and helped with putting together entire start-up teams. Based on a network of local experts, the incubator was able to supply talent quickly and locally. Upon request, some of the 24 Venturix employees were also dispatched temporarily to start-ups. In return, Venturix took equity and cash from its incubatees according to a predetermined scheme. After the start-up market became tighter, Venturix receded somewhat from its coaching and matchmaking support, and focused on venture capital intermediation.

8 Managerial implications for the incubator business model

Incubators are in the business of facilitating the creation and growth of start-up companies. However, there is no single measure of success. Is it the number of start-ups or businesses graduating from an incubator within a given time frame? Is it the number of jobs created in a given community? Is it return on invested capital after a given number of years? The incubators in our study sample created many beneficial side effects that had not been anticipated initially, such as regional attraction, brand recognition and redevelopment of parent strategy. The expectations for an incubator should not be exclusively financial, nor should they be short-term, since the true potential of a successfully graduating start-up is realised only many years after its creation. Any incubator business model must be designed for the long-term, matching a particular competitive advantage with the chosen strategic objective. Whether for profit or not, incubators should be run like a business.

Based on our generic business model (see Figure 3), we reviewed the processes and tools of the investigated incubators. The following practices were considered extremely valuable and effective for good incubator management (see also [7]):

1 *Incubation Charter*: A clear and well-communicated vision statement helped entrepreneurs and investors to identify the 'right' incubators. Entrepreneurs compared their expectations and needs with the incubator's charter and evaluated how much they would benefit from joining this incubator. Investors who were trying to diversify risk in their investment portfolio used the charter as a guideline to which industries and markets the incubator intended to invest its money in. Furthermore, the incubator team itself reviewed the charter regularly to make sure that its own selection and filtering of incoming entrepreneurs were still in accordance with the incubator's strategic objectives. Commercial incubators in particular had been tempted to 'go with the money.'

2 *Day-to-day management*: The great advantage of incubators over venture capitalists and business angels was daily presence and hands-on coaching. Incubator coaches were able to take the pulse of their start-ups every day. Since the coaches were better and more immediately informed about the events affecting the course of a start-up, they could act quickly and in the best interests of the entrepreneur. Of course, continuous supervision came at a higher cost. Successful incubators thus tried to impose graduation policies, focus on a few start-ups at a time and maintain low overhead costs. The management of internal or residual risk (risk remaining after the filtering of inappropriate start-ups) was the key to providing real added value for start-ups.

3 *Optimising leverage*: Incubators provided not only capital and coaching but also technological and market expertise and network access. IT specialists make poor biotech coaches, and vice versa. The incubator's focus on competitive scope significantly expedited the learning of a start-up by providing access to important industry experience and know-how that could only be accumulated over time. Since expertise and network access depended on the quality of each individual incubator coach, the proper recruiting, selection and retention of these incubator managers was a critical element of every well-run incubator.

4 *Optimising synergy*: Entrepreneurs did not exclusively depend on the support of incubator managers, they also coached themselves. Provided that start-ups had been appropriately selected, their teams were able to learn from one another's experiences and even reuse some of the tools developed for previous start-ups. We observed some incubatees specialise in critical start-up functions, such as secretarial services or start-up coaching. Also, some incubators selected start-ups so that they formed closely linked value-generation chains: A given start-up was a supplier to another start-up in the same incubator. Such incubators acted as industriators, creating interdependent companies that reached critical business mass more quickly than independent ones.

These four practices, in conjunction with a long-term commitment to incubation by the key investors, formed the basis for successful business models in the incubators we studied. A clear competitive focus with a clear added value to entrepreneurial customers and investors allowed an effective business model to be implemented. The more clearly an incubator defined the incoming entrepreneur profile, the better the incubator was able to leverage its given competencies as well as create potential synergy effects among already resident start-ups. Conversely, incubators with relatively open start-up acceptance

policies were less exposed to particular industry or technology risks and more flexible to accept particularly promising ventures.

9 Evolving forms of incubation

The way incubators have helped entrepreneurs has changed over the past 50 years and it is likely to adapt to future conditions. Within the framework of the five archetypical forms of incubation, a few specific challenges and opportunities stand out.

With their reliance on private venture capital, independent commercial incubators are the most exposed to the upturns and downturns in the economy. Only incubators that can orchestrate a variety of different sources of funding and revenues will be able to survive long term. Regional business incubators may have the best incubation potential because of long-term commitment from the local community, but they are often constrained by local politics. University-based incubators will only be able to develop a more viable business model if their parent universities redesign their occasionally antiquated attitudes and embrace technology commercialisation as a third form of knowledge transfer to society. Perhaps they could also exploit their geographical scope to greater advantage. Virtual incubators lack the ability to provide direct and hands-on coaching, which eliminates a splendid opportunity to charge fees for much-needed profits. Corporate-internal incubators may have the power to redefine the role of corporate R&D. Perhaps the future of industrial innovation will be based on more decentralised and applied R&D within business units, with ad hoc incubation teams taking on high-risk ventures in specialised corporate incubation facilities.

Although most of the incubators investigated fit nicely with one of the proposed archetypes, we detected some incubators that exhibited characteristics of two or more archetypes. Virtual incubation services seemed to be particularly attractive to add to an already existing incubator. A number of independent commercial incubators established right-of-first-refusal agreements with universities, which essentially turned them into preferred university start-up incubators.

What are potential future forms of incubation? We observed three trends that affect the evolution of incubators:

1 hybrid forms of incubation
2 joint venture incubators
3 incubator break-up.

Some incubators pursued *hybrid* forms of incubation. Public-mission incubators often combined public business promoters and private companies or other private institutions such as foundations or business associations (in a 1999 survey, Thierstein and Wilhelm [15] found 43% of all studied incubators and innovation centres in Switzerland originated from a joint public-private effort). But primarily profit-oriented incubators were also hybrid, for instance the Austrian Blue-C, which for a while combined consulting and IT services to support an incubator, or the British NewMedia Spark incubator, which primarily acted as a venture capital company. Hybrid incubators had the potential to be quite successful if the niche was carefully chosen – otherwise, the combination of seemingly attractive opportunities diluted the effort and base of competitive advantage of incubation.

Another evolving model we observed was the *joint venture* between two organisations that together provided the necessary incubator services. A natural line of differentiation was real estate and infrastructure operations versus management coaching and professional services. Venture funding was often shared. Although the principal advantage was the combination of excellent skills and resources rarely found in a single incubation provider, there were some caveats. As in traditional joint ventures, strategic objectives diverged and the commitment of the partners abated once their respective goals had been achieved. Conflicts of interest occurred particularly in later stages, when partners fought over preferred service rights or follow-up funding decisions. Power struggles between partners over successful ventures led to the failure of more than one joint venture. Anything that made the incubation environment unstable distracted the start-up from its ultimate goal to achieve success (the matrix management argument). Also, since most incubation coaching and management services were provided from off-site, the quality of day-to-day incubation suffered.

A number of firms in the legal, accounting and consultancy businesses entered joint ventures with technoparks and other independent or governmental research laboratories. This incubation business model was only sustainable and viable if the partners were closely collocated and the competitive advantages were complementary. In one case in the study sample, for instance, a consulting company incubated start-ups with the help of a science park more than a hundred kilometres away. The cooperation was marked by uncertainty among the start-ups and power struggles between the two partners.

Finally, we also observed a number of for-profit incubators *breaking up* their incubation services into two separate businesses: one focusing on running the real estate business, and one concentrating on providing venture capital. The real-estate business focused on breaking even through rent and infrastructure utilisation fees, while the venture capital business was organised very much like any other independent venture capital firm. Neither business made a major contribution in terms of venture coaching, so the incubator as a whole had to find external coaches and service providers who provided day-to-day support to their entrepreneurs on a contractual basis.

10 Conclusions

Any business model of incubation is doomed to fail if the execution is poor. Whether for profit or not, incubators should be run like a business. The greatest temptation for incubators is to invest in promising projects without being able to offer real added value. Another jeopardy is over-investment in infrastructure that is never needed, excess overheads and high operating expenses. Most commercial incubators are start-ups themselves, hence they are likely to make mistakes. Only those that are able to learn from their mistakes and adapt quickly will succeed. The most trivial hazards can be avoided by following four fundamental best practices of incubation:

1 Introduce an ‘incubation charter,’ which defines an investment portfolio and serves as a guideline for selection and investment practices.

2 Focus on day-to-day management: manage residual risk by coaching and hands-on start-up support.

3 Optimise leverage by ensuring that start-ups benefit from the incubator's industry expertise and network access as well as the specific skills of the incubation team.

4 Optimise synergy, including mutual coaching and cross-holdings among start-ups, and the creation of internal value chains (*industriation*).

The goal of this contribution was to cast some light on the differences and similarities between incubators. Firstly, we offered a definition of the term 'incubator,' identifying five central characteristics that most incubators share. We also suggested a categorisation of five incubator archetypes: independent commercial, regional business, university, company-internal and virtual incubators. These categories were based on analysis of the competitive scope and strategic objective of incubators and their parent organisations. We also introduced a generic business model of incubation and used it to describe some of the specifics of the five archetypes.

The future of incubation rests on the readiness of sponsoring organisations (either for profit or not-for-profit) to support their incubation vehicles in the long term. Therefore, incubators that are attached to other businesses or institutions that support them until they eventually generate proceeds from earlier start-up investments may have a natural advantage. This may be bad news for independent commercial incubators. Although we are aware that incubation business models continue to evolve, we hope that this contribution has clarified some of the confusion about incubation and presented some potential for mutual learning among different types of incubators. Certainly, research on incubation is in an early stage, and more insight is needed not only into a sustainable business model of incubation but also into the linkage between incubators – as industriators, educators or mediators – and their environment.

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