



# University Spin-Off Companies

a Saskatchewan-Manitoba success story

*The Report*

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A report from an economic impact study commissioned by the Prairie Intellectual Property Management Network  
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## Preamble

The writer of this report would like to thank all of the participants for taking time to respond to the survey and provide feedback. The success of this report is due to the contributions of the participants. The writer of this report would like to thank the Survey Steering Committee members for completing the survey planning and implementation process in a short frame of time.

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## **Executive Summary**

“Talented, skilled, creative people are the most critical element of a successful national economy over the long term.” – *Mobilizing Science and Technology to Canada’s Advantage* (2007)

Manitoba and Saskatchewan’s academic institutions generate both high-quality research and skilled, knowledgeable personnel, both of which contribute positively to the local and national economies. These institutions have also been linked to the creation of spin-off companies that are credited with both job and wealth creation. This report summarizes the impact of spin-off companies associated with these institutions.

This study was commissioned by the Prairie Intellectual Property Mobilization (IPM) Network, a collective of Technology Transfer and Industry Liaison Offices from academic institutions based in both Manitoba and Saskatchewan. The report distinguishes between spin-off companies (those that have linkages to particular institutions via various means) and a subset of that category, start-up companies (those that have intellectual property agreements with Prairie institutions). Company lists were provided by the Partner organizations with a total of 78 spin-off companies identified. Since some of the Partner institutions have only begun tracking company creation recently, it is probable that a proportion of the potential survey population was omitted.

Note that for the purposes of this report, "Prairie" refers to the provinces of Manitoba and Saskatchewan only, and academic institutions, companies and industries located within these two provinces. A listing of the institutions can be found in the introduction. Information about other locations is described as appropriate.

Of the 78 companies identified, 53 have survived (were active and operational) to the time of survey (March 2008). These 53 companies have generated 3,652 jobs, with 91% of these jobs located in the Prairie Provinces. The largest company in the portfolio has 850 staff members in two Canadian locations.

The Prairie institutions described in this study collectively average 2.2 company starts per year. However, the number of companies formed annually has tapered off in recent years, possibly due to the slowdown in the venture capital industry. This mirrors trends seen by academic institutions in both Canada and the United States.

These companies face tremendous challenges in sourcing financing. The funding gap for Prairie companies is large and growing due to the concentration of early-stage investment in British Columbia, Ontario and Quebec. Despite this challenge, 78% of the surviving spin-off companies have set up operations close to their source institutions, facilitating effective public-private research collaborations and delivering economic impacts directly to the region.

The survey results suggest that spin-off company survival rate is independent of technology type, indicating that the key driver of spin-off company success is people (specifically, the management team). The presence of a serial entrepreneur can have a substantial impact not only in terms of strategy

implementation, but also on securing venture financing. 38% of respondent companies indicated that their management teams included the participation of a serial entrepreneur.

The companies surveyed range from mature companies to fledgling firms, with both public and private companies in the portfolio. 18% of the spin-off companies are publicly traded, with a collective market capitalization of \$6.9 billion.<sup>1</sup> In 2007, a small proportion of public companies held share offerings, raising \$16.7 million. In addition, a small proportion of privately held companies reported private investment of \$31.5 million, increasing the total amount of funds raised in 2007 to \$48.2 million. When you consider that 78% of companies are retained, this translates to a significant investment in the Prairie Provinces.

When company creation activities are compared with other Western Canadian academic institutions, the Prairie institutions have been wildly successful. The proportion of inventions suitable for company creation activities is small (on an annual basis). However, the economic impact of spin-off companies suggests that supporting this technology development option is an important part of any university's technology transfer portfolio. Not only do these companies act as receptors for locally developed technologies, they also act as employers for highly qualified personnel and produce entrepreneurs that can go forward to build next-generation companies.

“[P]eople—more than the technology or institutions . . . are most crucial to the region's success.” –  
*Milken Institute: America's Biotech and Life Science Clusters San Diego's Position and Economic Contributions*

The advanced technology companies sourced from universities have the potential to be key drivers of the growing knowledge-based economy. University spin-off companies stay close to home and thereby provide significant long-term contributions to the development of sustainable regional economies. These clusters of technology companies create highly skilled jobs, invest in ongoing university research, purchase services from other local companies, and reinvest in the community.

## **Part I: Introduction**

The Prairie Intellectual Property Mobilization (IPM) Network was established in 2007 and encompasses institutions in both Manitoba and Saskatchewan. The Network is designed to facilitate cooperation between the institutions and to accelerate the transfer of knowledge and the development of new technologies to the commercialization stage. The Prairie IPM Network is expected to open up new licensing opportunities by allowing technologies to be bundled together and by facilitating research collaboration among the partner institutions. In addition, the Network will aid in the sharing of best practices and generate cooperative activities, such as technology fairs to highlight innovation.

Showcasing technologies and their successful commercialization is essential to demonstrating the outcomes of publicly funded research. University-developed technologies can enter the marketplace through a variety of mechanisms, such as direct license or purchase by established organizations, or the creation of new companies to complete the innovation process. These spin-off companies can have a significant impact on the national and local economies and on the originating institution through job creation and research and development relationships.

### **Prairie IPM Network Members:**

Brandon University  
CancerCare Manitoba  
Health Sciences Centre (Winnipeg)  
Red River College  
St. Boniface General Hospital  
University of Manitoba  
University of Regina  
University of Saskatchewan  
University of Winnipeg

### **History of the IPM Network**

In September of 2005, the Government of Canada awarded the University of Manitoba-led ‘*Manitoba IPM Partnership*’ \$1.2 million to strengthen regional collaboration and accelerate the transfer of knowledge and new technology developed in Manitoba universities, hospitals and colleges.

In 2007, the province-wide partnership expanded into Saskatchewan, the first time that a Canadian intellectual property partnership has reached across provincial borders. Renamed the ‘*Prairie IPM Network*’, the University of Manitoba-led collaboration added the University of Saskatchewan and the University of Regina. The expansion was made possible by an additional \$300,000 in funding.

For the purposes of this report and the affiliated survey, the term *spin-off company* is defined as an incorporated commercial entity that is formed either:

- as a result of technologies and/or know-how developed (or derived) at an academic institution,
- to further develop technologies at an academic institution by providing funding, or
- to provide a service: either new, or one that was originally offered by a department within the academic institution.

The preceding definition does not presuppose any legal or financial arrangements between the academic institution and the commercial entity regarding intellectual property. Spin-off company creation models include creation of a new company, modification of an existing company, or bundling existing companies to create a more commercially viable entity.

A small subset of spin-off companies are called *start-up companies*, which are companies based upon licensed or assigned intellectual property from their institution. These companies may have been incubated in-house or have received company creation support from their host academic institution.

These definitions are analogous to those in use by Statistics Canada for the purposes of the Survey of Intellectual Property Commercialization in the Higher Education Sector.

## **Survey Population and Process**

Each of the partner institutions has their own unique definition of spin-offs and start-ups, which results in variations to their internal lists of companies and those included in this report based upon the preceding definition. Some of the institutions have second generation spin-off companies, that is, companies that have been spawned by the original spin-off companies. In some instances they were created through partnerships between the institution and the first generation spin-off, and therefore have been included in this report. In other instances these second generation companies are not directly linked to the university and therefore are not included in the report.

The University of Saskatchewan's spin-off companies have been successful enough to spawn seven second generation spin-off companies, six of which are still active. It is possible that both the Universities of Manitoba and Regina partners also have second generation spin-off companies, however, none were identified during the survey process. The University of Saskatchewan's knowledge of spin-off companies begins in 1972, but the University of Manitoba only began tracking companies in 1984 and the University of Regina in 2004. Their collective knowledge of companies before those periods and even since those dates is limited to those companies that have self-identified as spin-offs or have been brought to the institution's attention by other means.

Company lists were provided by the Partner organizations with a total of 78 spin-off companies identified. Since some of the Partner institutions have only begun tracking company creation recently, it is probable that a proportion of the potential survey population was omitted.

The purpose of surveying the Prairie IPM Network spin-off company activity was to collect baseline data to assess the current and future economic impacts that spin-off companies have on the Prairie region. The Network engaged an independent contractor to carry out the survey and data analysis process. The contractor received both company and institutional information on a confidential basis with permission to present aggregate figures.

Email invitations to the online survey were sent, with follow up telephone surveys carried out as appropriate. The survey was conducted between March 18 and May 2, 2008, with data relevant to respondent companies' fiscal year 2007. In an effort to encourage participation, completing respondents were included in a draw for a \$200 Future Shop gift card.

53 'live' companies (of the total population of 78) were eligible to complete the survey (companies were early-stage, active or merged/acquired<sup>2</sup>). 26 (51%)<sup>3</sup> eligible companies responded to the survey. In addition, those companies identified as closed or inactive (25) were contacted to confirm current status and to obtain historical information if appropriate respondent personnel were identified. The information presented in this report is based on the completed responses from 26 companies, plus internal and public

information available on the remaining 27 companies. Companies that are operationally inactive or closed are not included in the survey results, unless otherwise noted.

## Company Creation Pipeline

The early-stage companies eligible for participation in this survey had to at least be incorporated to be considered for inclusion. Each of the Network institutions is currently assessing the suitability of several technologies for company creation activities. The box at right indicates the number of potential companies in their respective pipelines at the time of writing this report. These conceptual start-up companies will only be formed if the required criteria are met in each respective institution/incubator program.

### Start-up Pipeline

Manitoba Cluster – 3  
U of Regina – 2  
U of Saskatchewan - 2

## The Prairie IPM Network Institutions

The survey focussed on spin-off companies arising from institutions involved in the Prairie IPM Network. It is important to note that this cluster of institutions utilize widely different intellectual property (IP) management models. It does not appear that the variance in IP models has an impact on spin-off company success factors. These models of intellectual property ownership vary from 100% inventor-owned to 100% institution-owned. Ownership and revenue sharing are mutually exclusive and range from equal shares in revenues (about 50% inventor and 50% institution) to scenarios that are negotiated *ad hoc*. In most cases both ownership and revenue sharing relevant to developed technology are laid out in the respective faculty's collective agreements.

Company creation support models also vary widely, with the University of Saskatchewan taking an internal approach (in-house company creation support personnel) and all other institutions utilizing an external approach (company creation support provided by an affiliated external incubator). It is impossible to determine within the confines of this survey which approach is superior, as both models have their advantages and disadvantages. The methods of each institution are described in the rest of this section.

### **Manitoba IPM Cluster**

The University of Manitoba's Technology Transfer Office (TTO) provides an array of intellectual asset management services to the university community and the people of Manitoba.<sup>4</sup> The TTO, part of the portfolio of U of M's Office of the Vice President Research, is the lead organization for the Prairie IPM Network and provides intellectual property management and out-licensing services to the seven Manitoba institutions.

Ownership of inventions at the University of Manitoba is split 50:50 between the university and the inventor when IP is created in the course of activities that include substantial use of university assets. The inventor has the sole right to pursue commercialization or allow public free use of the invention. The U of M intends to enter into inter-institutional agreements for each technology that it manages on behalf of

the Manitoba IPM Partners, in which the IP ownership and revenue sharing arrangements will be defined on a case by case basis.

When the TTO identifies a technology that is deemed suitable for company creation, they facilitate the creation of start-up companies by liaising directly with the eureka project, SmartPark's business incubator (described below). In the event that technologies from the Manitoba Partner organizations have company creation potential, each situation will be handled on a case by case basis, with U of M taking care of the technology licensing and protection elements and liaising with the eureka project where necessary.

***the eureka project: SmartPark's Incubator***

SmartPark Development Corporation is a wholly owned subsidiary corporation of the University of Manitoba with a mandate to develop a research and technology park adjacent to the U of M. In early 2007, SmartPark created a strategic business unit, the eureka project to deliver management support to technology-based new ventures. (An earlier model of incubator had been housed at SmartPark, but ceased operation in 2006.) The eureka project's mission is "to create and provide a superior incubator experience and facility founded on participation of SmartPark's business community and on the doorstep of The University of Manitoba."<sup>5</sup>

The incubator is focussed on supporting companies in the information technology, communications, biotechnology, advanced materials and agri-food sectors. By focussing on these areas, the incubator aims to build clusters of expertise to support the growth of these types of businesses. Companies must apply to participate in the incubator to ensure the most effective use of assets. Since its establishment in January 2007, the incubator has been involved in the mentoring of 12 companies, three of whom are poised to graduate from the incubator in the near future.

After completing a pre-screening process (which includes business plan and prototype development, as well as evaluation by an Admissions Committee) entrepreneurs are partnered with a group of volunteer business mentors with a variety of backgrounds and areas of expertise to assist them in advancing their business. The incubator provides support in the areas of strategic planning, market penetration and financing. It also provides turnkey offices with subsidized rental fees and information technology support.

The not-for-profit incubator is mainly financed through government grants. A small proportion of revenue is sourced from client rents. As clients move through the mentoring process and meet business milestones, their rent gradually increases toward market rates. The program also has several corporate sponsors who provide either cash or in-kind support to run the incubator and provide services to clients. The average client is expected to exit the incubator three years after entrance, effectively graduating from the program into independent space. Gary Brownstone, the Director of the eureka project, says, "[The eureka project is] focussed on working with new ventures to turn IP into successful, revenue-generating companies. Our key strength is our 'dating service' approach to create appropriate linkages between early-stage companies and the services or mentoring they need. I think that our entrepreneurs appreciate that we help them identify the gaps in their businesses and figure out how to fill them."

In its first 16 months of operation, the incubator has supported the creation of 70 high-end jobs. Five companies are presently seeking financing so that they can enter rapid growth phases over the next 3 to 4 years. The incubator space is currently fully occupied so the program is seeking ways to provide 'virtual

incubation' services to companies that are physically housed elsewhere. This would include creating mentor networks and business coaching services that are part of the core eureka project offerings.

### **University of Regina**

The University of Regina's University Industry Liaison Office (UILO) is part of the portfolio of U of R's Vice President Research and International (VPRI). The UILO was created in 2001 as a joint initiative between the City of Regina and the university. They offer a full range of intellectual asset protection and commercialization management services for faculty members, students, and the university community. The UILO works with individuals to develop their intellectual property by creating commercial objectives, coordinating patents, developing commercialization strategies, and regularly reviewing commercialization plans to monitor progress.

Services include intellectual property and market assessments, patent registration (Canadian, U.S., and International) and maintenance, trademarks and copyrights. Individuals can also access professional and in-depth research databases via the UILO to assess both technology development opportunities and competitive threats. The UILO works with faculty and staff to facilitate internal and external funding opportunities in a variety of ways, including liaising with funding partners and industry sponsors on behalf of researchers to expedite agreements and coordinate special communication events such as technology fairs.

The UILO evaluates the patentability and commercial potential of university technology. If a decision to file a patent is made, they will draft and prosecute the patent applications and manage the patenting process to ensure the greatest commercial opportunity is achieved. In most cases the UILO will front all costs associated with Intellectual Property protection until the invention is commercialized and revenue is generated. Intellectual property created by an academic staff member at the University of Regina is owned by the inventor. If the inventor and the university decide to pursue commercialization, the rights to the technology are assigned to the university. Revenues received from commercialization are shared between the inventors and the university in a ratio determined on a case-by-case basis.

When appropriate, the UILO will work to identify commercial partners and licensing opportunities to move university-generated inventions to market. The UILO, through their strategic alliance with SpringBoard West Innovations Inc., engages in proactive facilitation of start-up companies based on University of Regina technology. The university is committed to supporting entrepreneurial efforts as part of its mission to bring technology to market for the benefit of society.

### ***Springboard West Innovations Inc.***

SpringBoard West Innovations Inc. (SBWI) is a non-profit organization that was established to help accelerate the transformation of ideas into commercial reality. SBWI was established in July 2007 and made possible by funding from the Provincial Government through Saskatchewan Industry and Resources, and the Federal Government through Western Economic Partnership Agreement funds from Western Economic Diversification. There were many 'champions' of this cause throughout the province who provided letters of support. Local stakeholders worked diligently to determine the feasibility of such an offering, then on the development of the business case and funding proposal.

SBWI assists clients by facilitating access to programs and services related to commercialization. Their team of 'innovation experts' help entrepreneurs navigate the complex issues related to new ventures by acting as advisors, mentors and coaches. SBWI works exclusively with technology-based innovations

and has a wide array of clients at the time of this writing. The technologies come from industries as diverse as software to alternative energy, and complex electro-mechanical devices to ingenious value-added tools.

Protecting intellectual property is a cornerstone activity for any technology-based innovation. SBWI works with research institutions to enhance their services and help our mutual clients adhere to the IP policies of their institutions. Collaboration is one of the critical success factors for both organizations.

Entrepreneurs can access SBWI's programming by presenting their business concept during an intake interview. If the company's goals and needs match SBWI's mandate, they proceed to a diagnostic phase, where the company is guided towards the development of a work plan to move the company closer to market realization. This might include preliminary coaching regarding market research, competitive analysis, business planning, and product management and operations. Once a plan is in place, SBWI assists companies in solidifying and implementing key new venture ingredients: a commercialization strategy, a business model, a business plan, an operational work plan, and securing funding.

Once accepted into the program (at the diagnostic phase), services are rendered to clients on a cost-deferral basis. In addition to provision of services, SBWI has access to a small pool of "technology maturation funds" that can be used to develop prototypes and assess manufacturability and product design. As soon as clients achieve significant investment, SBWI expects repayment for all cash and in-kind investment.

SBWI also provides a range of educational programs that have been designed to address common deficiencies in new ventures: financial modelling, risk management in new businesses, improving sales techniques, and assembling an effective team.

In the first 12 months of operations, SBWI has reviewed over 55 projects and currently has over 20 active clients. In January 2009, SBWI will have incubation space in Regina for client companies. The rental cost of incubation space is yet to be determined.

### **University of Saskatchewan**

The University of Saskatchewan provides intellectual property management and support services through their internal Industry Liaison Office (ILO), which is part of the portfolio of the Office of the Vice President Research. The ILO office has a mandate "to build relationships, enable university research and translate resulting knowledge into practical use for the benefit of society, the university and inventors."

The University of Saskatchewan Collective Agreements and related Memoranda of Agreement dictates both intellectual property ownership and revenue sharing arrangements, which include 100% institution ownership of inventions and 50:50 institution:inventor revenue sharing of the same. Copyrighted works (such as computer programs) are exclusively held by faculty member authors and fall outside of the ILO's IP management mandate. Faculty could still choose to utilize the services of the ILO when copyrighted materials are developed, however, there have been no historical examples of this at the University of Saskatchewan.

In order to shift technologies past the conceptual stage, the U of S has a prototyping funding program called "Forge Ahead" that provides up to \$25,000 for short term projects that are targeted towards technology development and demonstration. The ILO staff will also assist inventors in applying for

prototyping funding from external agencies, such as NSERC's<sup>6</sup> Idea to Innovation and CIHR's<sup>7</sup> Proof of Principle programs, which provide larger sums of money to develop technologies in greater detail.

The ILO supports company creation through their internal Start-Up Company Program. The main purpose of this program is to “assist faculty, staff and student inventors to evaluate the feasibility of forming a start-up company and licensing their technology to that company in order to capture optimal value from the technology for the inventors, the university and the local and global economy.”<sup>8</sup>

The U of S defines a start-up company as “a company founded upon intellectual property created at the U of S with the intention of commercializing products and processes which derive from that intellectual property.” The ILO works jointly with the inventors to determine if a technology would be suitable for company creation and supports company creation by offering the following services:

- putting legal agreements in place to structure the new company,
- assisting in the preparation of the company's business plan,
- helping the company to find investors and negotiate the terms of financing,
- recruiting a management team,
- locating appropriate space for its initial operations, and
- incubation support to the new company including intellectual property, management, finding prototype development funds, and advice regarding Scientific Research and Experimental Development tax credits.

In contrast to the other Prairie IPM Partners, the University of Saskatchewan does not have an established incubator program. However they are currently refining a model for an incubator initiative and pursuing funding.

## **Part II: Prairie IPM Network 2008 Survey Results**

### ***PROFILE – SED Systems: From the Prairies to Outer Space***

SED Systems, incorporated in 1972, is the oldest company in the survey population. Its origins lie in 1965, when the University of Saskatchewan's Institute of Space and Atmospheric Sciences, set up a new group called the **Space Engineering Division** that was responsible for designing and building rocket instrumentation for upper atmospheric studies.

SED Systems has grown and evolved from a small internal division of the university with 5 employees to a leading developer of satellite, communications and defense technologies with over 275 employees and an annual sales volume of about \$60 million. Their customized 125,000-square-foot facility was built in 1987 at Innovation Place Research Park and includes an open-architecture manufacturing area that allows for flexible integration of new product lines.

SED's technology solutions have a global impact; their systems are deployed worldwide and operate on six continents. Some examples of their activities include: developing and manufacturing deep space antenna systems for the European Space Agency, testing the Canadarm-II (the International Space Station's robotic manipulator), management systems for XM Radio, and operations support for the Canadian Space Agency's RADARSAT-1 and -2.

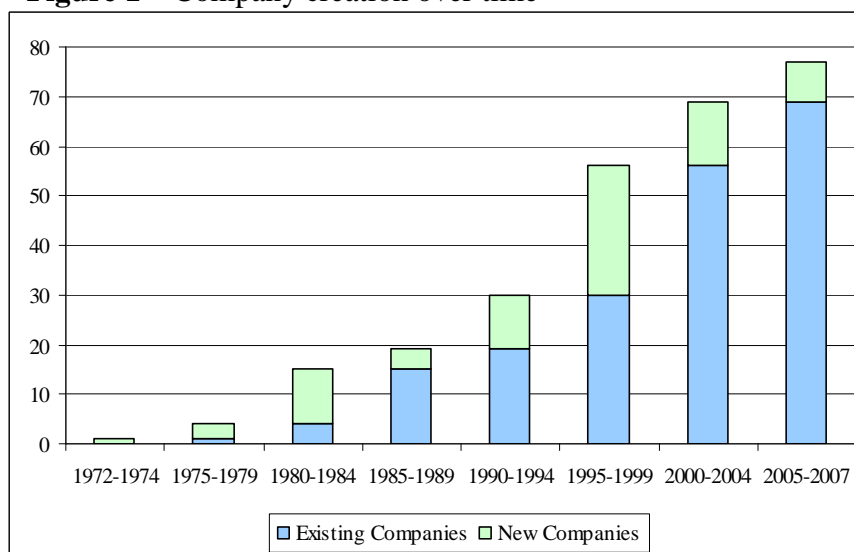
SED enjoys a close association with the University of Saskatchewan and views the university as a source of highly skilled workers. SED regularly engages students in internship, co-op and summer positions through partnerships with the University of Saskatchewan and Regina. SED Systems became a division of CALIAN Ltd., a wholly owned subsidiary of CALIAN Technologies Ltd. (TSX: CTY) in the late 1980s.

## Company Creation Trends

Over the past 36 years, the number of spin-off companies from the Prairie IPM Partner institutions has slowly grown to total 78. Of these companies, 53 have survived (are active and operational<sup>2</sup>) to the time of survey (March 2008). These “live” or “surviving” companies form the basis for survey data, unless otherwise noted. Figure 1 represents the growing number of companies over time and includes 77<sup>9</sup> spin-off companies (all company types: early-stage, active, merged/acquired, inactive, and closed).

The largest number of companies (33%) were created between 1995, the approximate start of the dot.com era, and 1999. About 64% of these companies are still active, which is a slightly lower survival rate than the total survey population (68%). While that era was characterized by an increase in information technology companies worldwide, only 15% of this sub-population falls into the IT sector (similar to the sector stratification of the total population). A bubble in company creation activity should warrant a higher failure rate, however this does not appear to be true.

**Figure 1 – Company creation over time**



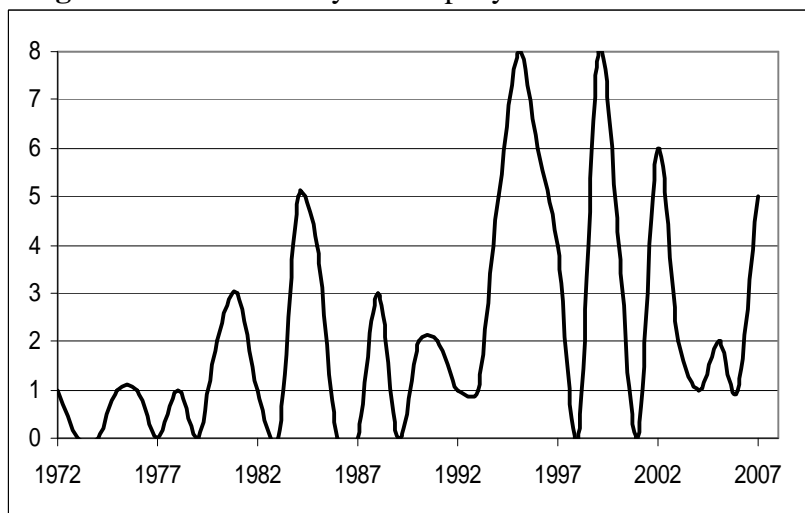
A 2003 Canadian Foundation for Innovation (CFI) study by Clayman analyzed survival rates for spin-off companies from five institutions (Alberta, Montréal, Sherbrooke, SFU and UBC), and found that the aggregate survival rate trended towards 67%. They concluded that survival over an initial short period (3 years) is predictive of long term survival rate.<sup>10</sup> This suggests that the formative years are critical ones for spin-off companies.

It is difficult to determine exactly what factors influenced the increased number of spin-off formations during the period 1995 to 1999. According to Macdonald & Associates, the years 1996 to 2004 were formative ones for the Canadian Venture Capital industry.<sup>11</sup> The early part of this period was characterized by an up-cycle in venture capital (VC) formation and investment, with the emergence of new seed, startup and early-stage funds. The availability of investment may have made the creation of new ventures more appealing, but was there more innovation in that period?

Company creation activity shows remarkable volatility from year to year (Figure 2). The average number of companies formed is 2.2; however the average by decade ranges from 1.8 in the 1980s, to 3.7 per year in the 1990s. The dot.com and VC up-cycle (1995-99) period had an average of 5.2 companies formed per year. Two of those years, 1995 and 1999, each saw eight new companies. This seems to suggest that there were more opportunities, or that marginal opportunities were able to find financing and move forward during that period.

It is most likely that the increase in company formation during the late 1990s is linked to the availability of funds. After the 2000 peak in North American venture activity, “early-stage activity tended to decline with the [rest of the venture] market.”<sup>11</sup> The average number of companies formed during the period 2000-07 is 2.6 per year. This follows the VC downtrend and mirrors the reduction in start-up company activity reported by other Canadian Universities.<sup>12</sup> The 2006 Association of University Technology Managers Canadian Licensing Survey suggests that the decline in the number

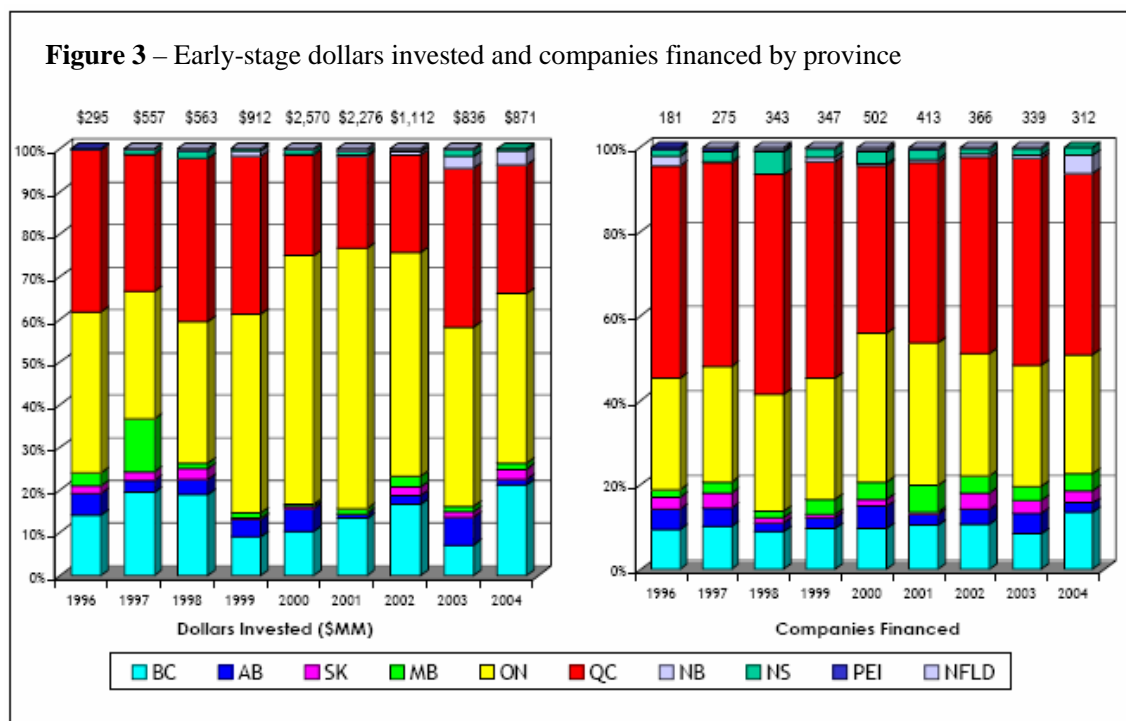
**Figure 2 – The volatility of company starts over time**



of new companies can also be linked to the creation of new funding programs that allow universities to incubate technologies in-house, such as NSERC’s Ideas to Innovation and CIHR’s Proof of Principle.<sup>13</sup> These programs should result in more fully developed technologies that have a greater probability of long term success and sustainability for company creation.

Since their inception, these programs have awarded \$54.1 million for technology development research to 509 projects (that is an average award of about \$106,000). Unfortunately, the Prairie institutions have had a very low participation rate in the programs, with only 1.2% of awards and 1.1% of funding. This is in comparison with UBC and the University of Alberta, which have captured 9.2% and 2.6% of awards, and 10.1% and 2.7% of funds, respectively. These figures do not reflect success rates, only proportional program participation.<sup>14</sup> As previously discussed, the Prairie institutions have small internal pools of funds for technology development (such as U of S’s Forge Ahead fund). However, technologies requiring significant capital investment, such as life science technologies, require more funds to achieve advances in technology development.

This limited access to federal technology development capital is similar to the availability of venture capital in the Prairies in general. Technology companies have typically faced challenges in raising capital to finance technology development. In some cases, this has necessitated the relocation of companies to other regions (British Columbia, Ontario, Quebec or the US) with better fund concentration. Figure 3 indicates that the majority of early-stage funding occurred in BC, Ontario and Quebec. “In fact, over this period, companies financed in these provinces represented . . . over 90% of total dollars invested.”<sup>11</sup>



Source: Macdonald & Associates Limited, 2005

During the VC up-cycle, several specialty early-stage funds were formed across Canada. Two of them set up branch offices in the Prairies and received funding from the provincial governments and a consortium of other public and private investors. Foragen Technologies Management was a \$42 million fund with an agriculture sector focus and Western Life Sciences Fund (WLSF) was worth \$43 million and targeted life sciences and pharmaceutical opportunities. Several of the Prairie IPM Partner spin-off companies received investment from either Foragen or WLSF. Both of these funds are currently fully invested and do not appear to be raising capital for second stage funds. Their inability to raise second generation dollars is more likely due to the VC down-cycle than to the success rate of the funds themselves. To elaborate, Foragen was part of RBC Technology Ventures’ family of boutique seed-stage funds, all of which are fully invested and/or closed. One fund, Milestone Medica (which had a life sciences focus), was able to raise second generation capital by moving to the United States and merging with another fund to become VIMAC Milestone Medica. RBC Technology Ventures itself appears to have reorganized and no longer exists in its original form.

The current contraction in available venture capital dollars has created a “backlog of fledgling firms in Canadian VC portfolios ... as firms have focussed on survival strategies for companies financed during the boom years.”<sup>11</sup> This conservation of funds has further compacted the available seed dollars for financing new companies and widened the funding gap for early-stage companies.

Currently, Manitoba and Saskatchewan have very different investment climates and funding gaps. In Manitoba, companies seem to be able to obtain their first financing through angels, other local government and non-governmental bridge funding ventures, as well as debt financing, but second stage dollars (\$1 to \$5 million) are less accessible. In Saskatchewan, the opposite is true, with the first \$1 million difficult to source and the follow-on funding easier to identify.<sup>15</sup>

## Trends: Start-up Companies

It is important to note that the Prairie IPM Partners have only recently begun formalized tracking of spin-off company creation: the U of S in 1972, the U of M in 1984, and the U of R in 2004. In addition, their collective knowledge of companies created before and even since those dates is limited to those that have self-identified as spin-off companies or have been brought to the institution's attention by other means. It is probable that some companies that should have been included in the study were omitted. Inferences from the data are based on population sampling and are therefore generalizations.

Within the pool of spin-off companies there is a subset of companies this report refers to as “start-up companies.” These start-ups, unlike other spin-offs, have formalized intellectual property arrangements with their source institutions, and in many cases have received mentoring or other support during their creation phases. As the technology transfer/industry liaison offices have matured, they have become better able to support company creation activity, or identify appropriate non-university partners that can.

Each office has a different set of metrics used to determine what technologies constitute a potential company creation opportunity. In general, the key elements include:

- a platform-type technology (multiple application/multiple product potential),
- an entrepreneurial-inclined company creation champion (sometimes the inventor),
- a solid market,
- a patentable position, and
- a reasonable expectation of financing success.

In some cases, start-up formation is the only opportunity for commercializing a particular technology because there are no licensing receptors available. The perfect convergence of events happens rarely. Therefore the best opportunities move forward with variable risk potential. Of the 78 spin-off companies included in this study, the Prairie IPM Partners recognize 33 as start-up companies.

## Operational Status

As previously discussed, this report pools information for companies that are deemed to be “*live*” or have “*survived*.” This compiles the number of companies that are early-stage, active, or are merged or acquired. The types of operational status are defined as follows:

An **Early-Stage** company is one that is incorporated, but is still in development, i.e. “getting ready for business.” Activities might include sourcing partnerships, financing, pursuing technology development, or finding a management team and appropriate facilities.

An **Active** company is one that is incorporated, is located in an appropriate private or rented facility (i.e. an incubator) and has at least one of the following in place: a management team or a financing/revenue stream. This type of company is “poised for growth” and has completed the company creation stage.

A **Merged or Acquired** company is one that was purchased in whole or in part by another company and is no longer actively pursuing business as an independent entity. For the purposes of this survey, data from merged or acquired companies is not included in the analysis unless the original entity is a separate sub-division from the parent organization and information on the division or branch office could be collected.

An **Inactive** company is one that is not legally disbanded yet, but is not actively pursuing business activities. A **Closed** company is one that is legally disbanded and is not pursuing business activities. There are rare instances where an inactive company will transition back to active status.

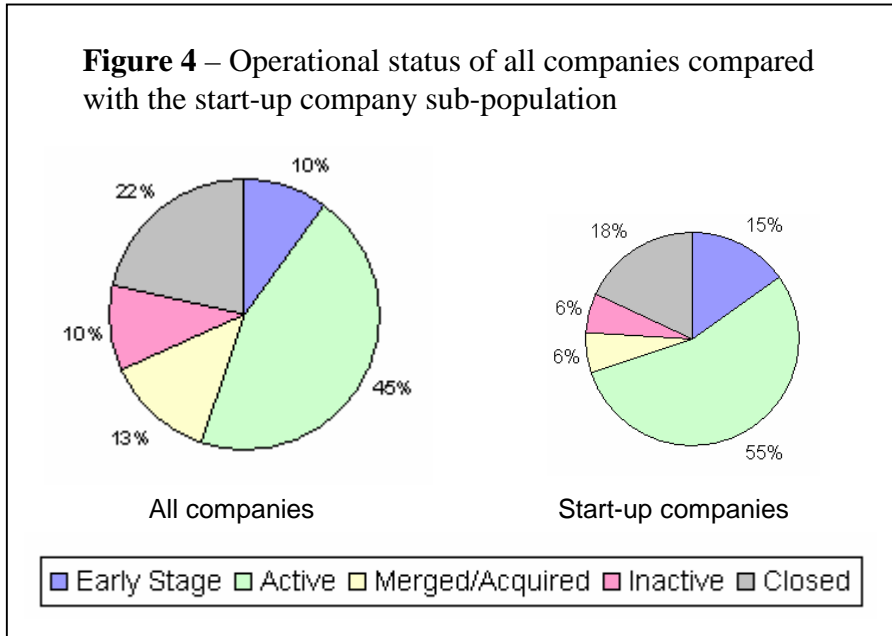


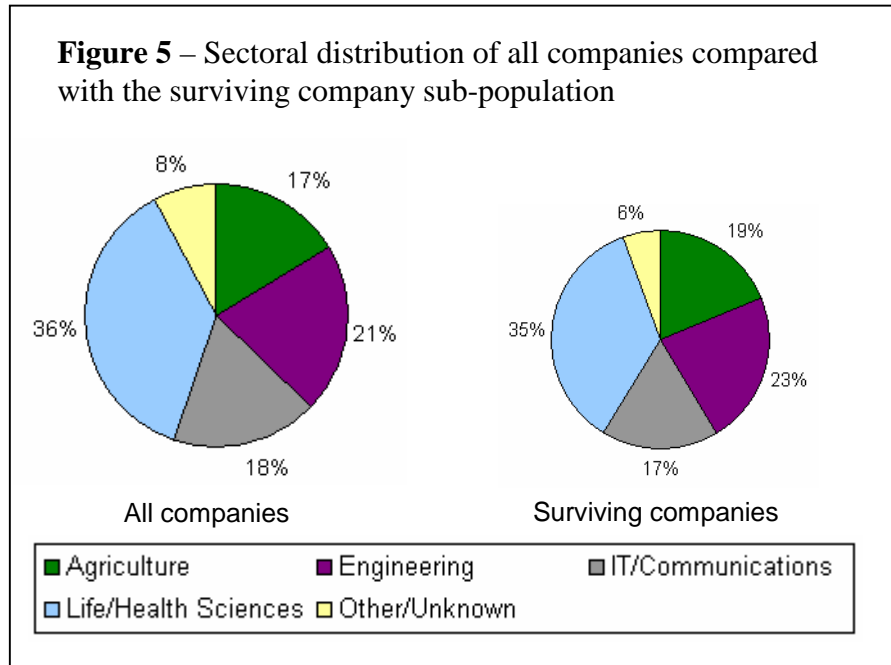
Figure 4 indicates the breakdown of companies by operational status for all companies on the left, and the sub-population of start-up companies on the right. This sub-population appears to have a slightly higher success rate, at 76%, compared with the entire pool of spin-off companies at 68%. Their improved rate of success could be due to the increased level of pre-formation due diligence that occurs prior to company creation by the university. In addition, the ability of a university to front intellectual property protection and other costs gives these companies a cash burn advantage over other new ventures. This conservation of early-stage cash and the provision of advisory services seems to help companies thrive over the long-term.

## Sector Distribution

Of the spin-off companies, 68% are functioning and providing employment and financial returns to the Prairie economy. The companies have been grouped according to whether they are in the following technology sectors: agriculture, engineering, information technology and communications, or life and health sciences. Results are pooled for 'other' surveyed sectors.

Figure 5 indicates that the sectoral profile of all companies is analogous to the profile of the surviving companies, suggesting that survival rate is independent

of technology type. The core facets of company creation include technology, business opportunity, markets and management team. Business and market opportunity are quite often integrally linked to the technology itself. Therefore the only truly technology-independent factor is people (i.e. the management team leading the spin-off company).



Attracting venture capital can be directly correlated to the personnel involved. As stated by John T. Preston<sup>16</sup>, “I would rather have a first-rate management team with average technology, than a first-rate technology with a second-rate management team.” This sentiment is echoed frequently by other venture capital investors and technology managers. Human factors drive investment and technology development by bringing key knowledge to a new venture. Companies formed with teams of entrepreneurs with complementary skills, or an entrepreneur open to advice from mentors who have essential skills, will have a greater probability of success. “If a technologist partners with someone who knows the capital markets and another person who knows how to market technology-based products, the [entrepreneurial] team of three will have a much higher probability of success than the solitary technologist trying to start a company on his or her own.”<sup>17</sup>

While clusters of knowledge are essential to success, another driver can be the presence of a serial entrepreneur. A serial entrepreneur is an individual who has a track record of participating in successful ventures. These individuals impart a higher probability of success to their subsequent entrepreneurial activities. According to Gompers, “entrepreneurs who succeeded in a prior venture . . . have a 30% chance of succeeding in their next venture. By contrast, first-time entrepreneurs have only an 18% chance of succeeding and entrepreneurs who previously failed have a 20% chance of succeeding. This performance persistence suggests that a component of success in entrepreneurship is attributable to skill.”<sup>18</sup> Gompers also found that venture capital investors are more likely to invest in an entrepreneur from a previously failed venture, than a first-time entrepreneur, likely because they are able to judge whether the failure was due to personal performance factors.

Building a population of knowledgeable technology managers appears to be a critical factor in developing clusters of technology companies. Both Manitoba and Saskatchewan have fledgling clusters of technology industries and small populations of serial entrepreneurs. In fact, 38% of the respondent companies indicated that their current management team includes the participation of a serial entrepreneur. While not on the scale of Silicon Valley or San Diego's biotech cluster, serial entrepreneurs do exist in the Prairies.

San Diego is well recognized as the location of a leading biotechnology cluster in North America. On the 25<sup>th</sup> anniversary of Hybritech's founding, the *San Diego Union Tribune* reported that the cluster's "seeding company" spawned more than 50 firms. Hybritech's 8-year lifespan from inception to purchase by Eli Lilly generated over a dozen experienced managers that went on to build other companies in an ever-expanding cycle.<sup>19</sup> Similarly, Saskatoon's SED Systems indicates that over a dozen Saskatchewan-based companies trace their roots to SED.<sup>20</sup>

***PROFILE – Cangene Corporation: A key member of Manitoba's life science cluster***

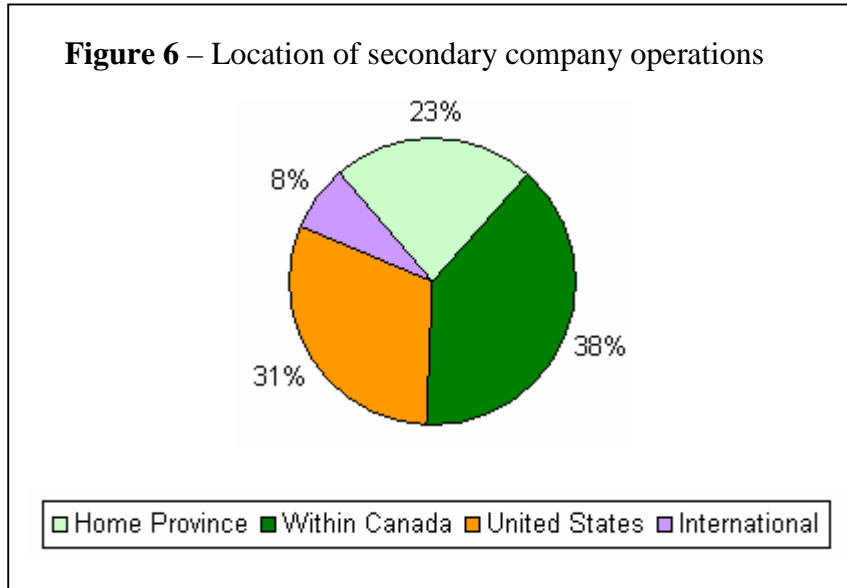
Cangene Corporation (TSX:CNJ), is one of Canada's largest biopharmaceutical companies. The company is based in Winnipeg, Manitoba but they are also active in Ontario, California, Maryland and Florida. In 2007, they were ranked 35<sup>th</sup> in a global analysis of biotechnology companies by revenues. Founded in 1984, the company is emerging as a world leader in developing and manufacturing medical countermeasures against infectious disease-based bioterrorism agents. Their business is built on a suite of platform manufacturing technologies, with a solid pipeline of four approved drugs, two more submitted for regulatory review and several others in earlier stages of development.

Their lead approved hyperimmune (antibody-derived) product, WinRho<sup>®</sup>SDF, prevents hemolytic disease of the newborn (a serious blood-type incompatibility between the mother and fetus) and immune thrombocytopenic purpura (ITP) (a blood platelet disorder). Cangene's expertise in developing hyperimmune biopharmaceutical products has led to contracts with the U.S. government worth more than a billion dollars over the last five years. They are #29 on a list of the top 100 civilian contractors to the U.S. Government and provide biological therapeutics for the Strategic National Stockpile (medicines and medical supplies for public health emergencies).

Cangene also provides contract research, development and manufacturing services to other biopharmaceutical companies, as well as government organizations. The company was the first tenant of the University of Manitoba's SmartPark and has expanded their main facilities to meet production and manufacturing needs. Cangene is a cornerstone member of Manitoba's emergent life sciences cluster. The sector includes 41 biotechnology companies that generate over \$200 million in annual revenues and employ 2,300 people. Five key companies engage over 80% of the workforce: Cangene, Apotex Fermentation Inc., Biovail Corporation, Monsanto Canada and Vita Health.

## Location

Despite the challenges of securing financing and experienced entrepreneurs in the Prairie Provinces, a significant proportion of spin-off companies choose to remain close to their origins. 78% of the surviving companies have at least one location near their home institution, 18% have activities elsewhere in Canada, and 4% operate outside of Canada. In addition to these primary operations, 25% of companies reported additional offices. Figure 6 indicates the locations of these secondary operations. Notably, 61% of these secondary operations remain in Canada. These findings reaffirm the fact that technology-based start-up companies prefer to stay close to the source of technical innovation.

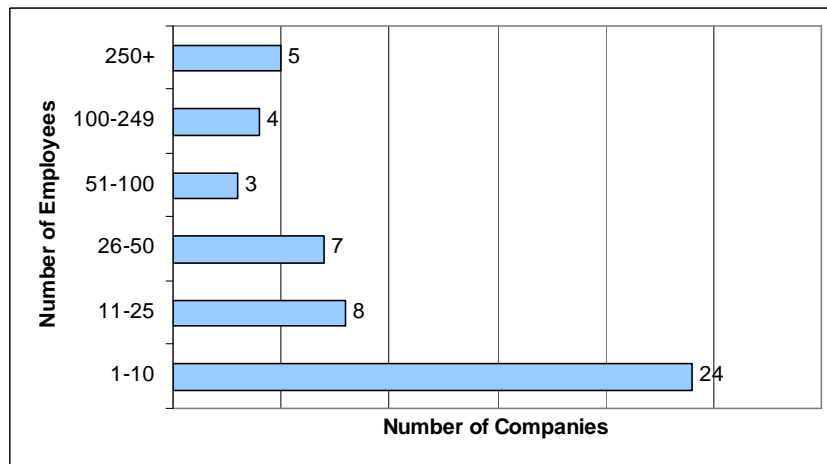


61% of these secondary operations remain in Canada. These findings reaffirm the fact that technology-based start-up companies prefer to stay close to the source of technical innovation.

## Employment Profile

In 2007, Prairie IPM Network spin-off companies employed approximately 3,562 people in full time equivalent positions.<sup>21</sup> The vast majority (76%) of companies are small to medium enterprises (SMEs) with less than 50 employees. However, there are a significant number (18%) of very mature companies with more than 100 employees. The largest firm employs over 850 staff in two Canadian locations.

**Figure 7 – Companies by number of employees**



Spin-off companies are an effective means of technology transfer, leading to job and wealth creation. Job creation is an easily measured direct impact on the economy, however, the indirect impact of this activity is far greater. Insightrix Research Services Inc. describes the multiplier effect as follows:

“The direct impact of salaries, purchases, and employment is augmented by indirect or “multiplier effects”, as a portion of money spent in the area is re-spent within that region, and jobs are created to produce and handle goods and services required by direct employees.”<sup>22</sup>

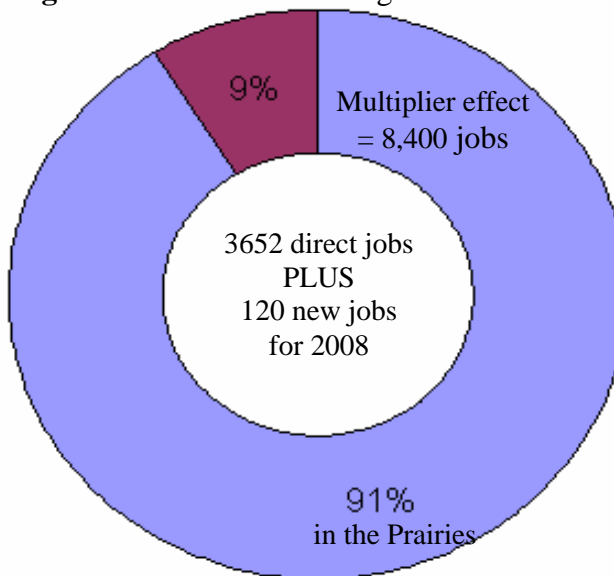
Inshgtrix, in partnership with the University of Saskatchewan, recently published an economic impact study of Innovation Place (Saskatchewan’s Research Parks). In the study they determined that the cumulative effect of job creation is equivalent to an additional 1.3 jobs.

Applying this multiplier effect, we can predict that the Prairie IPM Network spin-off companies have **created about 8,400 jobs** (including direct, indirect and induced impacts). In the context of company locations and employment figures, these companies have successfully created **7,613 jobs in the Prairie Provinces**. This suggests that spin-off companies can have an incredible impact on job creation in the Prairies, since 91% of all created jobs are retained.

Spin-off companies often grow rapidly and increase staffing to meet both technological and manufacturing demands.

52% of respondent firms forecast that they will be hiring in 2008, creating approximately **120 new jobs**. Only 10 of these new positions will be located outside of Prairies and the majority (84%) of these appointments will be in either research or manufacturing positions. Figure 8 summarizes the job creation impact of Prairie spin-off companies.

**Figure 8 – Job creation at a glance**



Surveyed companies reported that 20% of their staff are alumni of their associated institution, and about 60% of companies participate in graduate or co-op programs. These companies engage a large proportion of HQP from academic institutions with about 60% of the reported workforce having at least a bachelor's degree and 30% of the total work population having an advanced graduate degree. Therefore, spin-off companies act as significant receptors and training partners for a major academic institution output: skilled talent.

Providing challenging and pertinent high-tech jobs for trainees could retain a more youthful and educated workforce. In addition this could potentially reverse brain drain effects by retaining and recruiting skilled workers for Manitoba and Saskatchewan. Canada’s Science and Technology Strategy identifies the creation and retention of trained scientific personnel as a critical facet of mobilizing Canada’s scientific competitiveness:

“Canadian businesses and other organizations need to recognize, reward and make better use of the skills, talent and knowledge of our current graduates. This, in turn, will help foster greater interest among Canada’s young people to pursue S&T and related studies and careers, fostering a virtuous circle of talent generation and mobilization.”<sup>23</sup>

Respondent companies were asked to stratify staff by job function, which confirmed that the majority of companies are focussed on research and development, with 42% of reported staff falling into this

category. The next most reported categories were manufacturing (32%), management (10%), administrative and other (8%) and marketing and business development (7%).

When large companies (with more than 100 employees) are factored out, the relative proportion of certain job functions change significantly. These SMEs report 42% of staff in R&D, 21% in management, 18% in manufacturing, 15% in marketing/business

**Table 1 – Job stratification of spin-off companies: comparing an SME population with a sample mixed population**

	SMEs only	All companies
Management	21%	10%
R & D	42%	42%
Manufacturing	18%	32%
Marketing/Business Development	15%	7%
Administrative & Other	3%	8%

development, and 3% in other job functions. These shifts in staffing profiles suggest that smaller or earlier-stage firms have a greater need for management, marketing and business development knowledge during the company creation phase (Table 1). Then, as the company grows and matures, focus shifts toward manufacturing and product sales. Of note is the fact that spin-off companies retain their research-intensive roots as they mature.

## Financial Profile

### Investment

The majority of spin-off companies finance operations through investment and leveraged grant and tax credit programs. In addition, 28% of respondent companies obtain revenues through sales. While the vast majority of spin-off companies are privately held and funded, 18% of the companies are publicly traded. These publicly traded companies have a collective market capitalization of **\$6.9 billion** as of May 15, 2008. 8% of the companies are not-for-profit ventures.

Three of the public companies held share offerings in 2007, raising a total of \$16.7 million on the public markets. Six of the privately held companies received financing in 2007 totalling about \$31.5 million<sup>24</sup>. Thus, the **total investment in 2007**, in spin-off companies from the Prairie IPM Network, **was about \$48.2 million**.

According to Inshtrix, payroll and purchasing activity generates \$1.65 for every dollar of input in Saskatchewan.<sup>22</sup> If we assume that the majority of investment will go towards purchases and payroll, then the collective economic impact of the funds raised by spin-off companies in 2007 is **\$79.5 million**.

An analysis of a random sample of 15 firms comparing total investment and number of employees suggests that there is no relationship between the number of employees and the total amount of investment in the company. Eighty percent of companies in this sample are SMEs (less than 50 employees); however the range of total investment is split quite evenly: 33% <\$1 million, 33% \$1-10 million, and 33% \$10-100 million. This suggests that SMEs are able to efficiently utilize capital to advance their businesses regardless of size.

***PROFILE – DiaMedica Inc.: Sharing access to skilled management***

DiaMedica (TSX:DMA) was incorporated in 2000 to commercialize a revolutionary technology platform for the treatment of type II diabetes. The company is based on the discoveries of Dr. Wayne Lutt, a Professor at the University of Manitoba, and was recognized in 2007 as one of “Canada’s Top 10 Life Science Companies”™. Their lead candidate, DM-71, just completed positive Phase IIa clinical trials in Canada.

Clinical trials are an expensive part of technology development. In order to efficiently use their available capital, DiaMedica has partnered with Genesys Ventures Inc. (GVI), a private Winnipeg-based incubator, to access management expertise. According to L. Michael Coutts, Director of Business Development for Genesys Ventures, “We add value by providing shared access to high quality human resources important to company development on the business, regulatory and IP management side, which allows companies to focus their resources on technology advancement.” With three drug candidates in simultaneous clinical trials, this focus on applying resources to product development bodes well for DiaMedica’s investors.

Genesys utilizes an enhanced incubation model where GVI staff actively participate in company development by providing a tailored mix of services to accelerate product development. Their Winnipeg facility allows early stage companies to share facilities and research and management infrastructure. GVI provides experienced clinical trial management, document control programs, regulatory affairs and quality assurance expertise, and intellectual property management knowledge. They help facilitate private financing through their network or provide assistance accessing public markets, including providing investor relations expertise. GVI has a strategic alliance with CentreStone Ventures, an early stage life sciences fund that is physically located at the GVI facility.

Genesys Ventures Inc. was established in 1997 by Dr. Albert Friesen, an experienced bio-entrepreneur who has helped found several health industry companies including Rh Pharmaceuticals (now Cangene Corporation), ABI Biotechnology (acquired by Apotex Inc.), Novopharm Biotech Inc., Genesys Pharma Inc., and KAM Scientific Inc. Genesys has been actively involved with a number of other Prairie IPM Network start-up companies, including: Medicure (TSX:MPH; AMEX:MCU) and Cronus BioPharma.

## **Research Expenditures**

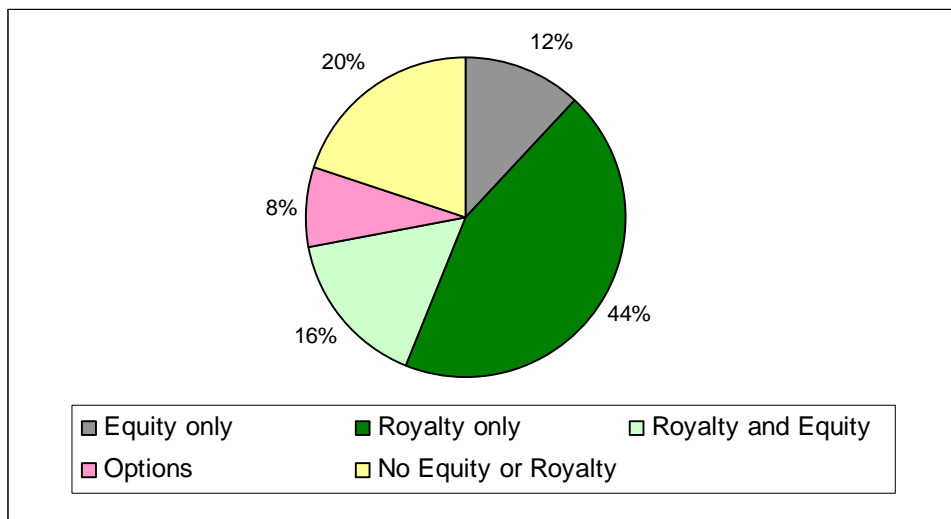
As discussed earlier, spin-off companies maintain research intensity as they mature and carry out R&D activities through both in-house and contract-out mechanisms. 48% of respondent companies reported engaging their university in a research contract. Many of these companies (62%) also access federal programs through the universities, which allow them to leverage public grant funding to accelerate their research goals. With 42% of personnel directed to research and development activities, it is not surprising that early-stage and active companies devote an average of 57% of their expenditures to R&D<sup>25</sup>.

### Start-up Company Equity Participation

As noted earlier, a small subset of spin-off companies are *start-up companies*, which are companies based upon licensed or assigned intellectual property from their institution. These companies may have been incubated in-house or have received company creation support from their host academic institution. Many of these relationships include deferred revenue sharing licensing terms, which allows start-ups to focus their resources on company creation. Of the live start-up company population, the majority of companies (60%) have

royalty arrangements with their source institution. Only 28% of deals included equity arrangements, and half of those were combination equity/royalty deals. 20% of start-ups do not have equity or royalty relationships with the university. Figure 9 indicates the proportion of equity/royalty relationships between live companies and their

**Figure 9 – Relationships between start-up companies and universities**



universities. The majority of deals (72%) are non-equity deals, suggesting that the IPM universities have not aggressively pursued equity participation in their start-up companies. This is in contrast with a 2003 AUTM report that indicated 71.8% of licensing agreements with start-ups in North America included equity provisions.<sup>26</sup>

The upside potential of equity participation could be significant for universities. However, the challenges of managing equity ownership oftentimes make it unappealing for universities. “In 1996 the average annual income from a traditional license was \$63,832. The average value of equity . . . [was] \$1,384,242. If one assumes that half the spin-off companies fail before they go public, the average value of equity is \$692,121. This is more than 10 times the average annual income from a traditional license, and is significantly higher than the amount usually received as a license issue fee.”<sup>27</sup> More recent reports suggest that universities can generate a risk-normalized return of \$500,000 in liquefied equity per license in addition to non-equity returns.<sup>26</sup>

The recent downturn in the venture market and company valuations has also had an impact on the up-side benefit of equity participation. UBC routinely takes equity positions in their companies to reduce up-front cash flow demands and “join management and investors as [shareholders] in the company.” They have reported that in the “past five years [2000-2005], the value of UBC’s equity . . . has been significantly diluted by factors . . . beyond UILO’s control, not least of which are the stringent terms that follow-on investors (typically venture capital) apply to later rounds of financing.” UBC’s equity participation in 42 public and private companies was valued at \$4.2 million on March 31, 2005.<sup>28</sup>

The challenges of valuing private company equity and identifying liquid exits for the university make equity participation a daunting choice for technology transfer offices. Realistically, divestiture of equity can only occur after the initial public offering, or when the company is acquired through merger, acquisition or other tendered offer. Managing this equity (and in particular valuing it) between the time of start-up to liquidity date can take time and effort away from core technology transfer activities. In addition, the means by which technology transfer offices are measured puts additional pressure on the offices to focus on short term value creation for the university.

## **Supporting Company Creation**

All of the Prairie IPM Partners approach company creation with great flexibility. It is rare for company creation and technology licensing parameters to follow fixed rules. While taking an equity position is not assured, all of the Partners agree that it is important to help establish start-ups to give them a greater probability of success. Roughly 60% of start-up companies accessed the services of their respective Technology Transfer or Industry Liaison Office. Some of the start-ups predate their respective offices, but are still part of the start-up company population.

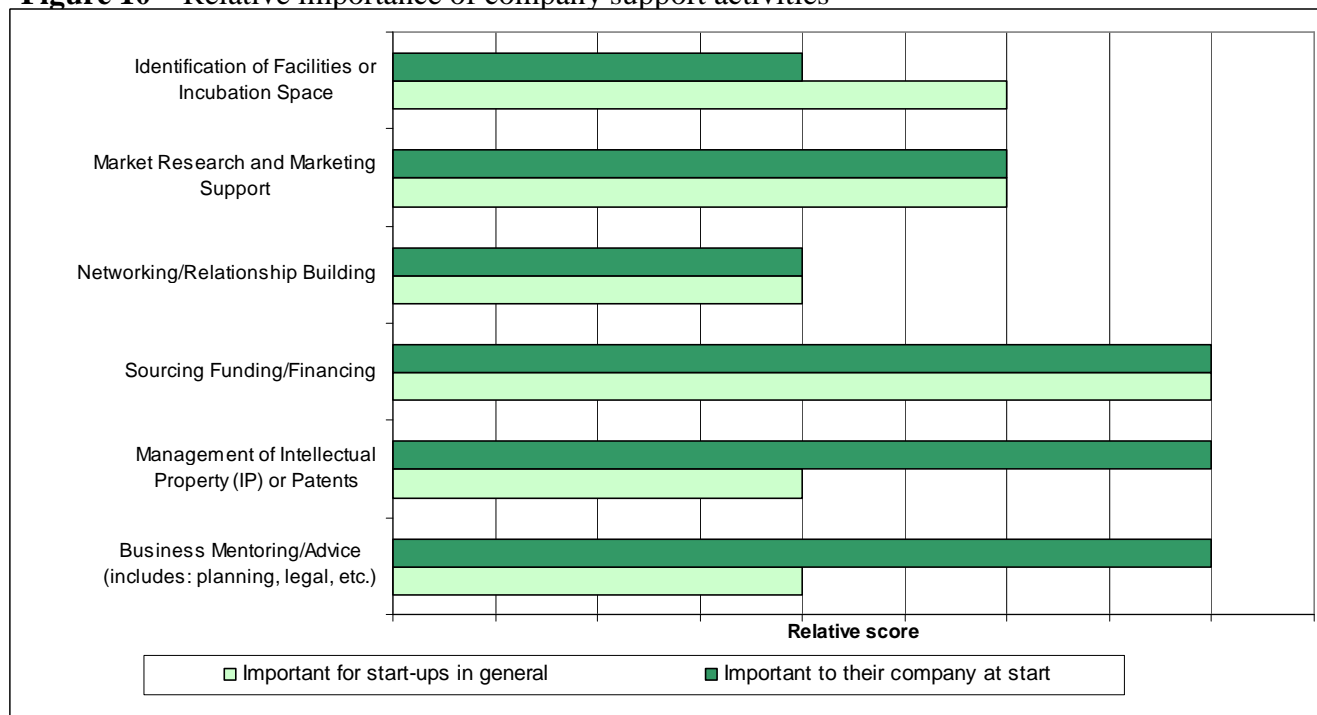
The services that the universities can provide include:

- mentoring and business advisory services,
- facilitating access to venture capital,
- an entrepreneurial centre providing education and outreach events,
- advice on government commercialization grants,
- business plan competitions,
- aid in recruiting management teams,
- prototyping funds,
- IP management,
- market research and marketing support,
- university-affiliated research/science parks, and
- university-based incubator facilities or services.<sup>29</sup>

The Prairie IPM Partners endeavor to provide this broad range of services to their companies, however, not all of the listed services are available at all institutions.

Of the respondent companies 83% reported that they received IP management services, 33% received business mentoring, and 33% received assistance with sourcing financing. When asked to compare the importance of particular services to start-up companies in general and to their company at incorporation, while the majority of respondents received IP management assistance and noted that it was important to their firm, they did not see it as the most important element (Figure 10).

**Figure 10 – Relative importance of company support activities**



Assistance sourcing financing is one of the most critical services that a TTO/ILO can provide. When asked what challenges their firm faced at creation, 81% of respondents indicated that sourcing financing was the critical issue. Other subjects of concern included product development (43%), identification of a management team (29%), marketing (29%) and sourcing qualified staff (14%).

## Comparables

The University of British Columbia (UBC) is well known in North America as a company creation powerhouse. They rank 8<sup>th</sup> in North America for university technology transfer and commercialization activities and 6<sup>th</sup> for start-up company formation.<sup>30</sup> UBC has surveyed spin-off company activity every three years since 1994. This body of information catalogs their success and helps to demonstrate how the university has a significant impact on the technology cluster that has developed around the campus and within the province.

The University of Alberta has also committed significant resources to their technology transfer co-venture with the Edmonton Economic Development Corporation: TEC (Technology, Entrepreneur and Company Development) Edmonton. TEC Edmonton has formalized company creation and incubation services, called JumpStart and the TEC Centre. In addition, their Executive in Residence program is specifically geared to partner serial entrepreneurs with emerging technology companies. TEC Edmonton and their predecessors (administrative units of the University of Alberta: 1994-2002 Industry Liaison Office, 2002-2004 Research Services Office) have a substantial body of data on their spin-off company activities available.

**Table 2 – Comparable spin-off company creation in Western Canada**

	<b>Prairie IPM Partners</b>	<b>UBC<sup>31</sup></b>	<b>University of Alberta<sup>32</sup></b>
Research revenue	~\$366M <sup>33</sup>	~\$228M <sup>34</sup>	\$461.4M <sup>35</sup>
Total # of spin-off (all companies)	78	117	82
# of live spin-offs	53	70	69
% inactive/closed	32%	41%	10%
# of jobs created (response rate)	3577 (81%)	1907 (75%)	934 (64%)

Table 2 provides a frame of reference to compare the activities of the Prairie IPM Partners against the Universities of British Columbia and Alberta. Research revenues are provided as a measure of the relative research intensiveness of each of the institutions. In the context of job creation alone, the Prairie Partners have been wildly successful.

The advanced technology companies sourced from universities have the potential to be the key drivers of the growing knowledge-based economy. All of the surveys report that the majority of spin-off companies stay close to home and thereby provide significant long-term contributions to the development of sustainable regional economies. These clusters of technology companies create highly skilled jobs, invest in ongoing university research, purchase services from other local companies, and reinvest in the community.

## References

- <sup>1</sup> Public company market capitalizations collected on May 15, 2008.
- <sup>2</sup> Data from merged or acquired companies was not included in the analysis unless the original entity is still intact as a separate sub-division from the parent organization and information on that particular division or branch office could be collected.
- <sup>3</sup> Only 51 companies were truly eligible to take part in the survey, as two companies were added to the population post survey. The total 'live' population is 53 companies. With 26 responses out of 51 potential survey participants, the response rate was 51%).
- <sup>4</sup> <http://umanitoba.ca/research/tto/about/index.html>, retrieved June 7, 2008.
- <sup>5</sup> <http://umanitoba.ca/research/smartpark/theeurekaproject.html>, retrieved June 7, 2008.
- <sup>6</sup> Natural Sciences and Engineering Research Council of Canada (NSERC)
- <sup>7</sup> Canadian Institutes of Health Research (CIHR)
- <sup>8</sup> <http://www.usask.ca/research/ilo/aboutstartup.php>, retrieved June 7, 2008.
- <sup>9</sup> The incorporation date for one (closed) company is unknown.
- <sup>10</sup> Clayman, B.P. and Holbrook, J.A. (2003) "The Survival of University Spin-offs and their Relevance to Regional Development" Centre for Policy Research on Science and Technology (CPROST), Simon Fraser University
- <sup>11</sup> Macdonald & Associates (2005) "Growing the Businesses of Tomorrow: Challenges and Prospects of Early-Stage Venture Capital Investment in Canada"
- <sup>12</sup> AUTM Canadian Licensing Survey, Fiscal Years 2005 and 2006
- <sup>13</sup> AUTM Canadian Licensing Survey, Fiscal Year 2006
- <sup>14</sup> CIHR Funded Research Database and NSERC Awards Search Engine, data retrieved May 5, 2008
- <sup>15</sup> Personal communications, May 2008.
- <sup>16</sup> John T. Preston is a Senior Lecturer at MIT's Entrepreneurship Center and a Director of several private companies. He has founded, directed, and invested in many technology companies and currently serves as an advisor to three venture capital firms.
- <sup>17</sup> Preston, J.T. "Building success into a high-tech start-up." *The Industrial Physicist*, June/July 2003.
- <sup>18</sup> Gompers, Paul A., Kovner, Anna, Lerner, Josh and Scharfstein, David S., "Skill vs. Luck in Entrepreneurship and Venture Capital: Evidence from Serial Entrepreneurs" July 2006. Available at SSRN: <http://ssrn.com/abstract=933932>
- <sup>19</sup> Ross DeVol et al., "America's Biotech and Life Science Clusters San Diego's Position and Economic Contributions," Milken Institute, June 2004
- <sup>20</sup> <http://www.sedsystems.ca/history>, retrieved May 15, 2008.
- <sup>21</sup> Employment data includes 3577 reported FTE positions plus estimates for non-reporting companies (Data provided by the 26 respondent companies, with information collected directly or indirectly for 17 additional entities. Total respondent number of 43 companies (81% respondent rate).)
- <sup>22</sup> "Innovation Place Economic Impact Studies Summary" Inshtrix Research Services Inc. [http://insightrix.com/pdfs/innovation\\_place.pdf](http://insightrix.com/pdfs/innovation_place.pdf), retrieved July 7, 2008.
- <sup>23</sup> Industry Canada, "Mobilizing Science and Technology to Canada's Advantage", 2007
- <sup>24</sup> One privately held company reported \$25 million in investment in 2007.
- <sup>25</sup> Not-for-profit and manufacturing companies' responses to this question were filtered out.
- <sup>26</sup> Edwards, M. et. al. "Gold in the ivory tower: equity rewards of outlicensing" *Nature Biotechnology*. (2006) 24:5, p509-515.
- <sup>27</sup> Bray, M.J. and Lee, J.N., "University revenues from technology transfer Licensing fees vs. equity positions" *Journal of Business Venturing* (2000) 15:5-6, p385-392.
- <sup>28</sup> UBC UILO 2005 Spin-off Company Summary Report
- <sup>29</sup> Summary of surveyed factors from Association of Pacific Rim Universities (APRU) 2002 Study "Technology Transfer and Wealth Creation (T2WC)"
- <sup>30</sup> Ross DeVol et al., "Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization," Milken Institute, September 2006
- <sup>31</sup> UBC UILO 2005 Spin-off Company Summary Report
- <sup>32</sup> 2002-03 University of Alberta Spin-off Company Summary
- <sup>33</sup> Sum of: \$189M University of Saskatchewan (2006-07 research revenues) +\$22.4M (University of Regina Facts for 2004-05: <http://www.uregina.ca/orp/FactBrochure/FactsBrochure2005.pdf>) +\$154.9M (University of Manitoba 06/07 Research Revenues: <http://umanitoba.ca/research/facts/index.html>)
- <sup>34</sup> 2007-08 Research Revenues [http://www.ors.ubc.ca/stats/0708\\_Stats/R0708M\\_Institution\\_YTD.pdf](http://www.ors.ubc.ca/stats/0708_Stats/R0708M_Institution_YTD.pdf), retrieved June 20, 2008
- <sup>35</sup> 2007-07 University of Alberta Financial Analysis <http://www.financial.ualberta.ca/pdf/FinancialAnalysis0607.pdf>, retrieved June 20, 2008.

## **Appendix A: Spin-off Companies**

2007	ADE Therapeutics	SK	EARLY STAGE
2007	NetSecure Technologies Ltd (formerly LDE Innovations Inc.)	SK	MERGED
2007	JBD Golf Inc	SK	EARLY STAGE
2007	Blu-Amity Networking Solutions Inc	SK	EARLY STAGE
2007	Quantic EMC Inc	MB	INACTIVE
2006	CAPSI	MB	EARLY STAGE
2005	Solido Design Automation Inc.	SK	ACTIVE
2005	BioMark	MB	ACTIVE
2004	Name withheld	MB	ACTIVE
2003	Name withheld	SK	ACTIVE
2003	IL Therapeutics Inc. (acquired by Pacgen Biopharmaceuticals Corp. 2006)	SK	ACQUIRED
2002	Triage Therapeutics Inc.	SK	CLOSED
2002	JDA Livestock Innovations, Ltd.	SK	ACTIVE
2002	Forte Pharmaceutical Laboratories Inc.	SK	EARLY STAGE
2002	BioNatCom Technologies Inc.	SK	CLOSED
2002	Advance Technologies Inc.	SK	ACTIVE
2002	University Engineering Products Inc. (UEP)	MB	CLOSED
2000	On Target Electronic Design Inc.	SK	CLOSED
2000	MCN BioProducts Inc.	SK	ACTIVE
2000	Norzyme Inc.	MB	CLOSED
2000	DiaMedica (Diabex)	MB	ACTIVE
1999	Prairie Diagnostic Services, Inc	SK	ACTIVE
1999	PharmaLytics Inc.	SK	ACTIVE
1999	Innovative Cardiac Care Inc.	SK	EARLY STAGE
1999	CellFor Inc.	SK	ACTIVE
1999	Canadian Light Source Inc.	SK	ACTIVE
1999	Analog Design Automation, Inc. (acquired by Synopsys Inc. 2004)	SK	ACQUIRED
1999	Optex 2001	MB	INACTIVE
1999	Name withheld	MB	ACQUIRED
1997	Ceapro Ltd.	SK	ACTIVE
1997	ALviva Biopharmaceuticals Inc.	SK	CLOSED
1997	Name withheld	MB	CLOSED
1997	Name withheld	MB	ACTIVE
1996	TriNexus Technologies Inc.	SK	CLOSED
1996	New Leaf Biotechnology Ltd.	SK	CLOSED
1996	Name withheld	SK	INACTIVE
1996	HTC Pureenergy	SK	ACTIVE
1996	Fermion	MB	EARLY STAGE
1996	Biovar Life Support	MB	INACTIVE
1995	Western Ag Innovations Inc.	SK	ACTIVE
1995	GlobalED MultiMedia Inc.	SK	CLOSED
1995	MicroGro International Research Inc.	SK	CLOSED
1995	Name withheld	SK	ACTIVE
1995	Bregma Materials Solutions Ltd. (formerly Bregma International Trading Co. Ltd.)	SK	ACTIVE
1995	Acutemp Blankets	SK	ACTIVE
1995	Cronus BioPharma Inc.	MB	ACTIVE
~mid '90s	Bioquest International Inc	MB	CLOSED
1994	VEMAX Management Inc.	SK	ACTIVE

1994	Slipstream Software Systems Inc.	SK	CLOSED
1994	Saskatoon Colostrum Company Ltd. (SCC)	SK	ACTIVE
1994	YM Bioscience	MB	ACTIVE
1994	Coretech Medical Technologies Corporation	MB	INACTIVE
1993	Minerva Animal Health Corporation	SK	CLOSED
1992	Iders	MB	ACTIVE
1991	Prairie Swine Centre	SK	ACTIVE
1991	Pharmaderm Laboratories Ltd. (acquired by Helix BioPharma Inc. 1999)	SK	ACQUIRED
1990	University of Saskatchewan Technologies Inc.	SK	CLOSED
1990	Emerging Information Systems Inc. (EISI)	MB	ACTIVE
1988	Vecima Networks Inc. (formerly WaveCom Electronics Inc./ Vcom Inc.)	SK	ACTIVE
1988	QCC Communications Corporation	SK	CLOSED
~late '80s	Sysmon Corporation	MB	INACTIVE
1985	Quantic Electroscan Inc.	MB	ACTIVE
1984	BIOSTAR Inc.	SK	CLOSED
1984	Accutrak Systems Ltd	SK	INACTIVE
1984	Integrated Engineering Software Sales Inc.	MB	ACTIVE
1984	Name withheld	MB	MERGED
1984	Cangene Corporation	MB	ACTIVE
1982	Enviro-Test Laboratories (ETL) (acquired by ALS Laboratory Group)	SK	ACQUIRED
1981	Venmar CES Inc. (Saskatoon)	SK	ACTIVE
1981	SCI-TEC Instruments Inc. (acquired by Kipp & Zonen 1996)	SK	MERGED
1981	Name withheld	SK	ACTIVE
1980	Name withheld	SK	ACQUIRED
1980	International Road Dynamics Inc. (IRD)	SK	ACTIVE
1978	Name withheld	SK	ACTIVE
1976	Advanced DataSystems Ltd. (ADS)	SK	ACTIVE
1975	Startco Engineering Ltd.	SK	ACTIVE
1972	SED Systems (acquired by CALIAN Ltd.)	SK	ACQUIRED
?	Dacim Laboratory	MB	INACTIVE