Trillium Digital Systems Case Study: 1996 – 2003

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Abstract:

This paper presents a brief overview of Trillium Digital Systems, a company that developed and licensed communications software to telecommunications equipment manufacturers for the wireless, broadband, Internet and telephone network infrastructure. Trillium was founded in 1988, self funded through 1999, raised its first round of funding in 1999, and acquired by a public company in 2000. Trillium's product, financial, and organizational history are presented from 1996 thru 2003. Another paper covers Trillium from its founding in 1988 thru 1995.

Introduction

This case study is the continuation of “Trillium Digital Systems Case Study: 1988 – 1995” and covers Trillium’s history from 1996 – 2003. Trillium was founded in 1988 by Jeff Lawrence and Larisa Chistyakov. It started with $1,000 capital, no products, no customers and no employees. It initially offered software development consulting services and then started offering communications software products. By 1995 it had grown to $9.7 million per year revenue, was profitable and growing entirely from its cash flow (it had no outside investors or debt) and had 25 employees. Towards the end of 1994 a public company “Golf” approached Trillium and expressed an interest in acquiring it for $37.5 million.

In March 1995, Jeff arranged for a conference call between Golf’s and Trillium’s officers and advisors to decide whether to accept or decline Golf’s acquisition offer. By the end of the call Jeff and Larisa (who were the only shareholders of Trillium at that time) declined the offer. There were three different perspectives they had to keep in mind during their evaluation of the deal; what was best for them, what was best for their employees and what was best for their customers. The deal would have been financially good for them but because there was no stock option plan in place and no way to correct that deficiency without queering pooling the employees would not capture much value from the deal. Golf also intended to turn Trillium into an engineering organization and stop it from selling its software products to communications equipment manufacturers, many of which were competitors to Golf. Jeff and Larisa felt it would be better to wait for another opportunity in the future.

Teenager

After declining the deal Mr. B and the product marketing engineer became very unhappy and disruptive to the company. They felt the Golf acquisition offer should have been accepted. After some period of time they left Trillium. This left Trillium, yet again, without a VP of Marketing & Sales. Jeff and Larisa filled this role until they hired somebody in June 1996. A number of other people filled this role in subsequent years. The position of VP Marketing & Sales had consistently been a difficult role to fill at Trillium throughout its history. Jeff and Larisa had high expectations, that very few people could meet, about the necessary knowledge, experience, skills and motivations needed to fill that role.

As things settled following Golf and Mr. B, Trillium went back to what it had been doing; developing products, licensing products and trying to grow its organization and mature its processes. Trillium’s revenue in 1995 was $9.7 million of which over 40% was from 13 customers, almost all of which were telecommunications equipment manufacturers in the Fortune 500. Trillium customers were generally positive on the product architecture, training, and technical support although some customers were concerned about the company’s small size, ability to provide pre-sales copies of the software for review, documentation and higher prices. Competitors were also doing a better job establishing and maintaining contact with potential and existing customers.

The ATM Forum, an industry group that defined ATM standards, had one of their large meetings in Los Angeles in February 1996. At the time 40% of Trillium’s revenue was from ATM technology and growing significantly in absolute terms. Trillium’s remaining revenue was from SS7 technology (40%) and other technologies (20%). Trillium arranged to hold an open house at their facility to coincide with the forum’s meeting. Trillium arranged for buses to take people back and forth between the hotels they were staying at to Trillium’s office at which food was served and informational presentations about technology and Trillium were made. Hundred’s of people attended and it was perceived as one of Trillium’s first significant marketing events.

As Trillium grew, Jeff and Larisa concluded that they needed help running their legal, financial and technical support operations. Things were falling through the cracks. By way of example, in 1995 Trillium was providing technical support for its software products beyond its initial warranty period to about 100 companies for free, even though its license agreement entitled Trillium to charge for the support. It took Trillium over a half year to recognize and remedy this problem. After their experience with Mr. A and Mr. B, Jeff and Larisa were very cautious about hiring new senior management into Trillium. Jeff and Larisa got to know Mr. C, their outside legal counsel and business attorney, very well during the Golf deal. They observed by his words and deeds that Jeff and Larisa had similar principles and values as Mr. C. After some discussion, Jeff and Larisa asked Mr. C to join them. He said yes and joined Trillium in March 1996 as General Counsel. Some time later he became CFO and in April 1997 he became COO.

Mr. C had received a BS in Economics from Stanford and a joint JD and MBA from UCLA. Prior to Trillium, Mr. C was a corporate and securities attorney at a very large, international law firm and then two smaller law firms, including one of which was his own.

Trillium sponsored and participated in a number of field studies projects with local universities (UCLA, USC and Pepperdine) from 1996 onwards. MBA students from these projects would study some aspect of Trillium's strategy or operations as part of their own educational process and report back to the senior management of Trillium about their conclusions at the end of the study. Trillium didn't always agree with the conclusions of these studies but found the process of educating, explaining and debating its plans and operations to the students very valuable.

As a small and growing organization everybody in Trillium had a broad range of roles and responsibilities. The organizational structure was flexible and there were few consistent processes in place. No matter what titles employees had they did whatever they needed to do to move things forward, whether it was sales, marketing, engineering, support or some other activity. This was okay as a small organization since communications and coordination was fairly quick and efficient. As Trillium grew, communications and coordination (see Attachment 2) became more difficult. At a certain point people started intentionally and unintentionally playing in other people's sandboxes. As the company approached 25 - 50 people it became necessary to put in place a formal organization chart that more clearly defined employee's roles and responsibilities. The organization chart was discounted by the employees for a period of time but as Trillium grew towards 50 - 75 people it started being used and referred to out of necessity. Throughout Trillium's history, senior management had taken a consensus approach to decision making. This was a result of the founder's personalities and a desire for a team-based culture. Unfortunately, in some instances this approach resulted in a lack of timely or clear action. It was some time before Jeff and Larisa became more comfortable and effective in their decision making abilities.

Revenue growth slowed from 1995 and was $11.6 million in 1996. Some challenges had been addressed but others arose during the year. Many of the challenges were felt to be normal growing pains. The organization wasn't operating very efficiently; sales and marketing were not being very proactive in developing new leads, although they were buried in unsolicited leads; the sales incentive compensation system was not satisfactory; engineers were too busy; project management was inconsistent; and financial systems for tracking and allocating expenses were not satisfactory.

The quality assurance and technical communications departments were created to start offloading activities from engineering. It took some time for them to become established.

Trillium's direct sales force consisted of sales representatives and administrative staff that were supported in the early years by engineers and in the later years by pre-sales support engineers. The first pre-sales support engineers were engineers that were asked to move from research and development to sales. The sales representatives were assigned a mix of geographic territories and key accounts and were responsible for selling all of Trillium's products and services. In the late 1990s some of the sales representatives were assigned exclusively to a certain limited number of key accounts in effort to strengthen Trillium's relationship with these accounts. As the sales staff and activity levels grew geographic and account responsibility had to be shifted and balanced. During Trillium's early years sales people were compensated simply by a salary. This was not very attractive to most of the strongly motivated sales representatives and Trillium had to develop a commission based system. An interesting result of the compensation structure was that Trillium's top sales people had a higher yearly compensation than its President & CEO on many occasions. Trillium also had put into place corporate buying agreements with several customers that enabled different customer research and development locations to license through one pre-negotiated contract, thereby simplifying the licensing of Trillium solutions.

Trillium's first office was 200 square foot office in West Los Angeles. Trillium made its fourth move in February 1997 into 30,000 square feet of office space. By 2003, Trillium occupied about 80,000 square feet in that building. The space offered natural light, offices that started as private and became semi-private (two people per office) over time, many common areas and a design aesthetic that was clean and simple. The goal was to offer an environment that provided privacy and quiet as needed but also offered a chance for people to bump into each other and interact. A similar design was followed for the development facilities it opened in Vancouver, Canada

and Bangalore, India. The Vancouver facility opened in June 1999 and the Bangalore facility opened in late 2000. One of Trillium's biggest challenges was finding knowledgeable and skilled engineering staff in the face of strong competition for people from other companies in the telecommunications industry. An internal study showed that Vancouver would be a good place to open a second development facility. There were qualified engineers in Vancouver, the Canadian government made it easy for foreign national software engineers to get visas to enter the country, engineers in Eastern Canada would move fairly easily to Western Canada for the right opportunity and it was in the same time zone as Los Angeles. The facility was initially staffed by some Trillium engineers that moved from Los Angeles to Vancouver. Another internal study showed that Bangalore would be a good place for a third facility. The reasons for opening this facility were similar to those for opening the Vancouver facility. There was a large pool of qualified engineers in India and although the initial startup costs for a new facility were high the sustaining costs of operating the facility would be lower. Over time the sustaining costs of operating the facility went up because of a strong market demand and the mobility of Indian software engineers. Trillium's engineering staff at the time was also largely Indian so those that wanted to move back to India were able to do so without Trillium losing the experience and skills that they had developed at Trillium. These facilities were successful because they were both started up by long-time Trillium employees, because the product and project development efforts were distributed between the facilities along project (rather than geographic) boundaries and because the development and support efforts were standardized on a common set of tools designed to facilitate multi-site project execution and problem tracking. At most points in time Trillium engineering had 15 - 25 product development projects underway.

The mission critical nature of communications software technology was highlighted dramatically in 1990 and 1991. SS7 software bugs in the switching systems of the core network caused massive failures in the telephone networks of AT&T, BellAtlantic and Pacific Bell on multiple occasions. These network crashes shutdown telephone service for large portions of the United States and prompted Congressional investigations into the reliability of the telephone network. These failures seemed to present a market opportunity and prompted Trillium to start developing software products that could be used to build high availability and fault tolerant systems. Contrary to its previous practice, Trillium pursued patent protection in the late 1990's for some aspects of the high availability and fault tolerant software products implementation.

Trillium's early marketing efforts relied on a few articles in the technical press and word of mouth. In late 1996 Trillium conceived of a poster (see Attachment 4) that was first published in March 1997. The poster provided detailed technical information about the network infrastructure in an attractive format that was easy to understand. By virtue of the way it was designed it also highlighted all of the communications software products that Trillium offered. It became an indispensable tool for the industry and 10,000s of copies were distributed free of charge. It was displayed on the office walls and conference rooms of 1,000s of engineers, venture capitalists and financial analysts around the world. Trillium used its Web site extensively to provide pointers to communications industry resources, detailed technical information and business information. At the beginning it had very few visitors and hits but by mid-1999 it was receiving over 20,000 hits per day. In the late 1990s, Trillium's Web site was enhanced to provide various customer support functions (e.g. training, product updates, problem tracking, etc.). Trillium also started electronically publishing a newsletter that it distributed to 1000s of people that provided background about the communications industry, technology and some specific information about Trillium's products and plans. Recipients were very positive about the newsletter because it served an educational function. Trillium also used traditional methods of building awareness for its products and plans including exhibiting and speaking at trade shows, issuing press releases, authoring technical and business articles for industry publications and advertising. In the late 1990s Trillium started offering technology seminars for engineering and marketing people in the industry covering topics such as wireless, voice-over-IP, and broadband. They were educational in nature but provided an opportunity to also discuss Trillium's products and plans. In 1999 Trillium took things one step further and developed a New Venture Program. This program was focused on the early-stage start-ups in the portfolios of venture capital firms. The idea was to seek a venture capital firm's referral to their portfolio companies by providing a package of value added technical and support services aimed at accelerating the portfolio company's time to market and reducing their development risk. The program consisted of consulting, software integration assistance, training, program management and interoperability testing.

Internal communications were fairly ad-hoc in the early years of Trillium and consisted of hallway conversations, occasional meetings and occasional emails to the company as a whole. The complexity of the technical and business issues was immense and their constantly changing nature made it critical to ensure the right people got

the right information at the right time. It was also important to ensure that people had access to the background and history of an issue. Some of the first regularly interdepartmental meetings were held to coordinate the activities leading up to product releases. Meetings were added to discuss product development, changes to the product architecture, product management and marketing, pricing, sales forecasting, strategic planning, and company activities. Quarterly companywide meetings started being held in 1998 during which Trillium's product, organizational, financial activities were reported to all of Trillium's employees. The idea was to offer the transparency of a public company even though it was still private. It also allowed the employees to get to know the senior and mid-level managers. An internal Web site was maintained that provided detailed background and historical information about Trillium as well as detailed information about the vision, strategy, plans, organization and financial performance of Trillium. The goal was to have everybody in the company operating from the same baseline.

Trillium shifted from a conservative to a more aggressive growth strategy in 1997 and began increasing its headcount, establishing new sales offices and increasing product development. Trillium also started to actively seek businesses to acquire with complementary technologies in order to support its growth.

Jeff and Larisa won the Los Angeles area Entrepreneur of the Year award for technology in June 1997. Coincidentally, the award presentation occurred on the 18th anniversary, to the day, of Larisa's arrival in the United States as a Russian immigrant with her husband, speaking no English, with one suitcase, and pregnant with her first child. Throughout its early history, Trillium had focused on promoting people from within the organization. As a result, Trillium's middle and lower level management was populated by individuals who had grown up in the organization, most of whom had never worked in another company. Unfortunately, management training was sporadic and inconsistent for some time. Trillium decided that to sustain future growth it would be necessary to bring in professional management, for their experience and skills as well as for their ability to model professional management skills to the middle and lower level managers. Trillium hired the audit manager they got to know from the Golf deal as its CFO in August 1997. Trillium started filling out the other senior management roles in mid-1998 with professional managers experienced in high technology growth companies.

Many competitors offered consulting and integration services and this was starting to prove to be a competitive disadvantage for Trillium in some important opportunities. Trillium had decided early in its history to not offer these types of services but revisited this thinking and concluded there might be a good opportunity to offer professional services. The value proposition of professional services was to deliver more complete solutions by combining Trillium's software products with its integration, customization and consulting services. Customers were manpower constrained and willing to pay a single company to provide communications software and the services needed to integrate that software into their own products. The professional services group was created in mid-1998 as an addition to Trillium's already existing four groups (as described in Table 4 of the 1988 - 1995 case study).

Table 1 - Groups

Group	Department	Functions
Professional Services	None	Customized integration, customization, consulting services and product development services. Some customer support, some training, some publications, some marketing and some sales

In parallel with the formation of the professional services group Trillium thought there might be a good opportunity to merge with an Ireland based private company ("Europa"). Europa's primary business had been providing professional services to communications equipment manufacturers and it had started developing and licensing network management software products. Europa had about 150 employees. Trillium's primary business had been developing and licensing communications software products and it had started providing professional services. The staff of Trillium and Europa knew and respected each other from contacts that developed over a few years of overlapping customers and opportunities. Trillium approached Europa, incorporating the lessons learned from the Golf deal, and held a number of meetings between Jeff, Mr. C, Larisa and the Europa executives during the last quarter of 1998 in Dublin and Los Angeles to discuss the possibility of a merger of equals. The companies were following trajectories that were starting to converge because of complementary products and similar visions, principles, values and market forces. The belief was customers increasingly favored suppliers who could provide more complete solutions that reduced the time, risk, complexity and cost of getting their products to market. The conversations were positive and reached the conclusion that a combination of the two companies was worth

pursuing. During the conversations a US based public company independently approached Europa and indicated an interest in acquiring Europa. Europa, with the help of a financial advisor, investigated the other company's interest while still speaking with Trillium. After some time Europa accepted an offer to be acquired by the public company on February 25, 1990 for $81 million, which turned out to be Golf where Mr. B was then working in a senior executive role. The loss of Europa was very disappointing for Trillium. Interestingly, Golf was acquired almost immediately by a larger public company and Mr. B was mentioned in Wall Street Journal articles related to some unusual stock transactions undertaken by Golf's board just before its own acquisition.

The growth of the professional services group was accelerated and a new customer support group was started.

The East Asian financial crisis erupted in mid-1997 as poor fundamentals, structural weaknesses and a shift in investor sentiments caused liquidity problems in the financial systems of a number of Asian countries. The crisis stabilized by the beginning of 1999 but it had an impact on Trillium's sales in 1998 (since over 25% of Trillium's revenue in 1997 was from Asia) as industrial production, GDP and economies slowed down. In parallel to the East Asian financial crisis Trillium started to move to royalty based licensing for selected customers. The new licensing model was used in approximately 20% (measured by value) of the new licenses in 1998. The initial revenue realized from each license was lower with the expectation that royalties in future years would generate overall higher revenues. Trillium's revenue was $14.7 million in 1998. Trillium finished 1998 with over 120 employees from 17 countries speaking 26 different languages. Their median age was 29 and 40% of them were married. It was a fairly young, ambitious and motivated group.

Jeff had made the personal transition from an operational to a visionary and strategic role over the course of 1997 and 1998. He slowly handed over functional and organizational responsibilities to Mr. C during this period and became more focused on broad direction setting and communications issues (i.e. company meetings, employee meetings, customer meetings, press, analysts, trade shows, etc.). As a practical matter Jeff had very little involvement in operational issues (other than in an advising and consulting role) by 1999 although engineering still reported to him through Larisa. Larisa was CTO but also had been acting as the VP of Engineering since 1988. It became difficult for Larisa to fill both roles because of the time and energy demands. After some discussion an executive recruiter was retained to identify possible VP of Engineering candidates. After a thorough and time consuming search a number of candidates were identified, interviewed and one was hired in June 1999 that met Larisa's and everybody else's requirements for the role. As Larisa's role was teased apart engineering moved out from underneath Jeff to Mr. C and Larisa continued to report to Jeff as CTO. The transition for Larisa went more smoothly than anticipated although about a year later the VP of Engineering was lured away to a much larger private communications equipment company by previous work colleagues promising an imminent and potentially very lucrative initial public offering. The role was then filled on an acting basis by the VP of Quality Assurance & Customer Support. One ongoing concern of Jeff and Larisa's was a backup plan for Mr. C. Although Mr. C had recruited a pretty solid management team to head the various functional departments of the company, Trillium was growing rapidly in a quickly changing marketplace and the demands on Mr. C's time were substantial. Mr. C was very important to Trillium's operations; if something happened to him it would have been very difficult to fill his role.

Trillium enjoyed little competition when it was founded but as the telecommunications industry shifted toward using open, standards based solutions the competition increased. The technical barriers to entry weren't very high and the range of technologies needed by communications equipment manufacturers created many opportunities for technology suppliers (see Attachment 5).

Table 2 – Trillium Competition (June 1999)

Company		SS7	ATM	IP	Interworking	High Availability	Java	Software on Silicon	ISDN	Frame Relay	V5	X.25 / X.75	Professional Services
Trillium	US	X	X	X	X	X	X	X	X	X	X	X	X
ADC Newnet	US	X				X	X						X
Data Connection Limited	England		X	X		X							
Data Kinetics	England	X											
DGM&S Telecommunications	US	X			X	X	X						

(SignalSoft)													
DynamicSoft	US			X									
Ficon Technology	US		X	X									
Future Software	India		X										
Harris & Jeffries (NetPlane)	US		X			X							
Hughes Software Systems	India	X	X	X	X	X				X	X		X
Inverness	Israel		X										
Omnitel	France								X		X		
RADvision	Israel			X									
TDSoft	Israel										X		
Telenetworks	US		X		X				X	X		X	
Telesoft International	US								X				

A series of converging paths created the telecommunications and .com bubbles. There was a huge increase in Internet access, huge increase in wireless handset availability, and a belief that data intensive applications were going to drive the next generation network. The network was moving from being voice centric to data centric, from narrowband technologies to broadband technologies and from 2nd generation wireless to 3rd generation wireless technologies to accommodate real and perceived demand. The evidence was strong. Study after study showed data bandwidth needs were doubling every 3 - 4 months. Email and Web applications were becoming important and other data intensive applications had not made their presence felt yet. Internet applications were being developed and deployed at an amazing rate. Wireless handset sales were exploding. Wireless spectrum licenses were being auctioned for large amounts. The Telecommunications Act of 1996 in the U.S, as well as deregulatory efforts in other countries were opening markets to new competition that had never existed before. The combination of growth, perceived future growth and new competition created a frenzy of activity. The industry was moving up the hype curve towards the peak of inflated expectations. Between 1995 and 2000 more than 1,100 technology companies went public. There were over 350 technology initial public offerings in 1999 alone. The first day returns of those initial public offerings in 1999 averaged over 90%. Network bandwidth capacity was growing very quickly. In about a 5 – 10 year period the capacity of a fiber optic strand increased over 1,000 fold. Applications were also being deployed very quickly although their revenue models were more often based on faith rather than reality.

The industries technology and efficiency got ahead of demand. In other words, there was a disconnect between profits and investment. The industries profits were growing until 1997 and then they ceased to grow. Businesses nonetheless continued to expand investment until late 2000. The bubble collapsed into the trough of disillusionment. Network operators, service providers, equipment manufacturers and others suffered huge losses during the collapse. Over $2 trillion in market capitalization evaporated in less than 12 months and over 500,000 jobs were lost. Over 60 telecommunications carriers in the U.S. filed for bankruptcy between 2000 and 2002.

Jeff and Larisa's goals for Trillium were not completely aligned with the goals of the employees and shareholders. They were focused on some non-financial aspects of the company but many other employees, stockholders and option holders were looking towards some event that would allow them to enjoy the fruits of their labor or investment. Many had friends and colleagues at other companies that were enjoying huge success as companies were being acquired and going public during the telecommunications and .com bubble. Finding a path to liquidity and some way to monetize the shareholders equity became important.

Being acquired was a one path to liquidity but in 1998 Trillium's senior management felt going public would be a better, more valuable and more interesting path to follow. Discussions were held with various investment bankers and it became clear that the path to a public financing was going to require changes in the way the company was operating and growing. The investment bankers felt revenue visibility needed to increase, the composition of the revenue streams needed to change, growth needed to be more consistent and higher and the addressable market needed to be much larger. Valuations of initial public offerings at that time were high multiples of forward revenue. Investment bankers felt that a differently blended mix of single use license fees, royalties and professional service fees would smooth revenues and allow the capture of the addressable markets' significant upside.

There were struggles internally trying to plan towards these goals. It became clear to some, and to Jeff and Larisa after some persuasion, that it would be necessary to raise money from outside investors to fund the necessary organizational changes and growth. The idea of giving a significant portion of the company to an entity that had

not “earned it” was difficult for Jeff and Larisa to embrace. Detailed strategic and business plans were developed to frame the future direction of Trillium. Trillium commissioned a survey from a management consulting firm to provide quantitative support of the telecommunications market trends, customer needs, customer buying habits and market sizing. The survey results were reported in April 1999 and concluded that the addressable market (see Attachment 6) for outsourced telecommunications software was big and growing, especially for telecommunications switches, networking switches and remote access concentrators; many potential customers were not aware of the availability of outsourcing solutions; and product quality, performance and documentation were the most important evaluation criteria of a product.

A financial advisor from a small investment banking firm was hired to manage the fund raising process. After some preparation Trillium started approaching and engaging in conversations with various private equity and venture capital firms in the 2nd quarter of 1999. Numerous meetings were held with primarily west coast based firms during what was the height of the telecommunications and .com and venture capital funding boom. Compared to most of the companies the venture capital firms were seeing, Trillium was an unusual story since it was an 11 year old self-funded company with numerous shipping products, revenue streams and customers. In short it had a history. This proved to be challenging at times since a history had to be explained, whereas other companies that came in with just an idea simply had to sell their future plans and not explain their past decisions. The discussions generally focused on Trillium’s addressable markets, revenue streams, valuation and the value that the venture capital firm could bring to a deal. The venture capital firms typically emphasized their value by highlighting their market knowledge, management expertise and their customer, banking and other relationships.

A couple of firms expressed interest and after some discussion Trillium chose to work with the private equity firm, Rader Reinfrank & Co. Rader Reinfrank & Co. invested $10 million in July 1999 from their $100 million fund which was focused on communications, new media and Internet related companies. The investment thesis presented to its limited partners was that Trillium had a visionary, professional and experienced management team; was an established company with a track record; had a world class customer base; was in a premier position for traditional and voice-over-IP network convergence; and had an attractive relative valuation. Intel Capital expressed interest in investing in Trillium around the same time as Rader Reinfrank & Co. Intel Capital was very active at that time investing in many companies with an eye towards supporting Intel’s strategic plans and move into the communications industry. They generally did not take a lead investor role but they usually came in on a deal as a co-investor. Intel Capital was slower and more difficult to deal with but it ultimately invested $4 million on the same terms as Rader Reinfrank & Co. in September 1999. It was the first investment from the Intel Communications Fund, which was created to support Intel’s key strategic programs and initiatives in voice and data communications. As part of the investment Intel and Trillium agreed to work together to combine Trillium’s software with Intel’s communications chips.

The private equity deal took several months to complete and the legal agreements were over 130 pages long. Mr C, because of his previous securities law background, drove and managed the fundraising and negotiation process. The financial advisor and outside legal counsel were used as needed but they were not central to the negotiation process. The agreements included a securities purchase agreement, registration rights agreement, shareholders agreement, employment agreements with Jeff and Larisa and an indemnification agreement with Jeff. The combined Rader Reinfrank & Co. and Intel investments raised $14 million, on a pre-money valuation for Trillium of $55 million. A new series of convertible preferred stock was issued with liquidation preferences, a mandatory redemption requirement and other terms (see Attachment 3). Trillium management considered the $55 million valuation to be very low, but decided to proceed because they felt that venture capital backing, the strategic investment of Intel and the added discipline of having outside investors and an independent board member would be positive for the company as it made plans for an initial public offering.

At the conclusion of the deal the board of directors expanded from three inside directors consisting of Jeff, Larisa and Mr. C to four. The fourth director that joined the board was a principal from Rader Reinfrank & Co. and the board’s first outside director. The addition of the outside director changed the dynamics of the board meetings and made discussions more challenging. The primary focus became financial performance with little patience for missed plans and pressure to make changes more quickly, with less analysis than the Board had previously done.

Trillium had about $6 million in the bank at the time the Rader Reinfrank & Co. portion of the deal closed and its business plan called for $24.5 million of revenue and 250 employees by the end of 1999 with an addressable

market that was projected to be at least $500 million. Trillium had financial goals of $100 million per year revenue with a pre-tax profit of 20% by 2001 and other goals including market leadership for its key product lines, improved product quality and higher efficiency as measured by revenue per employee. The NASDAQ Composite index had almost quadrupled and the DJIA had doubled since Golf approached Trillium in 1995. Trillium management became focused on preparing for a public financing in 2000 and pulling in the date of that public financing as much as possible. For the first time since 1988, there was a committed plan towards liquidity.

Adult

Before and after the private equity deal Trillium was focused on growing revenue, headcount and efficiency. Trillium continued to move away from outside sales agents and built out its direct sales force and established its own sales offices in Asia, Europe and throughout the U.S.

Identifying, hiring, training and retaining new employees became challenging in 1999. For many years Trillium relied on word of mouth to identify potential new employees. In the late 1990s it started posting all open positions on its internal Web site and offered referral bonuses to employees. Over time, Trillium started placing recruitment ads, trawling Web based job boards and using staff and executive recruiters. Hiring bonuses, relocation allowances and in many cases visa sponsorship were important to hiring. Many of Trillium's employees were foreign nationals and moving to another country was a big disruption to their life. Trillium found it was very important to offer various forms of non-financial assistance to these employees as they made the transition into a new culture and society.

As the company grew, Trillium sponsored and hosted a number of different social events and activities to encourage team building. These included birthday parties, weekly bagel breakfasts, an annual company picnic in the summer and an annual holiday party in the winter. For one holiday party Trillium paid for all of the Vancouver employees to come to Los Angeles to join the party.

The efficiency of engineering was also becoming a concern. After some study it was determined that software engineers were spending only about 50% of their time actually developing and testing software. The other 50% of their time was spent on general administrative tasks, training new employees, training and supporting customers, providing sales and marketing support, holidays and time off. As the quality assurance, training, technical communications and system engineering departments were staffed the time spent by software engineers developing software moved up towards 75%, which was judged to be a reasonable number given Trillium's business and technology environment.

Project management, which had been inconsistent, improved slowly over time as the project managers became more experienced and skilled and the product management and engineering departments learned how to balance each others competing needs. In the early days project schedules were estimated fairly informally. As the engineering organization grew estimating became more formal and risk averse. Engineering offered schedules that could be met with a high degree of certainty but in many cases were unreasonably long. In many cases a product or project would be completed too late to meet the customer or market's needs. Product management, in response to customer and market pressures, would push for schedules that were unreasonably short. There was some oscillation between too long and too short but over the course of time the scheduling process settled down to something that was more consistent and reliable.

All of Trillium's product development, other than professional services projects, was unfunded. When Trillium was small the decision whether or not to develop a particular product or project was made by Jeff and Larisa. There was a culture of listening carefully to the customer and the market. One potential customer asking for something was interesting but when more than one customer started asking for the same product or capability then it became an opportunity for Trillium. In the early years development decisions were fairly qualitative. As the organization grew, the cost of developing products grew and as the operating functions of necessity became more specialized, it became evident the product development decision process could not rely on just Jeff and Larisa. It had to become more formal, inclusive and quantitative. A process was developed, which included a regular product committee meeting, that looked at the market requirements, market sizes, development costs and potential revenue streams to judge whether or not to pursue a product or project development effort. One of the ongoing themes in this process was the question of whether or not Trillium should start offering its own hardware

based products that incorporated Trillium's software. These discussions went back and forth for some time and never led to any hardware development efforts.

Jeff started to believe that security would become a significant issue in the network infrastructure. During his investigations he identified a company ("Salmon") that offered source code security software that he thought could be a good acquisition target. Jeff felt a company offering a combination of communications and security software technology, products and services would have significant opportunities in the telecommunications infrastructure, access and end user markets. Trillium initially approached Salmon on its own during the last quarter of 1999 to discuss the opportunity with its senior management. Salmon had been founded in 1995, was based in Finland, had about 60 employees and was projecting about $5 million revenue for the March 2000 year end. A number of meetings were held between Jeff, Mr. C and the senior management of Salmon in Helsinki, Mountain View and Los Angeles. At the time Salmon was in the middle of a venture capital funding round. Trillium brought an investment bank ("Catfish") into the discussion to help manage the process and provide its perspective about the potential opportunities, valuation for the combined company and a pro-forma ownership split. Catfish was selected from a number of possible investment banks. Catfish was chosen because of their interest in representing Trillium, large size, and strong reputation and extensive experience representing technology companies in public and private equity deals. Some financial and other information was shared between Trillium and Salmon. The pro-forma ownership split analysis was performed using a combination of contribution analysis, initial public offering value, precedent transaction analysis, and comparable private placement valuations. The analysis suggested Salmon should receive at 25 – 40% ownership take in a combined company with a possible initial public offering valuation of the combined company in mid-2000 of $750 million. Salmon received opinions from its already existing investors that its valuation was very high and would likely be much higher in the Finnish public market on a standalone basis. Salmon decided not to pursue a deal with Trillium, closed the venture capital round it was working on and went public in the last quarter of 2000. In October 2004 it was trading around Euro 1.25 per share with a market capitalization around Euro 35 million.

Jeff had gained some familiarity with the writings of W. Edwards Deming and the Malcom Baldrige Quality award in the late 1990s and became convinced of the importance of moving the company to ISO 9001 registration at some point during its development. ISO 9001 is an international quality standard for describing the business processes within a company. The purpose of the standard is to "say what you do and do what you say". Many people in Trillium were resistant to the idea of ISO 9001 registration. It was perceived as taking significant time to document and follow. It was also perceived as adding a layer of bureaucracy and paperwork that did not add any value to the company. Many Trillium customers were ISO 9001 registered and had asked Trillium to become ISO 9001 registered. Trillium's organization was approaching 120 people by the end of 1998 and it was becoming difficult to ensure the consistency of business processes and train new employees easily and quickly. Senior management had already begun the process of writing down procedures more than a year earlier, though without following the formal ISO 9001 guidelines. Most of management was convinced of the desirability of achieving ISO 9001 registration. Over time grudging acceptance developed within the rest of Trillium of the need to become ISO 9001 registered. A small team was identified within the company in early 1999 to prepare the necessary documentation and educate the company about how ISO 9001 worked. An effort was made to do what was necessary for registration but nothing more. A formal audit was performed at the Los Angeles and Vancouver sites in late 1999 and Trillium became ISO 9001 registered in February 2000. The Software Engineering Institute Capability Maturity Model (SEI CMM) provides a means for software development organizations to understand, describe and manage their processes for developing and maintaining software that is focused on software quality and process improvement. Trillium achieved SEI CMM Level 2 certification in less than a year for its Los Angeles, Vancouver and Bangalore development sites in December 2001. Senior management support was critical to the acceptance and continued compliance to ISO 9001 and SEI CMM.

The Y2K problem was a significant concern in the computing and communications industry as January 1, 2000 approached. Equipment manufacturers, network operators and service providers were concerned about potential operational problems when the date changed. Trillium's software had very few references to dates and those references were easy to identify. Because of its design, there was nothing to change in any of Trillium's software products. Trillium's entire Y2K remediation effort consisted of posting on its Web site a description about how its software would behave on the date change. The end of the world from Y2K, as had been predicted by some, did not occur.

Trillium missed its business plan targets for 1999. In the 1st quarter of 2000 the business plan was reset and lowered the revenue forecast but kept expenses about the same. This moved Trillium's breakeven point from 2000 to 2002. There were several reasons for the reset including greater competition, significant price pressure, a greater than expected shift towards royalty based deals (resulting in lower initial revenues), an increase in time before the royalty stream would be realized, slower than expected hiring and training of the sales and professional services employees and a forecasting model that needed improvement. Trillium had missed plans before, it was operating in a complicated and constantly changing environment, but this was different. There were now outside investors to contend with. Rader Reinfrank & Co. met with Jeff in early 2000 to express concern about Trillium's ability to execute to its plans, Trillium's future path and senior management's leadership in the face of these questions.

During the last half of 1999 and the first half of 2000 many of Trillium's competitors and companies offering other related technologies had been acquired or gone public with very high valuations.

Table 3 – Competitor Valuations

Company	Event		Valuation	Date
HotHaus	Acquired by public company	VoIP software	$280 million	March 1999
Telogy	Acquired by public company	VoIP software	$435 million	June 1999
Ficon Technology	Acquired by public company	IP, ATM software	$90 mllion	January 2000
RadVision	Initial public offering	IP software	Priced at $20.00 share	March 2000
Inverness	Acquired by public company	IP and MPLS software	$115 million	March 2000
NetPlane (Harris & Jeffries)	Acquired by public company	IP, ATM, Frame Relay software	$140 million	July 2000
SignalSoft (DGM&S)	Initial public offering	SS7 software	Priced at $17.00 share	August 2000
DynamicSoft	Acquired by public company	SIP software	$55 million	July 2004

In March 2000, following a number of inquiries from potential acquirers, Trillium decided to explore its possible sale and formally engaged the investment bank ("Catfish") it had used for Salmon to act as its financial advisor. Trillium also engaged outside legal counsel to represent it for any proposed transaction. Jeff and Larisa still wanted to move towards a public financing but felt the fiduciary duty to investigate other alternatives. Trillium had finished 1999 with about $20 million per year revenue. A formal valuation of Trillium performed for December 1999 determined that the fair market value of 100% of Trillium equity on a closely held, minority interest basis was between $75 – 85 million. Fair market value is defined as the price at which property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy nor sell and both having reasonable knowledge of the relevant facts.

Catfish met with Trillium's senior management to discuss Trillium's strategy, operations and potential fit with potential acquirers. Trillium and Catfish developed a list of whom they both felt would be appropriate to pursue a dialogue with. The list included communications equipment manufacturers, communications semiconductor companies and a few others. Intel was part of this list since they were already an investor in Trillium. After some preparation and meetings four potential acquirers expressed interest in discussing a deal with Trillium.

In the 1998 – 2000 time frame Intel decided that it was important to be in the communications industry (although years before they had been in the business and left it) because of its future growth opportunities. They were a manufacturing company at heart and had little experience and knowledge about the communications industry. To increase their presence and understanding they went on an investing and acquisition spree during which they spent billions of dollars to piece together a communications and networking business group. The first step was to build mass and the second step was to integrate the mass. Trillium was going to become part of that mass.

As one of the four potential acquirers, Intel indicated in May 2000 that it was interested in negotiating an acquisition of Trillium for cash at a valuation of $200 million. Intel's objectives in acquiring Trillium were to expand the networking software available to its network processor, establish a viable entry into the networking software business to complement the network processor business as they moved to sell platform level solutions, and validate and optimize software designs to address high growth communications market segments including voice-over-IP and wireless. The value created for Intel was going to be measured by a number of personnel, strategic, product, channel and financial performance indicators. These measurements included retention and integration of employees, networking software design wins for the network processor, integration of existing network processor software into Trillium's channels, integration of Trillium's and Intel's channels, increasing the revenue for

professional services, increasing the revenue per head, and decreasing the overhead. Intel's valuation of Trillium was driven primarily by discounted cash flow analysis and to a lesser extent by publicly traded comparables, public and private transactions and other strategic considerations. Intel and Trillium's emphasis on valuation factors were different. Trillium and Catfish believed discounted cash flow made sense for a manufacturing operation but not as much sense for a software operation. They were unable to alter Intel's views on this. After some additional negotiation, Intel agreed to increase the valuation to $300 million. The initial term sheet was received from Intel on June 8, 2000 and after review Trillium agreed to enter a period of exclusive negotiation with Intel starting on June 22, 2000. The general purpose of a term sheet is to list the principal areas of understanding, elicit discussion of business issues and set expectations. The term sheet from Intel was much more detailed and broad ranging. There was significant pressure from senior management, Catfish, and outside legal counsel to say yes to the deal since they felt it was the best opportunity available to Trillium. After extensive discussions it was concluded that the Intel deal would be good for Trillium's investors and employees (it provided liquidity for share and option holders), probably good for Trillium's customers (it provided new resources for product development and support), good for Trillium's business (there would be new customers from integrated chip and software solutions), good for Trillium's employees (good career opportunities, compensation and benefits) and good for Jeff and Larisa (it provided liquidity for their shares). On July 9, 2000, Trillium's board of directors voted unanimously to approve the proposed deal.

When the deal was publicly disclosed, Jeff, Larisa, Mr. C and others were inundated with personal and business calls. Employees experienced a range of emotions. Many were very excited while some were disappointed. Those that were disappointed had been thinking about a public financing and had expectations of a very high valuation. Being acquired by Intel didn't meet some of their expectations and those employees thought that Trillium's senior management may have made a mistake by settling for something less than it should have.

Work began on negotiating a definitive agreement. The negotiation and due diligence processes consumed huge amounts of time and energy. The negotiations were led and managed by the treasury group at Intel and by Mr. C at Trillium. The business group at Intel had very little contact with Trillium during the negotiation process. Because of its size, experience and business culture Intel had very specific and strong views about the negotiating process and deal terms. It was very challenging for Trillium to ensure the process and terms were fair to Trillium and its interests. The initial due diligence document request from Intel contained inquiries about finance, sales and marketing, legal, products, human resources, tax, property and environment, manufacturing (which didn't apply) business processes and information technology. The first delivery of due diligence documents to Intel consisted of over 100,000 pages of paper. The sheer volume and level of detail that was requested quickly validated how important it was to have in place systems to organize and maintain the corporate records (e.g. stock certificates, minutes, agreements, and other documentation) on an ongoing basis. It would have been close to impossible to pull things together in a short period of time if they weren't already together. A small team at Trillium was tasked to be responsible for the due diligence and negotiation processes. It was important to not get too distracted and ignore the day-to-day business of Trillium. Its performance during this time could affect the value and terms of the deal with Intel and importantly, if the deal didn't close, could affect Trillium's other acquisition and financing options.

Table 4 – Intel / Trillium Deal Agreements

Agreement	Description
Agreement and Plan of Merger and Reorganization	Shareholders could elect to receive either shares of Intel stock or cash. The consideration would be paid based on a total purchase price of $300 million. None of the shares of Intel stock would be registered. The deal was structured so that it was treated as a private placement and stayed within tax-free reorganization limits. Intel assumed all Trillium stock options.
Convertible Loan Agreement	Trillium was concerned about the consequences if the deal took a long time or did not close. A wholly owned subsidiary of Intel was obligated to lend Trillium up to $10 million at Trillium's request. The loan could be drawn upon even if the deal didn't close. The loan was convertible into various Trillium securities and repayable in full in 2002.
Founder Escrow Agreement	Intel did not want Jeff and Larisa to leave Intel / Trillium after the deal closed. A large percentage of Jeff and Larisa's consideration was deposited in an escrow account. The consideration was to be released over a 3 year period from the closing as long as Jeff or Larisa were still Intel employees. There was no earn out or performance requirement to release the consideration.
Indemnity Escrow Agreement	Trillium made a number of representations and warranties to Intel about its business. It also entered covenants with Intel that it would operate its business within specified guidelines prior to closing. Jeff, Larisa and Rader Reinfrank & Co. deposited $30 million into an escrow account to satisfy claims made for losses if Trillium breached its representations, warranties or covenants. The escrow lasted for 18 months.

Non-competition Agreement	Intel did not want Jeff and Larisa to compete against them. Jeff and Larisa were not allowed to compete against Intel, solicit employees or solicit customers from Intel for 3 years after closing.
Employment Agreement	All Trillium employees were fully integrated into the Intel compensation (i.e. salary, bonus, stock option) and benefits plans. The employment agreement described each employee's position and compensation package at Intel. It also had provisions for the assignment of inventions and secrecy.

The capital structure of Trillium at the time of the deal was:

Table 5 – Trillium Capital Structure on Fully Diluted Basis (approximate)

Security	Percentage
Common stock held by management and employees	63%
Vested and unvested non-qualified stock options held by management and employees	16%
Preferred stock and warrants for common stock held by investors	21%

The principles of the stock allocation plan developed in 1995 had been followed throughout the years but upon review of the results, Jeff and Larisa believed that the allocations were okay, but not as balanced or consistent as had been hoped. Unfortunately, there was very little that could be done about it by the time the deal discussions had started.

Jeff and Larisa put back into Trillium $20 million of their own common stock to ensure employee retention. The $20 million was paid to employees as two payments over a 6 month period. Almost every one of Trillium's 260+ employees at the time, stayed with Intel during the first 6 months after the deal closed. The attrition that did occur (< 2%) was mostly desirable. The reaction when the retention plan was announced was overwhelming. Employees were speechless, shocked, tearful, and disbelieving. Some of the things Jeff and Larisa were told by the employees that they were going to do with the money included buy a house, pay for a son to come to Los Angeles for Christmas, visit a widowed grandfather in Germany, pay for weddings, propose marriage to a girl friend, pay off a dead father's debts and take care of a disabled mother, pay off student loans, give to charities, pay for their children's college education, pay for a babies birth and more.

Throughout the negotiating and due diligence process there was pressure to close the deal as quickly as possible. Intel's treasury and business people were smart, organized, hard working and did what they said they were going to do. Unfortunately, Trillium felt that some of them were unnecessarily rigid, overly concerned about setting any precedents, and not very trusting although they asked Trillium to trust them a number of times during the negotiation. The deal closed, after early termination by the FTC of the Hart-Scott-Rodino antitrust review, on August 24, 2000. As part of the closing, Intel certified there were no Material Adverse Effects; any changes reasonably likely in the future to be materially adverse on the operations, assets, liabilities or earnings of Intel. On August 28 Intel stopped selling and recalled its Pentium III due to design defects and performance problems, on September 21 it issued an earnings warning and on September 28 it cancelled its Timna chip and delayed its Pentium 4 and Itanium chips due to design defects and performance problems. In just a little over a month (from August 24, 2000 to September 29, 2000) Intel stock plummeted from over $70 per share to $40 per share. During this same time the NASDAQ Composite (of which Intel was part of) went down only 10%. Jeff and Larisa were unable to trade any of their stock because it was either in escrow or constrained by Rule 144 of the 1933 Securities Act. Rule 144 restricts the sale of unregistered shares to volume limitations, manner of sale limitations and notice requirements. Furthermore, employees with vested options were not permitted to exercise and sell during a 30-day period after the closing of the Trillium sale. Jeff and Larisa did not have much personal finance experience prior to the deal and had to move up a very steep learning curve to learn about the theory, and practice of investment management.

Trillium's financial advisor earned a fee of 1.70% of the deal value at closing and Trillium's outside legal counsel earned a fee of about $500,000.

In hind sight, if the Intel deal had not occurred it is likely Trillium would have been very significantly downsized or out of business by the first quarter of 2001. The business plan upon which the 1999 financing was based upon called for rapid personnel and revenue growth through 1999 and 2000 leading to a public financing. Public financing valuations at that time were typically high multiples of forward revenue. The market has since moved back to moderate multiples of earnings. The business plan projected the need to go back to the public or private equity markets in the 4th quarter of 2000 or the 1st quarter of 2001. The telecommunications and .com market bubbles burst in the last half of 2000. As this happened the public and private equity markets shut down

completely and stayed shut for some time. Trillium, in the middle of a significant expense ramp and collapsing telecommunications market would have experienced a severe cash problem towards the end of 2000 with no likely means of raising additional funding.

Middle Age

Trillium became a wholly owned subsidiary of Intel through a reverse merger. It was renamed for external purposes as “Trillium, an Intel Company” and for internal purposes as the "Networking Software Division (NSD)"; in 2002, NSD was renamed as the “Control Plane Processing Division (CPPD)”. After the deal closed the paths of Jeff, Larisa and Mr. C/Trillium diverged. Jeff stayed in Los Angeles but functionally moved to Intel, Mr. C became the President and General Manager of Trillium/NSD and Larisa, who had reported to Jeff for 12 years, now reported to Mr. C as CTO of Trillium/NSD. Intel also assigned an Intel employee to Trillium/NSD as a General Manager Proxy, to be a resource at Mr. C’s disposal for learning how to navigate and operate in the Intel business environment.

The functional integration (finance, human resources, information technology, legal, etc.) of the Trillium organization into the Intel organization and the indoctrination of Trillium employees into the Intel culture was very quick and went well (rated "AAA" by Intel internally). The value integration was much more difficult and was never fully realized. There was wide ranging resistance, misunderstanding and misperception within Intel about Trillium’s value and the strategy of how that value was to be realized. After the deal closed NSD continued to focus on offering its communications software products and professional services to external customers and also started to develop cross divisional and business group customers within Intel. The NSD value proposition and strategy was to integrate its software with Intel chips to provide more complete solutions to Intel customers. This would then drive the sales of more Intel chips and software. Intel business groups and divisions wanted to use the NSD software and services to build demonstration projects, reference platforms, assist some strategic initiatives and assist some customer design activities but they had very little or no history of paying for this sort of support and very little or no history of charging their customers for software. Many divisions viewed software as something that was given away for free to drive the sales of chips. Business groups in Intel are very autonomous and generally held accountable for their own profit and loss. The development and acceptance of cross divisional and business group licensing and support models was an important issue for NSD because without these models it would not be able to meet the revenue, profit and loss targets that it was being held accountable for. Although NSD was respected for its technical knowledge and software business experience, it became perceived as difficult to deal with and unyielding by other Intel business divisions and groups as it pushed for acceptance of new business models, software development models, products and technologies.

Larisa continued in her role of developing the technological vision and strategy for NSD as well as providing guidance and advice to various development projects. Larisa also became very involved in educating Intel divisions and groups about NSD’s products, technologies and capabilities and working with the various Intel divisions to rationalize overlapping products, technologies, software architectures and organizations. This experience became difficult and frustrating as various entrenched constituencies with stronger positions in Intel managed and controlled organizational, technological and product directions.

Jeff was moved into a succession of roles within Intel and over a two year period had four bosses (these were the first bosses, other than Trillium’s shareholders and employees, Jeff had in over 12 years). Jeff became focused on broad business, technical and strategic issues for what was the Network Communications Group (NCG) and would later become the Intel Communications Group (ICG). Trillium was now a division of NCG and for a period Jeff was CTO of NCG. NCG had 5,000+ people and had revenues of $750+ million in 2000. The group provided chips, boards, systems and software for optical, broadband, Ethernet, wireless, network processors, storage and signal processing. As mentioned earlier, the communications group was a collection of many companies that had been brought together by acquisition and as a result had a formidable set of mission, integration, development, manufacturing, competitive and market issues. Jeff was primarily focused on these issues and received occasional reports about Trillium’s activities. In his role, Jeff had no responsibility or authority for Trillium, other than trying to help it gain acceptance in the Intel organization in the context of NCG’s and then ICG’s vision and mission.

What Intel did for personal computers, it wanted to do for communications. Personal computer OEMs distinguished themselves from each other by distribution channels and marketing. Communications OEMs distinguished themselves by offering differentiable feature, performance and price characteristics. As the telecommunications market collapsed communications equipment manufacturers started to move towards original design manufacturing (ODM) models and open platform models. This was threatening to many communications equipment manufacturers but reflected the changing economics of building and running the enterprise, access, and core networks.

Mr. C, like many other divisional Intel managers, became dissatisfied with the inconsistent direction and seeming lack of vision of Intel senior management in the communications group. Intel had effected two major internal reorganizations (with senior management shuffling and strategy changes) in the communications group in less than 12 months as its communications businesses continued to deteriorate. Mr. C's final straw came when Intel senior management, after enthusiastically approving a major strategy and operating change for NSD proposed by Mr. C (with a multi-year commitment designed to integrate Trillium software into Intel chips and related products more quickly), announced the plan internally and, within seven days, notified Mr. C that yet another reorganization would be made within the coming two months that would require the unwinding of NSD's newly announced plans and transfer of NSD into an underperforming Intel group. Mr. C expressed his dissatisfaction to Intel senior management in the 1st quarter of 2002 and worked out his departure from Intel in mid-2002.

Jeff had serious issues with the technology, business and strategies of the communications group and found that the group was unable or unwilling to accept or integrate his suggestions into their thinking. His issues were not personal but as a businessman and shareholder it didn't make sense to him that Intel was paying him a lot of money to do nothing. He left in March 2002. Larisa stayed longer but also found that she was frustrated in her role and she left in September 2002. Jeff and Larisa's payouts and escrows were accelerated when they left. Jeff, Larisa and Mr. C were not alone in their experience, as many senior executives from other acquired companies left Intel during this period. Some observations expressed by those that left included: business groups had such a tactical and operational focus that although they may have been making the best decisions for the business group, they were not necessarily making the best decisions for the greater and strategic benefit of Intel; employees didn't have a common understanding of the vision and strategies to realize the vision; functional groups wielded an inordinate amount of power over the business groups; and the organization was disciplined, loyal, insular and very highly matrixed, which required an immense amount of time to understand, navigate, direct and change.

Following the sale of Trillium in 2000, Intel senior management directed NSD to maintain its traditional business of supplying source code software products and services and to quickly double its employee headcount to integrate Trillium software products into various Intel chips and related products. NSD's planned operating budget called for substantial operating losses for a couple of years during this product development period since its newer products would not generate any substantial revenue in the short-run. Intel's executive management repeatedly stated its belief that the best way to weather an economic downturn was to invest heavily in research and development. Even as the telecommunications market was collapsing in 2001, NSD was growing towards its agreed upon plan of approximately 500 employees (240+ employees in Los Angeles, 100+ employees in Bangalore, 50+ employees in Vancouver and the balance elsewhere) by February 2002.

In the 1st quarter of 2002 Intel reviewed the future of NSD. At this point NSD had a pretty large headcount, offered over 100+ software products and had 300+ active maintenance contracts and, as planned, didn't have sufficient revenue to cover the expense of its larger headcount for the short-run. Even though NSD was meeting its plan Intel senior management felt that it was not generating sufficient revenue and so was not realizing its strategic value within the rest of the Intel organization. The revenue stream from Trillium's traditional software products and services was relatively small by Intel standards and did not seem important to Intel senior management. Mr. C's departure during this period and his replacement by another Intel employee who had very little knowledge about the history, plans, organization and customers of NSD made it difficult to represent NSD's interests very well. In the short-term Intel decided to reposition NSD and emphasize its professional services businesses and reduce its investment in the source code software products. The professional services would continue to pursue external customers and product development would focus on products and projects within Intel that would have a high probability of capturing chip design wins for its network processors. For the long-term Intel started discussions

about combining NSD's operations with other divisions, shutting down NSD, selling its assets or even making its intellectual property (source code communications software) open source.

Rebirth

Intel approached Jeff in the first quarter of 2002 and asked whether he would be interested in buying back what was left of Trillium. Jeff passed on the opportunity citing a number of reasons including his belief that the value proposition, market, and competitive landscape for Trillium software and services was becoming more challenging and the value of Trillium as a business entity had changed significantly as a result of its integration into Intel. In short, Jeff answered it was time to move on.

Continuous Computing, a company based in San Diego, CA (www.ccpu.com), acquired Trillium's assets from Intel in February 2003. The assets consisted of the Trillium brand communications software, its associated intellectual property and about 50+ NSD engineering, marketing and sales people. Continuous was founded in 1998 by six people with $60,000 to provide computer equipment to the telecommunications market. Continuous had about 200 employees and had raised $48 million of private equity as of October 2004. Continuous currently provides high availability platforms for telecommunications, computing hardware products and Trillium brand communications software. One of the co-founders, and the CEO of the company at the time of the Trillium asset acquisition, was very familiar with Trillium prior to its acquisition since he had previously worked for a potential Trillium customer and had also interviewed for a VP of Marketing & Sales role at Trillium in the mid to late 1990s. The financial terms of the deal were not publicly disclosed but it can be reasonably speculated that the valuation was significantly less than what Intel acquired Trillium for in August 2000. At the time the deal closed, Intel Capital was already an investor in Continuous Computing.

The people that worked at NSD and were not part of the Continuous deal were either redeployed (i.e. left Intel) or found positions in other parts of the Intel organization in the Intel Architecture Group, Intel Communications Group or other functional groups such as finance, human resources, and legal. Many of those that left Intel found positions in the technology industry although many others left the technology industry completely. Trillium's headquarters facility in Los Angeles was closed in July 2003. Jeff and a couple of other former Trillium employees were there to turn the lights off. Trillium as a business entity no longer exists. The Trillium brand communications software continues to exist and is still well respected and valued by the communications industry. It is still generating good revenue and opportunities for Continuous Computing on its own as well as a part of a complete hardware and software solution that is offered as a turnkey application ready platform. The Intel Communications Group (which offers networking, communications and flash memory products) represented over 15% of Intel's revenue and as of October 2004 has not yet had a profitable quarter since it was formed. At the time the Intel/Trillium deal closed in August 2000 Intel stock was trading at an all time high of over $71 per share, in October 2004 Intel stock was trading at around $20 per share.

Trillium's 15 year run started the same year (1988) the Internet shifted from exclusive government and educational control to commercial usage and 2nd generation cell phone standards were created and deployed. In 1988 there were less than ½ million Internet users, about 4 million cell phone users and 0 broadband (DSL, cable) users. By 2004 these numbers had increased to over 800 million Internet users, almost 1 billion cell phone users and over 125 million broadband users. This growth started out of a recession in 1987, weathered the East Asian financial crisis, and rode the telecommunications and .com bubbles both up and down. During the 15 years Trillium licensed its software to over 500 projects that were used to build communications equipment for the wireless, broadband, Internet and telephone network infrastructure.

For Jeff and Larisa, Trillium was a 14 year run of 24 x 7 days. Jeff is now spending some time with his family, managing his personal finances, speaking occasionally, running a family foundation he and his wife funded from the deal and working on some new technology and product ideas. Larisa is spending time with her family and managing her personal finances. Mr. C is involved in real estate, spending more time with his family and looking for another interesting business opportunity. The final measure of Trillium's impact can be described by some of the personal comments (see Attachment 7) communicated to Jeff and Larisa from investors, employees, customers and others when they left Intel.

Case Questions:

What does a CEO do during the later stages of a company and what are the important personal characteristics of the CEO?

How should a potential acquisition or merger candidate be approached?

What are the pros and cons of having raised venture capital? How did venture capital money change the business?

Evaluate the offer from Intel. Is it fair? Would you accept it? What are the risks in accepting the offer? What are the personal and company considerations Jeff and Larisa should have weighed in evaluating the Intel offer?

Did Jeff and Larisa hang on too long?

What was Trillium's sustainable advantage? What were Trillium's keys to success?

What are your takeaways from this case?

Can this be done again?

Additional Information

This paper was focused on the factual aspects of Trillium's life from 1996 to 2003 and doesn't adequately convey some of the ambiguity, challenges, excitement, changes and lessons learned during this period. Some additional information is available at:

"Trillium Digital Systems Case Study: 1988 – 1995"
by Jeff Lawrence at http://www.cliviasystems.com/general/trilliumCaseStudy95.pdf

"Trillium Digital Systems Case Study: 1996 – 2003" (this paper)
by Jeff Lawrence at http://www.cliviasystems.com/general/trilliumCaseStudy03.pdf

"A Founders Journey thru Growth and Change"
by Jeff Lawrence at http://www.cliviasystems.com/company/growthChange.htm

"Risk, the Game of Life"
by Jeff Lawrence at http://www.cliviasystems.com/activities/risk.htm

"Why Be an Entrepreneur?"
by Jeff Lawrence at http://www.cliviasystems.com/activities/whyBeAnEntrepreneur.htm

Attachments:

1 - Trillium Facts and Figures
2 – Trillium organization (2000)
3 – Summary of Series A Terms (partial)
4 – Trillium Poster (1997 and 1999)
5 – Communications Industry Value Chain
6 – Communications Industry Market Segments
7 – Goodbye Quotes

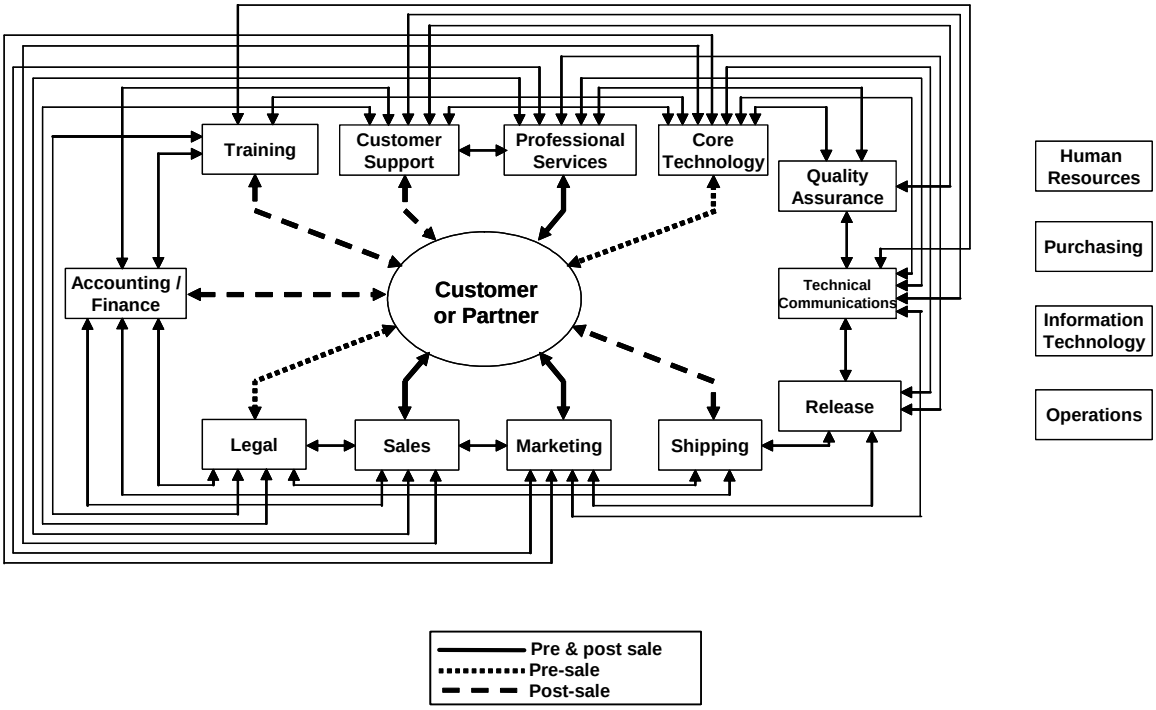
Attachment 1 - Trillium Facts and Figures

	Dec 1995	Dec 1996	Dec 1997	Dec 1998	Dec 1999	Aug 25, 2000
Environment						
NASDAQ Composite	1,052	1,291	1,570	2,192	4,069	4,042
DJIA	5,117	6,549	7,908	9,181	11,497	11,192
Corporate						
Corporate entity	C	C	C	C	C	C
Financial reporting method	accrual	accrual	accrual	accrual	accrual	accrual
Compensation, stock and benefits						
Preferred stock						
Authorized	0	0	0	0	5,068,000	5,068,000
Shares issued	0	0	0	0	4,729,729	4,729,729
Total paid in capital	$0	$0	$0	$0	$14,000,000	$14,000,000
Number of shareholders	0	0	0	0	2	2
Common stock						
Authorized	1,000,000	25,000,000	25,000,000	25,000,000	100,000,000	100,000,000
Shares issued	600,000	15,025,000	15,075,000	15,164,000	15,351,000	15,482,452
Number of shareholders	2	3	3		8+	55+
Options						
Stock option plan	Yes	Yes	Yes	Yes	Yes	Yes
Non qualified options authorized	150,000	3,750,000	3,750,000	3,750,000	3,750,000	
Non qualified options outstanding	39,500	1,393,750	1,831,875	2,154,934	3,058,462	3,690,630
Number of option holders	5+	5+	25+	80+	140+	250+
People						
Functional						
Engineering	16	35	51	53	64	
General & Administrative	6	16	25	26	40	
Marketing & Sales	2	4	13	19	39	
Customer Services & Quality Assurance	1	3	15	15	34	
Professional Services	0	0	0	9	38	
Total	25	58	104	122	215	262
Title						
Board Directors	2 (inside) 0 (outside)	2 (inside) 0 (outside)	3 (inside) 0 (outside)	3 (inside) 0 (outside)	3 (inside) 1 (outside) 1 (vacant)	3 (inside) 1 (outside) 1 (vacant)
President & CEO	1	1	1	1	1	1
COO	0	0	1	1	1	1
General Counsel & CFO	0	1	0	0	0	0
CFO	0	0	1	1	1	1
General Counsel	0	0	1	1	1	1
VP Technology	1			0	0	0
CTO & VP Engineering	0			1	0	0
CTO	0	0	0	0	1	1
VP Engineering	0	0	0	0	1	1 (acting)
VP Marketing & Sales	0			1	1	0
VP Marketing	0	0	0	0	0	1
VP Sales	0	0	0	0	0	1
VP Customer Services & Quality Assurance	0	0	0	0	1	1
VP Professional Services	0	0	0	1	1	1

Attachment 1 - Trillium Facts and Figures (continued)

	Dec 1995	Dec 1996	Dec 1997	Dec 1998	Dec 1999	Aug 25, 2000
External						
Accounting	Tax - Big 6 firm; Audit - Big 6 firm				Tax and audit - Big 6 firm	Tax and audit - Big 6 firm
Legal	Business, licensing, securities - Small private practice	Business, licensing, securities - In house with occasional external	Business, licensing, securities - In house with occasional external	Business, licensing, securities - In house with occasional external	Business, licensing, securities - In house with occasional external	Business, licensing, securities - In house with occasional external
Banking	Large retail bank	Large retail bank	Large retail bank	Large retail bank	Large retail bank	Large retail bank
Events	Mr. B separated Aug; First foreign national relocated to Los Angeles				Raised Series A private equity of $14 mil in July and Sep	Acquired by Intel for $300 mil in Aug
Money						
Income						
Products	$7,937,000	$9,068,000	$9,556,000	$9,655,000	$11,774,000	N/A
Services	$1,573,000	$2,529,000	$5,534,000	$5,002,000	$5,639,000	N/A
Professional services	$0	$0	$0	$0	$2,797,000	N/A
Total	$9,510,000	$11,597,000	$15,090,000	$14,657,000	$20,210,000	N/A
Costs & Operating expenses						
Costs	$325,000	$597,000	$2,056,000	$2,396,000	$4,995,000	N/A
R & D	$1,041,000	$1,935,000	$4,823,000	$6,226,000	$7,822,000	N/A
S & M	$1,468,000	$1,898,000	$3,280,000	$4,710,000	$7,892,000	N/A
G & A	$2,031,000	$2,281,000	$2,753,000	$3,352,000	$5,211,000	N/A
Total	$4,865,000	$6,711,000	$12,912,000	$16,684,000	$25,920,000	N/A
Operating Income	$4,645,000	$4,886,000	$2,178,000	($2,027,000)	($5,710,000)	N/A
Net income	$2,742,000	$3,149,000	$1,486,000	($1,081,000)	($5,232,000)	N/A
Stock valuation method	valuation	valuation	valuation	valuation	series A private equity at $14 mil and valuation	acquired by Intel at $300 mil
Space						
Office (square feet)	10,000		30,000			
Location - HQ and development	Los Angeles	Los Angeles	Los Angeles	Los Angeles	Los Angeles	Los Angeles
Location - development	-	-	-	-	Burnaby	Burnaby
Location - development	-	-	-	-	-	-
Locations - sales	Los Angeles	Los Angeles	Los Angeles	Los Angeles	Various	Various
Products						
Consulting						
X.25	x	x	x	x	x	x
Operating System	x	x	x	x	x	x
ISDN	x	x	x	x	x	x
Frame Relay	x	x	x	x	x	x
Integrated	x	x	x	x	x	x
Signalling System 7	x	x	x	x	x	x
Asynchronhous Transfer Mode	x	x	x	x	x	x
Interworking			x	x	x	x
High Availability				x	x	x
Internet Protocol					x	x
Services						
Professional Services				x	x	x

Attachment 2 – Trillium Organization (2000)



Attachment 3 – Summary of Series A Terms (partial)

Issue

Company completed the sale to investors ("Holders") of an aggregate of 4,279,729 shares of mandatorily redeemable convertible Series A Preferred Stock for $2.96 per share, resulting in aggregate proceeds to the Company of $14,000,000. The Series A Preferred Stock carries no par value.

Holders also received detachable warrants to purchase 443,333 shares of the Company's Common Stock at $3.75 per share, subject to adjustment for stock splits or dividends.

Liquidation Preference

Holders of the Series A Preferred Stock are entitled to receive, prior and in preference to any distribution of the Company's assets to the holders of the Common Stock and any other stock of the Company ranking on liquidation junior to the Series A Preferred Stock, an amount equal to $2.96 per share for each share of Series A Preferred Stock then held, plus declared but unpaid dividends. Holders then participate in the distribution of the Company's remaining assets on a pari passu basis with the common stockholders until the Holders of Series A Preferred Stock receive an aggregate of $6.66 per share of Series A Preferred Stock.

Uses of Proceeds

The proceeds from the Series A Preferred stock funding will be used for working capital and acquisitions.

Voting Rights

Holders of the Series A Preferred Stock will have the same right to vote as-if-converted to Common Stock.

Mandatory Redemption

Any shares of Series A Preferred Stock not converted within five years of closing are subject to redemption by the Company, at the option of the Holders of Series A Preferred Stock, at a price equal to the greater of the initial purchase price or the Series A Preferred Holders pro-rata share of the Company's fair market value, as determined generally by third party appraisal.

Warrants are also subject to redemption by the Company, at the option of the Holders of the warrants, if not exercised within five years of closing.

Registration Rights

Holders will have the right to demand one registration within three years of an initial public offering and piggyback on the underlying shares of any underwritten public offering within five years of an initial public offering.

Pre-emptive Rights

Holders will have the right to purchase on the same terms as are available to other investors, their pro-rata share of any new issues of securities in a private offering.

Conversion Rights

The Series A Preferred Stock is convertible at any time into shares of the Company's Common Stock on a one-for-one basis, which conversion ratio may be subject to adjustment in the event the Company completes certain sales of Common Stock at a price less than $2.96 per share. The Series A Preferred Stock is automatically converted to Common Stock upon the completion of an initial public offering of the Company's Common Stock resulting in gross proceeds of at least $20 million with a pre-money valuation of the Company of not less than $100 million.

Anti-Dilution

Holders will receive standard anti-dilution adjustments for stock splits or dividends as well as other additional forms of anti-dilution protection.

Rights of First Refusal

The significant shareholders if desiring to sell more than 5% of their shares (other than through an initial public offering), shall be required first to offer such shares to the Company and subsequently to the holders of the Series A Preferred Stock.

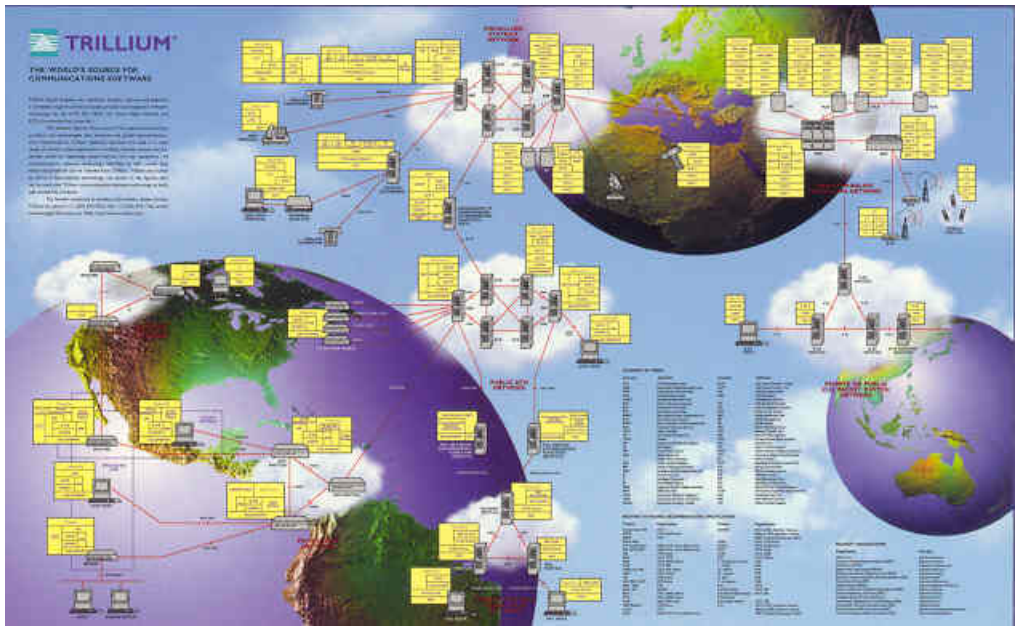
Information Rights

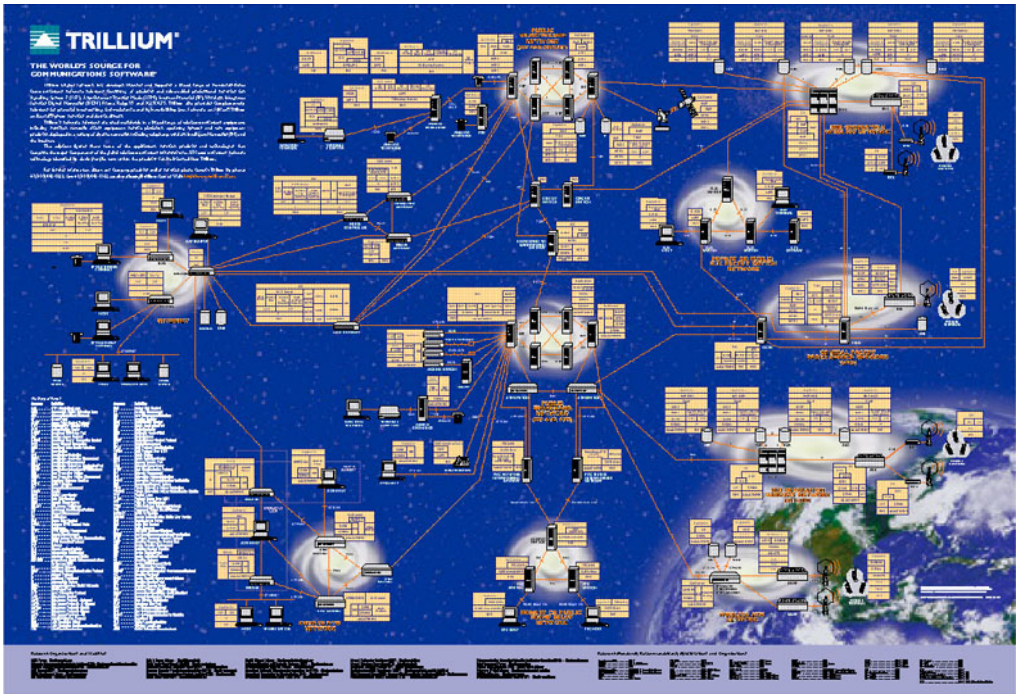
The Company shall deliver audited financial statements on a yearly basis and management prepared financial statements on a quarterly basis. A representative of the Holders will have a reasonable right of access to financial records and facilities of the Company.

Board of Directors

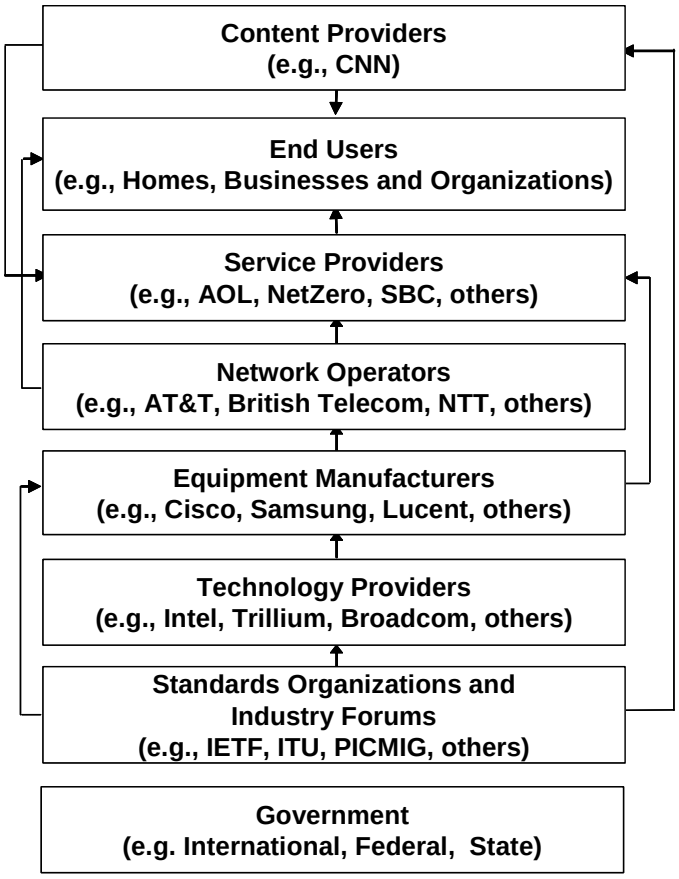
The Company's Board of Directors shall be limited to no more than seven members. The majority of the Holders will have the right to appoint one member to the board. At least two members of the Board will be outside non-management members who will be elected as suitable candidates are identified.

Attachment 4 - Trillium Poster (1997 and 1999)





Attachment 5 – Communications Industry Value Chain



Attachment 6 – Communications Industry Market Segments

	Clients & Devices	Infrastructure				
		Core	Access			
			Narrowband	Broadband	Mobile Wireless	Fixed Wireless
Type of Network	Enterprise, home	Public	Public	Public	Public	Public
Sub-types of Network	Not applicable	Core transport, metro transport and access	Narrowband access, remote access, aggregation	Broadband access, aggregation	Wireless access, aggregation	Wireless access, aggregation
Interface Characteristics	10/100E, HomePNA, HomePlug, Bluetooth, HomeRF, 802.11, IEEE 1394, 2G / GPRS / 3G / 4G wireless	OC-768, OC-192, OC-48, OC-12, OC-3, GbE, T/E	Analog, ISDN, T1/E1	DSL, cable, satellite, HFC, I(A)PON, OC-12, OC-3, T3/E3	2G / GPRS / 3G / 4G wireless - WCDMA, CDMA2000, GSM, PDC, TDMA, CDMOne, GSM, AMPS	MMDS, LMDS, 802.16, Free space optical
Product Solutions	Audio / screen / video IP phone, 2G / WAP / GPRS / 3G / 4G wireless handset, TV, DVR, PC, game console, tablet, PDA, laptop, consumer device, sensor	Core switch / router, edge switch / router, metro switch / router, multi service switch, media gateway controller / softswitch, optical cross connect, optical add/drop mux, signalling gateway, trunking media gateway, service node, service platform, test and monitoring, content switch, application / control / directory server, storage	Access switch, multi service switch, media gateway controller / softswitch, access gateway, residential gateway, remote access server, test and monitoring, cache server, storage	DSLAM, CMTS, multi service switch, media gateway controller / softswitch, access gateway, residential gateway, test and monitoring, content switch, cache server, storage	Base station controller, base transceiver station, radio network controller, node b, serving GPRS support node, gateway GPRS support node, location register, authentication center, equipment id register, media gateway controller/ softswitch, test and monitoring, content switch, cache server, storage	Base station, multi service switch, media gateway controller / softswitch, access gateway, residential gateway, test and monitoring, content switch, cache server, storage
Value Drivers	Power, cost, ease of use	Performance, availability, manageability, reach, scalability	Performance, availability, density, power, manageability, scalability	Performance, availability, density, power, manageability, reach, scalability	Performance, availability, density, power, manageability, reach, scalability	Performance, availability, density, power, manageability, reach, scalability

Attachment 6 – Communications Industry Market Segments (continued)

Enterprise			Home	Service Platforms, Servers, Storage
Small	**Medium**	**Large**		
< 4 users	**< 100 users**	**> 100 users**		
Private, enterprise	Private, enterprise	Private, enterprise	Home	Not applicable
SOHO, VSO, LAN	Enterprise, PBX, iPBX, Key system, SOMO, LAN	Enterprise, PBX, iPBX, LAN, SAN	Home, SOHO	Not applicable
10/100E, HomePNA, Bluetooth, HomeRF, 802.11, 802.16, IEEE 1394	GbE, 10/100E, T1/E1, T3/E3, Bluetooth, 802.11, 802.16,IEEE 1394	GbE, 10/100E, T1/E1, T3/E3, Bluetooth, 802.11, 802.16, IEEE 1394	10/100E, HomePNA, HomePlug, Bluetooth, HomeRF, 802.11, 802.16, IEEE 1394	100E, 1/10 GbE, SCSI, Fibre Channel, InifiniBand, iSCSI
Business gateway, integrated access device, router, network interface card, wireless LAN, firewall and intrusion detection, application server, web server, storage	Business gateway, integrated access device, workgroup switch / router, backbone switch / router, server switch, content switch, IP PBX, network interface card, wireless LAN, firewall and intrusion detection, application server, web server, media server, dbase server, storage	Business gateway, integrated access device, test and monitoring, workgroup switch / router, backbone switch / router, mux, server switch, content switch, IP PBX, network interface card, wireless LAN, firewall and intrusion detection, application server, web server, media server, dbase server, storage	Residential gateway, settop box, cable modem, DSL modem, router, network interface card, wireless LAN	Service platform, service node, content / server switch, application / control / media / directory / security / dbase / web server, content processing, storage, media gateway controller / softswitch, location register, authentication center, equipment id register, position determining entity
Performance, availability, manageability	Performance, availability, manageability, scalability	Performance, availability, density, power, manageability, scalability	Cost, availability	Performance, availability, density, power, manageability, scalability

Attachment 7 – Goodbye Quotes

Trillium products were used for over 500 projects.

“I can count the number of companies that made me money on one hand, and you’re one of them.” – A Trillium investor

“I decided to write to you this evening because you have touched my life. You see, my daughter works for you… I want to thank you for giving her a fine example of how achieving success does not mean sacrificing your humanity…” – Mother of a former Trillium employee

“Thank for the opportunity to work with the best people in Los Angeles… I couldn’t have asked for a better group. Thank you for pulling all of these wonderful people together.” – Former Trillium employee

“Thanks for helping me achieve my career and financial goals.” – Former Trillium employee

“I want to say a very big thank you for your inspiration as a leader and the opportunities that you helped create for all of us.” – Former Trillium employee

“You, through Trillium, gave me and my family a chance of a new life, fresh challenges and greater horizons to conquer.” – Former Trillium employee

“Instead of being just a leader, you were and still are a coach guiding people in small steps to meet massive goals. That, to me, is the best way to teach and be taught, by example.” – Former Trillium employee

“I am proud to work for a company that values their employee’s efforts and contributions.” – Former Trillium employee

“I haven’t worked for many companies, maybe 6, but Trillium is by far the best; this is mostly due to the atmosphere and culture the two of you have created over the years. Be it the work environment, the sense of purpose or the parties, Trillium has become a great thing.” – Former Trillium employee

“Trillium set the gold standard for the industry.” – Former Cisco business development employee