

ARCHIMAX SYSTEMS LTD.

Stephen Jack prepared this case under the supervision of Professor Joseph N. Fry solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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Early in June, 1994, Charles Douglas, a recently graduated MBA, and an equally recent employee of Archimax Systems Ltd., met with R.J. Bates, the president of Archimax, to review plans for the company's exhibition booth at SIGGRAPH 94. Douglas was standing in for his boss, Gary Hopkins, who had just left for an extended holiday sailing in the Greek Islands, confident that the plans for the booth were set, and that Douglas would carry through with the implementation.

But Bates was not satisfied with the plans. He was concerned that the exhibit was not impressive enough and didn't fully reflect Archimax's accomplishments and technology. He instructed Douglas to make a number of significant changes in the content and mechanics of the presentation.

Douglas left the meeting with more than a few concerns. SIGGRAPH opened in just six weeks. He wasn't at all sure that the changes could be completed by then. Further, he had been cautioned in earlier conversations with Max Emery, the company controller, that cash was tight, and that holding the line on costs was important. Most recently, as Hopkins was preparing to leave on his holidays, Emery had warned, "no changes without agreement from Hopkins". But a quick guess indicated that the new requirements might add nearly \$500,000 to the original estimates of slightly over \$1,000,000 for the exhibit. Finally, Douglas felt that he had been put in a situation in which his boss's boss had hijacked the project. The changes that Bates had in mind were in significant conflict with the approach Hopkins had been taking to the exhibit. What was he to make of this?

THE VIRTUAL REALITY INDUSTRY

The Technology

Archimax was a fledgling company in the emerging virtual reality industry. "Virtual Reality" was the term given to the effects made possible by the convergence of two technologies, three dimensional (3D) computer imaging and robotics. By ingeniously merging the technologies, subjects in a virtual reality experience were given the illusion of an alternate reality, a world in which manufactured images and sensations were perceived as if they were reality itself. This effect was achieved by immersing the subject in an environment of created objects that looked and acted like real objects; (for example, a subject would feel a bump on visually "walking" into a wall image), and by adding other sensory input such as sound, temperature, and smell. Flight training simulators were an early application of the possibilities of the concept of virtual reality. In current development projects, however, the ambitions of virtual reality were reaching well beyond the limited repertoires of simulators, to encompass a much wider range of user input and experience.

The creation of a virtual reality experience required the integration of a system of supporting equipment and related database, as illustrated in Exhibit 1. The main elements of hardware in a generic virtual reality system were: an 1) image generator, 2) host computer, 3) input device, and 4) output device. The image generator processed input and database information to produce images — objects, color, texture, motion, background, etc. Image generator manufacturers sold their product in units of capability called "channels", which were currently priced at \$150 to \$200,000 per channel. Image generators usually represented at least half of the cost of a virtual reality installation and were the key to the quality of the experience. Like most electronic equipment, image generator prices were falling, even as they increased in performance.

The host computer housed the custom database and software for the experience and operated to control the system by bringing together the stored data and input device feed to drive the image generator and associated output devices. The required host computer capabilities were on the order of a competent engineering workstation.

Input and output devices were directly dependent on the type of experience being created. The input devices for a car racing experience, for example, would include a gas pedal, brake, steering wheel, and gear shift. The output devices for the same experience would include a head mounted or projection display system and a motion platform that would react to events as they occurred.

The database software was the raw material from which the virtual reality system produced the user's virtual world. The larger the database, the larger and the more detailed the world in which someone could participate — but also the more powerful and expensive the image generator and host computer/software would have to be. The

minimum cost to create a database of usable size was about \$175,000. Databases could be used in a number of sites and/or experiences if the targeted end results were similar.

The Virtual Reality Market

The market for virtual reality applications was in its infancy and thus difficult to categorize and quantify. In general, virtual reality applications were positioned as an integral part of a broader, \$6 billion, 3D imaging market. Elements of virtual reality were found, for example, in such major 3D imaging sub-markets as flight simulation, entertainment, computer assisted design, and Medical/Catscan. Among the 3D sub-markets, however, the entertainment segment was widely regarded as the most attractive for the near term development of virtual reality applications; with these applications leading, industry observers had forecast sales for virtual reality systems of about \$1 billion in 1996.

The major prospective customer groups or channels in the entertainment business were: 1) mall developers and owners, 2) theme and amusement parks, 3) location-based entertainment centres such as casinos and retail stores, 4) edu-tainment centres such as museums and science centres, and 5) cross promotion prospects, such as beer and athletic shoe marketers. The appeal of virtual reality in these markets ranged from offering a quantum improvement over arcade games in malls and amusement parks, to providing a powerful custom designed package in the case of museums and product promoters, to the possibility of a proprietary range of experiences in a theme park. To this point, however, most customers had had minimal experience with virtual reality and were for the most part testing a promising, but unfamiliar and relatively expensive product. In many cases, and particularly with independent customers such as small amusement parks, prospective customers were seeking manufacturer support for their entry into virtual reality.

The Supply Structure

The supplier structure of the virtual reality-entertainment market was split between specialized producers on the one hand and system integrators on the other. Within each of these categories there was a handful of sizeable companies and a multitude of smaller players. The specialized producers concentrated on one element of the system described in Exhibit 1, such as image generators, or database software. Among these specialized producers, Silicon Graphics Inc. (SGI) was by far the largest and best known company. SGI had been a pioneer in 3D imaging and was best known for its engineering workstations for computer assisted design. SGI was a major supplier of image generators to companies assembling virtual reality entertainment experiences and was known to be working closely on product development with the video-games giant, Sega. Other competent companies, such as Evans and Sutherland and Martin Marietta, sold

image generators; and a wide and changing range of suppliers, most of which were small enterprises, worked on other systems and components such as database software development and robotics.

System integrators designed and assembled a total virtual reality product. The degree of vertical integration among the integrators was quite low, although some, such as Disney Imagineering, encompassed design and software, and others such as Evans and Sutherland, built their own image generators into their products. But even the large firms such as Sega relied heavily on the efforts of a range of independent suppliers.

Among the integrators, the larger firms such as Disney and Sega tended to concentrate on total experiences such as a full game park. Smaller integrators, such as Magic Edge and W Industries, focused on the development and sale of specific experiences. Some integrators had begun to develop the concept of indoor theme parks, called Location Based Entertainment Center's (LBE's). This new concept was a step forward in the value chain for the integrators as the LBE's would be stocked with the integrators' equipment. Some integrators planned to operate the locations and others planned to franchise. There were also independents seeking to design and operate/franchise LBE's. These companies had the theme and location but not the equipment or software.

In spite of its promise, the market for virtual reality products had proven to be a difficult one. As one industry observer put it, "So far the only people who have made money in virtual reality are those who write about it - and SGI who sells to those who try". The shortage of proven products and markets meant that long term financing was difficult to come by. The larger companies, of course, could rely on cash-flows from other product/markets, but many of the smaller companies were forced to operate on a shoestring and to devote a significant proportion of their energy to financial survival.

ARCHIMAX

Archimax was incorporated by R.J. Bates and Greg Raidler in Richmond, British Columbia, in 1989. Bates had just moved west after a successful marketing career which included experience in high tech and entertainment companies and in the operation of his own advertising and PR firm. From this experience he had become convinced that technical developments would make it possible to open new markets in entertainment, but he had been unable to persuade his employers of the potential of his vision. He had met Greg Raidler, an accomplished electronics engineer, at an industry association meeting and after a number of conversations the two decided to pursue a start-up from a new base.

For almost three years Bates worked from his home trying to raise money for a major development project and Raidler did contract work for various companies to keep the company afloat. The dream was to build a unique computer system, dubbed the C21,

which would serve as an image generator and control system specifically for virtual reality applications in entertainment. Several small grants from the B.C. and federal governments had helped to keep the project alive, but the prospects of survival were pretty grim when Bates was introduced to Evan Lee.

Lee was a well known personality in the west coast technical and financial communities. Earlier in his career he had built a very successful disk drive company, only to see it crash as a result of over expansion and industry squeeze. Lee vowed at the time never to expand a project until the money was in the bank, and true to his word, he had used conservative strategies to rescue and rebuild two other computer industry start-ups. He was impressed by Bates and Raidler and ultimately a deal was struck under which he became a shareholder, and Chairman, part time, of Archimax.

Lee's early moves were to raise some private funding for Archimax, and to arrange a public stock listing by way of a reverse takeover under which Archimax was acquired by a shell Vancouver Stock Exchange company. Most recently he had been instrumental in Archimax's acquisition of PS Technologies, an Austin, Texas-based developer of image generators.

The Archimax Strategy

The focal point for Archimax's efforts remained with the development of virtual reality experiences for the entertainment market. A key element in this approach was the completion of the C21, which would give Archimax an industry leading position in low cost, high quality graphics. The C21 would be available for sale to equipment integrators but Archimax also intended to supplement the C21 through alliances to provide a complete product, for example, by working with design firms and software houses to provide a turnkey product and merchandising service to the theme parks and shopping malls.

C21 was an ambitious project. It was based on new technologies and design concepts which promised superior results and economies. As of June, 1994, however, the C21 development program was behind schedule and over budget. Raidler was unperturbed by this, saying only that in a development project as complex as this, delays and unforeseen costs were bound to occur. He was confident that a working prototype would be completed by the end of 1994, with systems available for sale by mid 1995.

As a result of the delays with C21, the original Archimax was still very much a development company. Operations statements and balance sheets for the period ending April 30, 1994, and just prior to the PS Technologies acquisition, are presented in Exhibits 2 and 3. A rough statement of planned uses and sources of financing, including the PS Technologies acquisition, is outlined in Exhibit 4. Beyond this, Archimax's financial aims were to be self-financing from operations in two years.

The PS Technologies Acquisition. In Lee's view, the acquisition of PS Technologies fit into the overall Archimax strategy by providing some immediate credibility in image generation, a cash flow bridge, and a faster accumulation of the business base needed to secure a NASDAQ listing.

PS was an organization of about 40 people that operated as a division of Larson Electronics, a very large avionics and general electronics manufacturer based in Austin. PS had been losing money and had been through two years of uncertainty as its parent went through a process of refocusing on its core avionics products and customers. An assessment team from Archimax concluded that PS still had a nucleus of good technical people and some attractive projects underway, but that its sales force had been badly mauled in the ups and downs of the divestment process. Notably, PS had a fully developed product on the market, the PS 100 image generator and a \$4-million agreement in principle to develop a custom product for Petco, a Taiwanese video game manufacturer. These products nicely fit into a capabilities/price range below the C21.

Lee was particularly intrigued by PS's inventory of fully and partly assembled PS100s, worth an estimated \$2.8 million, albeit in a rapidly changing market. In late May of 1994 he made a deal for PS for \$900,000 cash, Archimax shares valued at \$1.8 million, and an assumption of \$1.4 million of PS's liabilities. An immediate aim following this transaction was to generate cash as quickly as possible by selling off the PS100 inventory.

The Archimax Organization

The Archimax organization in Richmond consisted of fewer than 15 people and operated on a very informal basis. It was Douglas' view that management, from Bates on down, was stretched thin and was under tremendous pressure to balance their time between long term needs and critical short term demands.

At the time of the case Archimax was in the process of setting up PS Technologies to operate as an autonomous profit center. It was thought that the freedom to operate, which had not been the Larson Electronics style, and the spur of tangible business goals would energize PS to work off its inventory and finalize a contract on the Petco development project. To Douglas, this was making a virtue of necessity - Archimax had minimal resources to commit to supervising and assisting PS management.

THE SIGGRAPH EXHIBIT

SIGGRAPH was the acronym for an industry association called the Special Interest Group on Graphics. To achieve its objectives of providing education and information on computer graphics, SIGGRAPH organized an annual convention that was the

showcase for everything that was new to the graphics industry. The convention was known as an image show, where exhibitors demonstrated their best ideas, rather than a sales show aimed at specific product sale. Attendance had grown in the 15 years of SIGGRAPH's life to over 30,000 for the three-day show.

Early in the year, Lee and Bates had decided that Archimax needed exposure and that attendance at SIGGRAPH was an essential step. The task of carrying this through fell primarily to Gary Hopkins, vice president for marketing and product development, and next to Bates and Raidler, the longest term member of the management team. In preliminary meetings it was decided that Archimax would commit to a 50' x 60' booth, which would rank it among the largest exhibits at the show. The prime concerns centred around the look of the booth and what the main focus would be. The problem was that the C21 was still in development and the PS100 was nothing new. Bates and Hopkins were concerned that too great a focus on a development project would create the impression of promoting "vapourware" — a term used in the industry for products that were announced even though they didn't exist. It was decided that Archimax would present a full virtual reality experience that demonstrated its design and integration capabilities, although, of necessity, outside suppliers would have to be used for the system components.

There was a further aim in developing the SIGGRAPH exhibit. The IAAPA (International Association of Amusement Parks of America) convention was scheduled three months after SIGGRAPH. IAAPA was a key sales show in the industry and would attract a very different audience of buyers and owners from amusement and theme parks. Archimax could use this same booth with some relatively inexpensive changes.

Work started on the design of the exhibit and sourcing of components. This was a major job that involved people from across the organization in very significant tasks. Hopkins worked full time and then some to get the concept and technical components agreed and to coordinate the effort of various internal and external participants. One major accomplishment was recruiting Apex Images, an emerging "hot" software developer, to collaborate in creating the exhibit database.

It was clear from the start that the exhibit would be an expensive proposition, but no specific numbers were available until Douglas put together a formal budget as one of his first tasks on joining Archimax. This budget, dated June 1 and calling for expenditures of \$1,050,000, is outlined in Exhibit 5. Then, with the concepts, budget, and most arrangements seemingly settled, and Douglas working into the picture, a very tired Hopkins felt he could leave on a long-planned vacation. There had not been an opportunity in Bates's schedule for a final presentation and agreement, but Douglas could handle that within a week.

CONCLUSION

Following his meeting with Bates, Douglas sat back in his office and reviewed his situation. He recognized that he had been shaken by the events of the morning. He felt that his next actions would be critical to whatever role he was going to carve out for himself at Archimax. But what was that role? What would be the best course for himself and Archimax? And beneath this lay an even more fundamental concern. Did Archimax have a future in this emerging industry, or was it an illusion itself? He reflected on some advice given to him by a professor at the business school — that his challenge in this kind of company would be deciding on “how native you go”.

Exhibit 1

VIRTUAL REALITY INDUSTRY SYSTEM

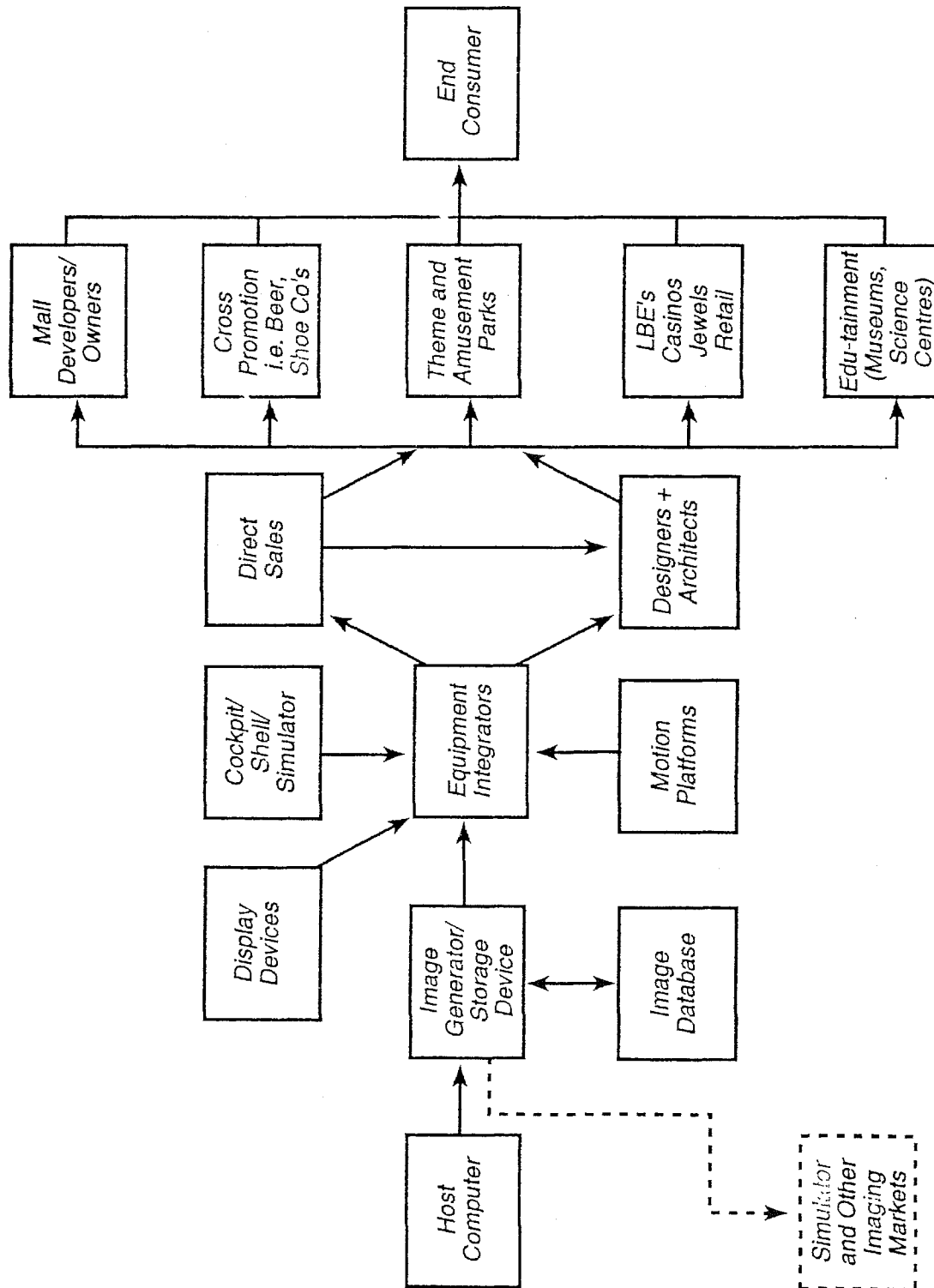


Exhibit 2

CONSOLIDATED BALANCE SHEET

April 30, 1994

(\$Can)

	April 30, 1994	January 31, 1994
ASSETS		
Current Assets		
Short-term deposits	\$ 523,900	\$ 0
Grants Receivable	58,700	133,200
Subscription Receivable	0	882,000
Advances and prepaid expenses	37,300	31,300
Total Current Assets	\$ <u>619,900</u>	\$ <u>1,046,500</u>
Furniture and Equipment	92,600	52,700
Deferred financing costs	66,200	66,000
TOTAL ASSETS	\$ <u>778,700</u>	\$ <u>1,165,200</u>
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current Liabilities		
Bank Indebtedness	\$ 94,900	\$ 22,500
Accounts Payable	66,200	131,300
Total Current Liabilities	\$ <u>161,100</u>	\$ <u>153,800</u>
Debentures Payable	750,000	750,000
Shareholders' Equity		
Capital Stock Issues and Outstanding:		
100,000 Class A non-voting Preference Shares	100,000	100,000
4,750,000 common shares	1,286,100	396,600
Share Subscriptions	0	882,000
Deficit	(1,518,500)	(1,117,200)
Total Shareholders' Equity	\$ <u>(132,400)</u>	\$ <u>261,400</u>
TOTAL LIABILITIES AND SHAREHOLDERS' EQUITY	\$ <u>778,700</u>	\$ <u>1,165,200</u>

Exhibit 3

CONSOLIDATED STATEMENT OF OPERATIONS

Three Months Ended April 30, 1994
(\$Can)

Expenses

General and Administrative	105,700
Legal and Consulting	157,300
Research and Development	125,800
Research and Development - Government Assistance	(25,200)
Selling	10,200
Interest, Net	18,100
Depreciation and Amortization	9,400

Loss for the Period \$ (401,300)

Exhibit 4

PLANNED SOURCES AND USES OF CASH

ITEM

Monthly Cash Use by Archimax, Richmond	\$ 60,000
Monthly Cash Use by Archimax-PS	375,000
SIGGRAPH Budget	1,050,000
IAAPA Budget	200,000
Debenture Payout (October)	750,000
PS Purchase	900,000
TOTAL USES	\$ <u>3,335,000</u>

ARRANGED SOURCES

Private Investor (Late June)	\$ 750,000
New York Bridge Financing ¹	4,000,000
Public Offering of \$15mm (November) ²	15,000,000
Petco Development Money ³	4,000,000
TOTAL SOURCES	\$ <u>23,750,000</u>

¹ Conditional on applying for NASDAQ listing, which is dependent on an asset level that the PS purchase provided, stock trading at \$2.50 per share. Money to be drawn down \$2mm in August, \$1mm in September, \$1mm in October.

² Conditional on full NASDAQ listing. A full listing is dependent on a minimum of US\$4-million in assets, US\$2-million in net worth and a minimum of 300 shareholders.

³ Part of PS purchase. Timing on funds was \$1mm in June, the rest contingent on achieving development targets. The expected timing was \$1mm in September, \$1mm in November and \$1mm in January.

Exhibit 5

SUMMARY OF SIGGRAPH BUDGET

June 1, 1994

ASSET PURCHASE AND DISPLAY TOTAL

Exhibition Booth
Formula One Cars
Software
Projection Booth and Installation
Projection Equipment
Contingency - 10%

Sub Total - Asset Purchases \$ 875,000

MARKETING DIRECT COST

SIGGRAPH Fee
Promotional (Brochures, etc.)

Total Direct Marketing Cost 130,000

TRAVEL AND ATTENDANCE

19 people from Archimax, PS, and Apec 45,000

GRAND TOTAL \$ 1,050,000

