Licensing in a Growth Company

Case history; business factors considered by high-technology company

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My subject is research and development and licensing as seen from the viewpoint of a growth company. In particular, I intend to outline some of the business factors associated with decisions involving the licensing of advanced technology. My paper is organized around the following outline:

1. The general background of the growth company of which I am president, SAI Technology Company, and of its parent company, Science Applications, Inc.
2. I'll share business factors that I considered in making a decision to license SAIT's technology to a West German electronics company.
3. I will review business considerations in the other side of licensing, namely my decision to obtain the technology of a scientific instrument by licensing.
4. I will draw conclusions and inferences from these two cases.

THE PARENT COMPANY — SCIENCE APPLICATIONS, INC.

I shall begin by reviewing the context in which my licensing decisions have been made. An important aspect for SAI Technology Company is its parent company, Science Applications, Inc., or SAI.

SAI is a medium-size, privately owned company, which for the most part, provides research and development studies, largely to the federal government and largely to the Department of Defense in a wide range of disciplines. It does not perform pure research but rather R&D studies. It also has a strong computer software capability. The past three or four years it has developed an important high-technology products business. Recently, SAI began servicing contracts which marry hardware to computer software or "systems integration", as these contracts are called in current jargon.

SAI was established in February 1969 in La Jolla, California. It attracted top scientific talent through shared ownership which simply means that the company is principally owned by its employees. It initially provided R&D studies for the Department of Defense programs, and gradually expanded into other federal government programs in energy, environment, and health areas. SAI now also provides services to the private sector.

The major businesses which SAI services are national security policy and defense systems, the principal business area, with software management and computer systems integration, second, and defense science and technology, third. Other important areas include nuclear power and nuclear waste management, environmental sciences, health care and biomedical services.

The company has offices throughout the United States, but its principal performance centers are located in La Jolla, California; Washington, D.C.; and Huntsville, Alabama. Its staff has grown from 20 people at the end of the first fiscal year to 3,400 as of January 31, 1981. The total employment has increased to about 3,600 to 3,700 at the present date. About 60% of the employees have advanced degrees and approximately 75% of the employees have technical or mathematics degrees.

The company is unique in that it is almost entirely employee owned with only about 17% of the stock held by other than employees. Most of these outside stockholders are former employees.

The company grew from annual revenue of approximately $1 million in 1970 to $185 million in the 1981 fiscal year. In the fiscal year ended last January 31, revenues approximated $225 million.

The company has been continuously profitable, and earnings in 1982 have continued to increase beyond the $4.6 million in fiscal 1981.

The parent company, Science Applications, Inc., is part of the context in which my technology transfer and licensing decisions are made. A closer and perhaps more important part of the context is that of my company, SAI Technology Company. I shall review its activities and operations so that later comments on technology licensing will be more meaningful.

THE GROWTH COMPANY—SAI TECHNOLOGY COMPANY

SAI Technology Company, or SAIT as I will refer to it, is the manufacturing arm of Science Applications, Inc.

SAIT is a stand-alone division and has separate engineering, manufacturing, quality assurance, administrative, and finance functions. It is dependent on the parent company only for its management information system and for cash advances. The division employs about 200 people and it occupies about 55,000 square feet of facilities in Sorrento Valley which is about 10 miles north of central San Diego.

About 85% of our current sales are made to Department of Defense end-users and about 15% are made to

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the nuclear power industry. We have relatively few foreign sales and those we have are made through manufacturers' representatives.

SAIT's current annual sales rate is about $14 million. After something of a turnaround three years ago, SAIT's sales have increased by a factor of six since then. This increase represents an average annual growth rate before compounding of about 80%. We are planning for sales growth of 35%-40% in our current fiscal year, which began on February 1, 1982. We see continued growth at that rate or even higher if we do our jobs right. I believe that because of its past, present, and future sales outlook, SAIT may be fairly characterized as a medium-size, rapid-growth company.

Currently, SAIT develops, designs, and manufactures two relatively sophisticated, high-technology electronic or electromechanical product lines. Until recently, it had a third product line but it was sold because of a shift in its market. The first of the present products is a line of electronic plasma display computer terminals. The plasma display computer terminal is built around the plasma panel.

The plasma panel consists of two pieces of glass which are sandwiched together. Each piece of glass has a series of parallel, finely etched, electrically conductive lines or traces. The two pieces of glass are packaged so that the fine electric lines or traces present a grid of perpendicular, intersecting lines. The air between the two pieces of glass is evacuated and neon gas is pumped into the intervening space. The package is then sealed. In the typical panel, the result is a grid with 256,000 intersecting points. Each intersecting point may be lighted or erased through the use of sophisticated computer software. Through this computer software, alphabetical information, numerical information, graphical information, maps, and other types of data can be displayed on the plasma panel.

These plasma display terminals replace for use in military applications the conventional cathode ray tube of the type that you have in your television set at home. Without describing the physics of the plasma display, it has the advantages of small size and ruggedness. For example, a plasma panel is about one-half of an inch thick, whereas the depth of a cathode ray tube, or CRT, of comparable panel size would be approximately 12 to 16 inches.

Additionally, plasma panels have been placed in Army tanks and have run for up to 1,100 hours without electronic failure. Due to the extreme vibration, a conventional CRT would probably not survive a meaningful period of time. These characteristics are important in military applications where, for example, space in an aircraft may be very limited or where the environment in which a mobile ground based communications system is not benign.

Most plasma display terminals are equipped with a microprocessor or a miniature computer in the form of an integrated circuit.

The plasma display terminals are sold to end-users of the Department of Defense and presently are in such major military programs as the cruise and Pershing 2 missile launch control systems, the Army's divisional air defense system, U.S. Army command and control, and electronic warfare applications, and U.S. Navy airborne intelligence and communications systems.

SAIT's R&D activities in plasma display terminals probably have a greater emphasis upon the D than the R. We basically tailor the hardware, the system computer software, and the microprocessor software to the requirements of a particular application. We also have developed, are developing, and will continue to develop enhancements which add to the utility and speed of the plasma display terminal. We do not do basic or pure research, but rather direct our activities toward developing new applications and new features for the plasma displays. The sum total of SAIT's development, design, and manufacturing activities in the plasma display terminal area is a relatively large body of technology which can be, and has been, licensed for use by others.

The second line of products which SAIT manufactures includes nuclear detectors and monitors which are sold to the nuclear power industry. These are electromechanical devices which are somewhat less complicated than the plasma display terminals.

These monitors and detectors are used to measure various types of radioactivity in and about nuclear power plants. For example, in 1979, a number of SAIT's monitors were used to measure the amount of radiation emitted from the Three Mile Island Nuclear Plant near Harrisburg, Pennsylvania, following the accident there. Although these products are not as sophisticated as the plasma display terminals, nevertheless, they too represent relatively high-technology products which are proprietary to SAIT and which constitute a significant amount of technology. This technology has not yet been licensed to others.

BUSINESS FACTORS IN A DECISION TO LICENSE TECHNOLOGY TO OTHERS

Our basic objective was to increase SAIT's income from its existing proprietary plasma display technology by entering a new and separate market, specifically the NATO countries of Western Europe. Management felt that there was a relatively large demand for high-technology, advanced electronic equipment among the NATO countries, and that SAIT's experience of an occasional sale through a manufacturer's representative was an inadequate method of servicing this market.

Several options other than licensing were available to achieve this objective: SAIT could simply have organized a sales office or offices in Western Europe and shipped products from this country; SAIT could have joined with a Western European company in a joint venture; SAIT could have organized its own manufacturing and marketing facilities somewhere in Western Europe.

Organization of company sales offices in Western Europe with shipment of products from the United States was found, on analysis, not to produce an acceptable sales level. This option was not pursued further. Neither of the remaining options proved to be as desirable as that of licensing. As a result, the method by which SAIT plans to enter the Western European market is to license a qualified West German military

electronics company to manufacture and sell plasma display terminals which incorporate SAIT's technology.

Under this arrangement, SAIT provides its drawings, computer programs, and other technical documentation, as well as the limited services of its engineers, in return for a lump sum plus royalties. This particular agreement was linked to a teaming arrangement on an as yet unsuccessful proposal so that the actual technology transfer has not been made. However, I believe the transaction will close shortly and, in any event, I think the logic underlying the selection of this licensing arrangement still applies and may prove interesting or helpful to others.

The basic business factors which we considered in selecting a license arrangement include the following:

1. *Qualifications of the Licensee:* Before proceeding with any serious investigation of licensing SAIT's technology, we obviously had to satisfy ourselves that the West German electronics company was qualified. Its financial capability was not questioned since it is a subsidiary of a large United States multinational company. Further, the licensee company has extensive advanced electronic engineering and manufacturing capabilities and understands how to utilize the plasma display technology effectively. Perhaps more importantly, the licensee has a very effective marketing organization in the Federal Republic of Germany so that sales to the German Ministry of Defense are forecasted relatively high.

2. *Terms of the License:* An obvious part of my decision to enter into a license for the transfer of technology was that we were able to negotiate what we felt was a favorable arrangement with the West German electronics company. Although both parties to the arrangement were satisfied by its terms, the specifics of the license agreement satisfied a number of SAIT's objectives. The license is exclusive in West Germany and nonexclusive in the remainder of Western Europe, thereby enabling SAIT, if it chooses, to license other companies in Western European countries other than West Germany. Additionally, the terms of the license provide for a lump-sum payment in the first year plus a continuing stream of royalties based upon future sales of all plasma display terminals, including those designed by the licensee.

3. *Cash Flow:* The two options, other than licensing, would have required SAIT to make a cash investment of substantial amount. Bricks and mortar can usually be leased, but equipment typically has to be purchased. Personnel must be hired and trained, and so on. Joining with a West European company in a joint venture would ordinarily require a capital contribution plus continuing cash advances during the start up period. Organization of its own manufacturing facilities somewhere in Western Europe would have required SAIT to make a total cash investment of an even larger amount.

Under the licensing arrangement, SAIT will receive a reasonably large initial fee payable in cash in the first year, plus a stream of royalty payments into the future. I think that most high technology, rapid growth companies like SAIT, are cash poor because of a continuing requirement to provide more manufacturing capacity, more test facilities, more computer capabilities, and other equipment to handle an expanding business base.

Cash flow is perhaps even more important to SAIT than to other growth companies. While the current and recent high interest rates affect business as a whole, SAIT predominantly sells to the Department of Defense. Under that department's procurement policies, interest expense is not an allowable element of product pricing. As a result, interest expense must be taken out of profit which adds an even greater importance to cash flow as a consideration in my decisions, and it is equally important to SAI.

Only the licensing option enables SAIT to meet its basic objective while achieving a positive cash flow.

4. *Earnings:* The options other than licensing would have had a negative impact upon SAIT's earnings. During the start-up phase of any new European venture, whether partly or totally owned by SAIT, operating losses would be incurred. SAIT would also incur the time and travel expenses of its technical and management representatives assigned to assist and monitor the start-up activities. The time required to achieve a breakeven position for a new venture was estimated to be two to three years. As a result, there would be a significant negative impact of relatively long duration on SAIT's earnings from either of the two other options.

License Fee

Under the licensing arrangement, the license fee will have an immediate, beneficial effect upon SAIT's earnings because of the up-front payment and the royalty stream will benefit those earnings for several years in the future. SAIT is highly earnings oriented in order to satisfy the earnings objectives of, in this case, its parent company. My personal experience is that most growth companies are also bottom-line oriented in order to satisfy the earnings objectives of their stockholders or in order to posture themselves for possible future equity offerings. The pressure on earnings in growth companies is substantial because, in the final analysis, growth companies are building next year's sales with this year's assets.

5. *Engineering Resources:* The options other than licensing would have required the long-term assignment of a very senior engineer or engineers. Engineers who are qualified in plasma technology are almost an endangered species and we at SAIT spend a great deal of time in their care and comfort. SAIT does have a small, very capable staff of engineers who are very, very busy with sales proposals and our present design and development activities. I simply cannot afford to have very much of their time diverted from satisfying our current domestic requirements to supporting a new start-up venture. Once again, as the advertisements in the Sunday newspapers demonstrate, the demand for qualified engineers far exceeds the supply. Growth companies in high-technology industries have increasing requirements for engineering personnel whose availability is decreasing. As a result, I believe that optimization of limited engineering resources is a continuing problem in at least most high-technology

growth companies. In this case, the license arrangement enables SAIT to provide only consulting services which are relatively limited in scope. As a result, no significant impact upon the current operating requirements for the services of SAIT's engineering department will result from the license arrangement.

6. *Senior Managment Involvement:* The demands of a growth company on the time of senior management are formidable. Although I recognize that everyone in a responsible position in business today is very busy, I believe that the management requirements of a growth company are unusually demanding. Senior management is required not only to address the day-to-day operating problems but also to become heavily involved in the marketing and product planning and development activities that will result in next year's growth. And then there are the expected growing pains: the facilities become too small and must be expanded; a middle manager peaks out because of Peter's Principle and a more capable replacement must be found; and so on.

A very real consideration in my selection of the licensing process was that in order to follow either of the options that I have noted would require long-term involvement by senior management in the initial organization and start up of any type of venture in Western Europe. Although the license agreement did require senior management's time for preparation, review and negotiation, the total time was relatively limited. More importantly, administration of the license in the future will not require much involvement of senior management.

7. *Risk:* I think that it is obvious that all companies face risks, but I believe that growth companies face unusual risks simply because one of the ways by which many growth companies grow is their admitted willingness to assume risk.

The options other than licensing involved the risks associated with possible cost overruns, slipped schedules, a lack of top management knowledge about the foreign customer base, and other types of risks. The license arrangement enables SAIT to achieve its objectives in Western Europe with minimized risk. SAIT is dealing with a company which is fully qualified both financially and technically, which is domiciled there, and which has a demonstrated record of success in dealing with West German military agencies.

These are some of the factors that I feel were most important in selecting a licensing arrangement to capitilize on SAIT's technology in Western Europe. I believe that in this case, licensing enabled SAIT to leverage its assets — advanced technology and qualified engineers — to obtain an immediate cash throw-off at minimal risk. The only detriment that I can see in this licensing arrangement is a probable lower total return in the long run, but certainly the short-to-medium-run considerations, in my opinion, make licensing the most desirable choice in this case.

BUSINESS FACTORS IN A DECISION TO OBTAIN TECHNOLOGY THROUGH LICENSING

Until recently, SAIT manufactured and sold an electronic laboratory instrument, the ATP photometer, under a license from the inventors. The ATP in the name of the instrument refers to the chemical compound adenosine triphosphate. The instrument is used in general purpose laboratories to measure the amount of biological mass in a sample by measuring the amount of light emitted by the sample. The process uses the chemical compound ATP which is the same compound which causes fireflies to glow in the dark.

Prior to undertaking any consideration of a method of obtaining the ATP photometer technology, SAIT management first did its homework and studied the profit potential of the instrument. We found that because existing manufacturing facilities could be used to produce the instrument, its product cost would generate a good margin on the estimated selling price. We also found that a reasonably good market existed at this selling price. We decided that the instrument could be marketed through distributors so that marketing cost would not be unreasonable. Our conclusion was that on balance, the profit potential of the ATP photometer was high enough that SAIT should try to find a way to manufacture and market the instrument.

SAI and SAIT combined had the engineering and scientific talent to develop its own ATP photometer and probably could have done so at an acceptable level of technical risk. The inventors' patent position could probably have been bypassed through some ingenuity and imagination in design. However, for business reasons, SAIT elected to obtain the ATP photometer technology under a license from the inventors.

Now for considerations that were involved in the decision to license the ATP photometer technology rather than develop the technology independently. The principal business factors include the following:

1. *Terms of the License:* The terms of the license we negotiated with the inventors were reasonable and equitable to both parties. SAIT received an exclusive license to the instrument. The inventors were not greedy, and they recognized that SAIT would incur some production startup and some promotional expense for the new product. The inventors consequently did not insist on any up-front money but agreed to the payment of royalties based on total sales of the photometer. SAIT's analysis indicated the royalties would be adequately covered by the estimated sales price. Further, the minimum royalties requested by the inventors for the first few years were met with a safety factor by our sales projections. We concluded that the terms of the proposed license were acceptable and would enable SAIT to meet its earnings objective for the product.

2. *Time Required for Development:* Because SAIT received an almost completely developed instrument under the license, the 12-to-18-month period that would be required to develop the instrument independently was eliminated. SAIT was thereby able to generate initial sales and income 12 to 18 months earlier. The reduced development time provided by the license was a factor in selecting that vehicle to obtain the photometer technology.

3. *Low Business Risk:* Under the terms of the license, SAIT received from the inventors drawings, engineering documentation, and a prototype instrument. SAIT also received the assistance of the inven-

tors in working the bugs out of the first few production lots. For most practical purposes, SAIT received a completely developed instrument to which only minor changes had to be made before the instrument could be released for production.

Although, as I stated earlier, the technical risk of SAIT developing its own photometer was acceptable, the business risk was relatively high. By business risk I mean such calamities as the possibility of cost overruns in development, schedule slippage in completing the development, not timing properly the availability of completed instruments with market introduction promotion and advertising, and other hazards.

The ability to obtain an almost completely developed instrument significantly reduced SAIT's business risk. The reduced business risk was an important reason for selecting the license option over independent development.

4. *Familiarity with the Basic Technology:* The basic feature of the ATP photometer is the photomultiplier tube which multiplies the amount of light emitted by a sample several million times and converts the amplified light to a current whose voltage can then be measured. Through its research and development studies for the federal government, scientists in our parent company, SAI, were familiar with the basic technology of the photomultiplier tube so that the ATP photometer was not a mystery to the company as a whole. We accordingly felt comfortable in acquiring the ATP photometer technology by a license rather than by developing the technology ourselves.

5. *Cash Investment:* As I previously indicated, cash flow is an important consideration for SAIT because as its business grows it requires additional equipment, facilities, working capital, and other resources to service this growth. The ability to obtain an essentially completely developed ATP photometer without any significant up-front cash investment made licensing the photometer an attractive option to SAIT. Further, royalties were paid from the cash flow generated by photometer sales so that no future cash investment was required under the license.

6. *Impact on Earnings:* As I earlier indicated, SAIT probably could have developed a photometer by using its own technical resources. The independent development would have had a negative impact on earnings during the development and start-up phases. As a growth company, SAIT is highly earnings conscious because of the interest of its parent company in increasing earnings. I believe that other growth companies which have stockholders or the possibility of future equity offerings to consider are also earnings conscious. The ability to obtain a developed photometer without significant negative impact on earnings made licensing this technology very attractive to SAIT.

Because of these factors, SAIT executed an exclusive license agreement with the inventors and for a period of four years successfully manufactured and distributed the ATP photometer. Again, in this case licensing proved to be a desirable way to meet the risk exposure, earnings, and cash flow objectives of an R&D, growth company. The licensing arrangement was successful, I believe, because, in addition, SAI was familiar with the basic technology which it received under the license. I am not sure that the experience would have been as desirable if SAIT were not familiar with the technology.

CONCLUSION

I have explored with you two instances in which licensing enabled a high-technology, growth-oriented R&D company to achieve its business objectives more readily than by other available options. These two cases involved both a technology transfer-in, and a technology transfer-out. I am not sure that the business factors that I considered in these two cases apply to all other licensing situations, but I suspect that several of these factors are shared with other R&D, growth companies. Cash flow, earnings impact, optimization of engineering resources and senior management time, are I believe, important considerations to other companies which are similar to SAIT.

In any event, I personally am sold on licensing as an effective way to leverage my assets or to limit my business risks in many situations. I will continue to use licensing wherever and whenever it has a good fit with the objectives of SAI Technology Company.