Servicing Small-Niche Market

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Formidable obstacles of expense and competition make selection process critical

The paper presents several case histories of product development undertaken by Steedman Limited. The development of these products was aimed at satisfying very small, international niche markets.

In each case a detailed investigation of the economics of seeking protection was undertaken. The results of these investigations were incorporated into the product development proposal and a decision was then made as to whether to protect the technology. While not all developments were successful, they all serve to illustrate the licensing dilemma facing companies embarking on research and development projects for small markets.

Experience shows that the cost of protection can have a significant impact on the commercial viability of a development project, because it significantly delays the time at which the project begins to show a return. The case histories show that it is not possible for our company to seek protection for all its technology, but in selected instances protection has been sought.

Steedman Limited is a Perth-based consultancy in applied science and engineering, especially as they relate to meteorology and oceanography. The company has been providing services since 1974 in environmental field measurements, applied mathematics and science, coastal, ocean and underwater engineering, software and computing, and instrumentation and systems engineering.

During that time we have serviced a wide range of clients including offshore oil and gas, coastal and ocean engineers, government departments, mining companies, universities, and other research institutions.

The company has now operational bases in Perth Western Australia, Adelaide South Australia, Melbourne Victoria, Christchurch, New Zealand, Singapore, and Tokyo.

The overseas operations are presently providing approximately 25% of our sales revenue.

As a result of our consulting activities it became apparent to us that there were serious operating problems with many of the instruments manufactured in North America and Europe. Often the specifications of the available instrument did not suit the conditions encountered in our part of the world. Consequently, in 1980, the company cautiously began a research and development program to develop a range of instrumentation to meet our particular requirements.

Instrumentation research and development has continued since that time and today I will examine two successful products, the electronic meteorological station and the acoustic current meter.

In addition, I will also look at a third special research project aimed at the development of an ultra stable oscillator undertaken by the company and the University of Western Australia. I might add that this project was outside of the normal activities of the company. After a brief overview of each project, I will examine the licensing dilemma, as we see it, and the problems faced in each of the three projects.

ELECTRONIC METEOROLOGICAL STATION

An electronic meteorological station acts as the signal conditioning and data storage device for a variety of sensors. Usually these devices are battery powered and are required to operate unattended for a number of months.

By late 1984 it had become obvious that the electronic meteorological stations on the market had a variety of problems centering around:

1. Reliability, particularly in the very extreme conditions of Western inland Australia.

2. Servicing, particularly in the field.

3. Sensors, most data acquisition stations supported a limited range of sensors.

With these shortcomings in mind, our engineers proposed to develop a station that would be low powered, reliable, accept a wide range of sensors that are easy to maintain, and communications by telephone, radio and satellite.

Once initial design had been completed a claim for assistance from the Australian Industrial Research and Development Incentives Board was lodged and accepted. It is of interest to note that the IR&D Board deliberately excluded patent registration costs from eligible expenditure under these grants.

The project was successful, completed after an expenditure of $160,000 over two years. Some 60 stations have been built and are now deployed at various locations around Australia with meteorological sensors, on offshore buoys for CSIRO (including satellite telemetry), and onboard a ship for an international data gathering project, and in Tasmania and throughout Southeast Asia, with water level sensors.

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ACOUSTIC CURRENT METER

The acoustic current meter uses a two-axis flight time of an acoustic pulse over a precise fixed distance to determine the speed and direction of water flow. The advantage of the acoustic current meter over other types of meter is that it has no moving parts, is robust, is less susceptible to damage during deployment, and gives spurious water speed reading under the influence of oscillatory wave action.

In late 1983, as a result of problems in maintaining serviceability of an American acoustic current meter in the warm waters of the North West Shelf, the company applied successfully for an Industrial Research and Development Incentives Board project grant to develop a reliable, low-cost acoustic current meter suitable for use in the Australian region.

The unit was to be small and easily handled by one person and to operate unattended for periods of up to nine months in the coastal and continental shelf region (water depth less than 500 meters where the majority of current measurements are made. These requirements demanded advanced low-power electronic and acoustic engineering.

The project was very successful and 10 meters are now in operation around Australia and in Japan. The total expenditure on this project was $230,000.

ULTRA-HIGH STABLE OSCILLATOR

During December 1984 Steedham Limited lodged an application for a project grant with the Australian Industrial Research and Development Incentives Board to fund the development of an ultra-high stable oscillator for use as a frequency standard (clock). The project was to involve not only our company, but also the University of Western Australia Physics Department and CSIRO Division of Radio Physics.

The University of Western Australia had partially developed an ultra-high stable oscillator using a synthetic sapphire loaded cavity, which acts as a resonator driven by microwaves at 9.7 GHz. This oscillator operated at near absolute zero (4.2%K). The remainder of the system operated at room temperature.

The aim of the project was to develop a highly accurate frequency standard for use in astronomy, standards laboratories, and deep-space tracking stations, using the University of Western Australia's developments as a basis, with an initial objective of supplying to the Australian Telescope Project.

Unfortunately, after the expenditure of some $450,000 over two years, the company was forced to abandon the project because it failed to meet the performance specifications of the Australian Telescope Project within the time limits of that project. This summarizes our management's assessment of the joint project. The University of Western Australia Physics Department has continued with the project.

RETURN ON THE DEVELOPMENT

In each of the projects outlined it was necessary to determine the economic benefits, as well as the technical advantages, before approval to proceed. The costs of the projects can be broadly categorized as technical research and development, initial marketing and documentation, initial inventory, production, sales and distribution, protection, and cost of finance.

The market price of these products is not directly related to these costs, but is rather determined by the best assessment of the price most likely to allow entry into a small, often crowded, marketplace.

For the three products mentioned above, the estimated annual sales, worldwide, are:

Electronic meteorological station 100 units
Acoustic current meter 50 units
Ultra-high stable oscillator 5 units.

Figure 1 illustrates, in a general sense, the economic considerations of a research and development project within our marketplace.

We have normalized cummulative income to the unit cost of production and allowed two years for development. The expected return is from, say, 50 units annually at 3 times unit cost. The minimum return is from, say, 25 units at 3 times unit cost. The 15% bank interest on the money is shown for a secure investment.

It has been our experience that there is a significant (20-40%) risk of the project failing. As you can see

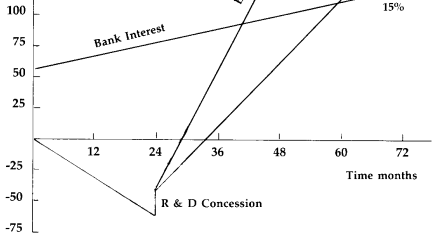

Figure 1

from the figure, there is a significant possibility that, if sales have been overestimated, the project, even if successful will never return better than bank interest on the investment, at considerably higher risk.

THE LICENSING DILEMMA

Let us now turn to the licensing dilemma to be, or not to be, and examine the level of product protection that can be afforded, and the various options for manufacture and distribution of the product.

Turning initially to product protection, as I mentioned, we operate in a low-volume niche market that at any one time has at least 5 to 10 companies competing for the available sales. In view of this, we must be very careful in trying to control both development and production costs if we are to be competitive.

In every project we have undertaken we have examined the proposed development to determine whether we should seek protection by way of patent or copyright. Since we operate in an international marketplace we must look at international, rather than national, protection.

In the case of the ultra-high stable oscillator project we sought a worldwide patent on the university development centered around the synthetic sapphire crystal. It was felt that in this case we should seek maximum protection because the world market was very small and we could gain a significant price advantage over present clocks if our development was successful. Also, it was felt that the patent cost of approximately $40,000 would not impact upon the economic viability of the project.

The electronic meteorological station, on the other hand, we considered was an innovative but not creative solution to the problem. After carefully examining the product we could find nothing that could be protected by way of patent or copyright. The electronic components were all commercially available and the software within the station was generic rather than specific. In this case, we decided that we could maintain our market advantage purely by keeping several years ahead of our competitors by way of ongoing research and development. Thus we are attempting to minimize development costs in order to keep our selling price sufficiently low to dissuade others from entering the market we are creating.

The acoustic current meter represents the middle road in this dilemma. As with the electronic meteorological station, we rapidly concluded that there was nothing within the electronics or software that was unique and protectable. In fact, in examining the instrument that was manufactured in the United States, we found that they held a patent only on the design of the acoustic mirror (a $50 item in a $40,000 instrument) used in their current meter.

We have redesigned the acoustic mirror in our instrument so that we do not infringe upon their patent and are currently considering whether we will seek an international patent on the small metal cap that houses the acoustic transducer in our meter. This is a creative solution to the problem. All other instruments use an encapsulation method using materials such as polyurethane.

Interestingly, we found that the patent laws in the United States differ from those here to such an extent that we may be able to obtain protection in Australia, but not the United States. This is because a number of patents combined result in a similar device, which we understand is a basis for rejection of a patent application under U.S. patent laws, but not Australian laws. If this is the case, the patent protection will be of little benefit.

Added to this, with at least three other manufacturers in the marketplace we must also struggle with the economic impact of obtaining patent protection. If we were to seek and obtain protection we would have to sell at about 50 instruments, or one year's projected sales, to recover the outlay.

Thus we can see that our dilemma over protection can be summarized as follows;

1. Do you have anything to protect?
2. Is it worthwhile to protect it?
3. Can your project bear the cost of protection?

The other question that must be addressed within the licensing area, particularly for international niche markets, is the manufacture and distribution of the products.

Two recent items that are relevant in this area are the articles in the December 1987 *les Nouvelles*, in which Parr and Smith examine the investment theory for royalty rates, and the recent Australian Institute of Management research study by Miller and Laptos into Australian exports.

Miller and Laptos conclude, "Licensing, joint ventures, offshore manufacture, technology transfer are options that are seldom examined in detail. There also appears to be extensive, and perhaps excessive, reliance on agents as a distribution mechanism."

Parr and Smith, in their paper, argue that an "application of investment theory to the pricing decision of intellectual property is an important step toward optimal management of these assets."

We have been struggling with both these aspects of the manufacturing and distribution process for several years. We have approached a number of large Australian companies with a licensing proposition for this country, and we may eventually end up with one of them acting as a sales agent — not a very encouraging start. We are also actively looking at a technology transfer into Asia. We feel that we have more likelihood of success in this area. As a matter of principle, it is our belief that a technically competent organization on the ground is the best way to make sales, and to this end we will be continuing to seek technology transfer, licensing or joint venture arrangements worldwide.

As an interim measure, we are handling manufacturing and distribution internally. We have clearly identified that manufacturing and distribution requires a different set of skills to those developed to service our traditional consulting clientele, who still form the major component of our business. We are still exploring the best method of

manufacturing.

CONCLUSIONS

1. Within our specialized market the small volume of sales and high level of competition generally preclude seeking protection for any products developed.

2. The impact of the cost of obtaining international patents can delay, for a significant time interval, the point at which a project is economically viable. This delay may result in the project failing because of the rapid changes that occur within the technologies we employ.

3. In selected instances, it is considered essential to seek international protection for a product, particularly if it is employing a hitherto unknown technology and the product is unique and there is likely to be a sale supplier situation.

REFERENCES

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