

# Technology Licensing for Future

*CEO's view of importance of value of strong research and development and licensing program*

BY FRED L. HARTLEY\*

I can only wish that the Licensing Executives Society had been in existence during the mid-50s when I was deeply involved in the technology transfer business on Union's behalf. Then, as now, there was a great need for an association to provide a regular forum for exchanging information about licensing practices and promote legislation to ensure efficient technology exchange on equitable terms for the inventors.

The formation of the Licensing Executives Society in 1965 went far toward meeting those twin needs. Thanks to the Society's expansion, both in North American and abroad, they are being met even more fully today. The rapid growth of your profession, and your organization, parallels the dizzying speed of technological change and represents business's attempts to turn these fast-paced changes to the most productive possible purposes.

I'm reminded of the time in 1959 when Reese Taylor, then president of Union Oil, invited me to leave our research division, which includes technology sales, and head up Union's marketing activities. He was at pains to remind me that this involved a radical career change and told me to take my time about making a decision. About a hour into the discussion he looked at me and said, "Well, let's have your decision."

I don't say that we must adjust to new technology quite that rapidly as yet. But we certainly seem to be headed in that direction. The pace of technological change is accelerating. It took 40 years from the first flight of the Wright brothers at Kitty Hawk to the introduction of the jet engine. It took about half that time, 19 years, from the introduction of the transistor to the appearance of the microprocessor. And it took only nine years from the appearance of the microprocessor to the computer-on-a-chip.

Nowadays, new chips, offering quantum leaps in memory capacity, emerge every couple of years. At Union, to bring the matter home, our scientists seem to develop new and better refining catalysts—seven in the last calendar year alone—almost before we have a chance to adopt their previous inventions.

In his book, *Future Shock*, Alvin Toffler dramatizes the meaning of this collapse in the time frame of tech-

nological development with an analogy to an automobile driver. If you are going down a freeway at ten miles per hour, you need very little forethought or preparation to change lanes and get off at your desired exit—your goal. But when you are traveling the freeway at 55 miles per hour, your preparations for changing lanes and exiting must begin far in advance. Toffler says this is also true of the technological future. It used to arrive at ten miles per hour; today it is arriving at 55 miles per hour. Hence we need to prepare for the future farther in advance.

The implications for technology sales are almost self-evident. Because significant changes in the art—virtually every art—proliferate so rapidly, the commercial potential is essentially unlimited. At the same time, we must plan our research more carefully, market our inventions with more agility and remain even more alert for the breakthroughs made by others which could benefit or affect our own companies.

I would also stress one other implication. We must redouble our efforts to reduce the high cost and the extended time period required to maneuver our inventions through the bumper-to-bumper traffic in the patent system. The faster technology advances, the more frustrating and damaging this perennial jam becomes.

Yes, the work of the licensing executive has grown more pressured. But it has also become more vital—vital to our companies, to our economies and to the world at large. The theme of this convention accurately describes what has happened. Intellectual property transfer *is* indeed the cutting edge of international commerce.

I am particularly partial to this theme because we at Union Oil are completely persuaded that technological development, and the licensing of opportunities which flow from it, are the foundation of our own corporate growth. Union established the petroleum industry's first research department west of the Mississippi. That was back in 1891, a year after the founding of the company. Our patent department was also the first in the west—for *any* industry.

The discoveries made and protected by these departments over the intervening years are far too many to highlight. The anti-wear additives used in over 90% of the world's automotive crankcase oils, for example, are products of Union research. Union-invented refining techniques and materials are widely acknowledged to be among the finest in the world.

We are a leader in the invention, testing and installation of environmental quality-control equipment, in the technology surrounding the production and application of rare earths, and in a wide variety of chemicals developments. The bulk of our business is still in oil and natural gas. And because undiscovered

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hydrocarbon deposits are now fewer and farther between, at greater depths and in more hostile environments, we are constantly looking to our scientists for appropriate new exploration and production technology.

Very few programs in any of our divisions have as high a priority as those aimed at inventing more sophisticated methods for finding new oil and natural gas and at coaxing significantly increased output from existing fields. We have had great success in improving our petroleum exploration and enhanced recovery techniques. But in the meantime, recognizing that conventional energy supplies are dwindling, we have simultaneously forged ahead with a variety of alternative energy sources. As a result of these pioneering research and production projects, Union is currently setting the global pace in at least two of these alternative sources—geothermal and shale oil.

The geysers area in northern California is the site of the world's largest geothermal energy project. Development continues there and in our two producing geothermal fields in The Philippines. We have also been making good progress in our research in the Imperial Valley, where techniques for handling the hot, energy-rich, but highly-corrosive subsurface brines are under intensive study.

Union's 10,000-barrel-per-day oil shale project in western Colorado—the first such commercial venture in the United States—is an excellent example of the long-range commitments, quick reflexes and corporate willpower demanded of those traveling in today's fast-technology lane.

26 First returns on this \$600 million investment, entirely funded by Union, will come when we launch production next summer. This project is the culmination of some 40 years of experimentation and pilot plant experience.

We persisted with our plans, when several competitors recently cancelled their oil shale projects, because we have faith in our unique technology. Now others are beginning to share our convictions. A short time ago our technology sales department registered its most outstanding achievement of the year, selling the first license for Union's oil shale retorting process. The multimillion dollar sale to the White River Shale Project near Vernal, Utah, allows Sunoco, Standard Oil Company (Ohio), and Phillips to construct a single Unishale B oil shale upflow retort with a capacity of 10,000 barrels per day.

In short, Union's research program has been a strong and valued aspect of our enterprise since its inception. We have over 1,400 active patents. And we can reasonably claim to be one of the most swiftly innovative major corporations operating anywhere.

But we are not content to stand on that record. We are a broadbased, earth resources company now—not just an oil and gas outfit. We know that we will grow just as rapidly, but only as rapidly, as we manage to cross new technological frontiers.

I'll be very specific. Upwards of 50% of our profits in the 1990s will flow from technology which our researchers are only beginning to conceive, develop, and apply today. Happily, we have a board of directors which grasps the need for more and better research and development. That isn't surprising, given the fact that

half of our executive committee members came up through the research department. Happily, too, we have a research organization—our Science and Technology Division—whose foundations are strong and deep enough to carry the extra weight we are constantly heaping upon it.

Just two weeks ago, we dedicated some \$32 million in new facilities at our research center in Brea, California. The expansion doubles our laboratory and administrative workspace. In anticipating this expansion during the past several years of planning and construction, we also more than doubled the size of our research staff.

The Technology Sales Department staff is up to nine professionals, triple the number a decade ago. It's a far cry from those early days when I was a one-man band. Clearly, technology sales, at least on a sustained basis, can be no more productive than the research organization which underpins it. But, in some aspects, the reverse is also true. Union's aggressive licensing philosophy provides valuable positive feedback for our 1,000-member research staff.

I can summarize that philosophy in seven brief points:

1. A successful research organization can and should increase the company's return on its research investment by generating substantial royalty receipts. Union's annual cash income from technology sales, never less than 10% of research costs in recent years, has sometimes gone as high as 30%.

2. Hefty technology sales not only enhance a company's reputation on the outside but they also provide executive management with dramatically tangible proof that the company's intellectual products are valuable.

3. A company's technological "balance of payment" is a meaningful measure of the vitality of its research operation relative to others in the industry. At Union, this balance is reassuringly favorable. For every license taken, Union grants 10.

4. An active licensing program motivates scientists and engineers by providing foreign travel, contacts with outstanding colleagues from other companies and direct experience in startup and technical services for plants all over the world.

5. A technology staff that is alert to industry trends keeps appropriate managers continuously aware of important information and developments cropping up outside the firm.

6. A tour of duty in technology sales provides future research executives with invaluable business training and market judgment. It might even produce an occasional company president.

7. Technology transfer is a major factor in helping provide progress for developing and emerging countries. For example, our company has concluded six advanced technology licenses to the Peoples Republic of China. One of these provides a major Unicracking plant designed to produce petrochemical feedstocks for a large polyester complex. Our Chinese licensees tell us that this complex when completed will produce enough synthetic fiber to clothe up to 300 million Chinese. In turn, the land now used to grow cotton for their clothing can then be planted to food grains such as rice, wheat and corn.

I have already alluded to the successful sale of our shale retort technology, one of a number of new processes we have developed to lead America into the fast-approaching era of synthetic fuels. Once the crushed rock has been retorted, the low-quality shale oil is converted into a clean, high-quality feedstock through a series of proprietary treatments collectively known as SOUP, or "shale oil upgrading processes". These, in turn, are close cousins to some of Union's most widely licensed technologies. Let me give you some idea of our range.

Unicracking is an unrivaled, extraordinarily efficient hydrocracking process which enables us to make 44 gallons of high-quality gasoline, jet, and diesel fuels from a 42-gallon barrel of lower value, heavy crude ordinarily burned as fuel oil. When all of the more than 50 commercial plants presently licensed worldwide are completed and operating, they will process more than one million barrels of fuel per day.

Our Unionfining process, the first commercial hydrodesulfurization plant to be designed and sold in the United States, is used to remove sulfur, nitrogen, and other contaminants from a variety of petroleum products. More than 65 commercial plants have been directly licensed and designed by Union Oil. Another 400 plants incorporating Union technology have been built by other firms.

Unicracking/HDS was developed to remove sulfur and a substantial portion of metallic contaminants from heavy residual fuel oils. Five large commercial plants are licensed. They will process about a third of a million barrels daily.

Some half dozen Union gas desulfurization processes are in use throughout the world. They range from the Beavon Sulfur removal process, the original member of the family, to Unisulf, the latest and most promising sibling. When all of the 60 plants incorporating these

gas scrubbing technologies are complete, they will forestall emission of over 1,000 tons of sulfur into the earth's atmosphere each day.

In these few minutes, I have had time to offer only a small sampling of Union's research and licensing activities and to make only a few, scant points about our commitment to new technology. If I were speaking to any other audience, I might fear that I had understated my case. The truth is, though, that more times and a longer list of examples would still be inadequate to capture the sweeping, pervasive influence of research, development and licensing in the operation of a high-technology corporation such as ours, and in all probability, yours as well.

Before I leave this exceptional captive audience, I would like to present you with an important challenge which deserves the support of your organization. Many of you are familiar with the efforts of the drug industry, supported by other groups as well, to obtain passage of the Patent Term Restoration Act, H.R. 6444, that seeks to extend the term of patents whose use is delayed by regulatory body approvals. The time has come to seek longer life on patents that protect massive, long lead-time investments in all industries.

We see today in refining and petrochemical plant projects delays of up to five years and more for environmental permits, construction lead times of three to five years and commitment delays caused by patent interferences. Those factors can be beyond our control and can easily consume half or more of a patent's useful life.

Corporate industrial research already is impaired and will suffer further serious reverses unless management can see better returns on high-cost creativity. I urge all of you LES members, therefore, to take the leadership in restoring an appropriate value and an appropriate life to hard-earned United States patents.