

UNIVERSITY OF UTAH
TECHNOLOGY TRANSFER OFFICE

FIVE - YEAR
STRATEGIC DEVELOPMENT
PLAN

I -- EXECUTIVE SUMMARY

A. INTRODUCTION

This Strategic Development Plan describes an approach to optimizing the contribution of the University of Utah's Technology Transfer Department to the University, the State, and to appropriate private industry. Like most long-range plans, it is a very general blueprint of how the University might bridge the gap between where it currently finds itself and where its real potential in Technology Transfer might take it. It is divided into four parts, following this Executive Summary; these are:

II -- Where We Are

III -- Where We Should Be

IV -- Action Plans

and

V -- Five-Year Financial Projections

B. RECENT CHANGES IN TECHNOLOGY TRANSFER

The University of Utah's organization for managing its commercializable technology has undergone a comprehensive change in recent months. Most significant among the changes was the establishment of a new Office of Technology Transfer, created with the objective of broadening the scope and horizon of the Technology Transfer activities, and of exploring opportunities for technology commercialization supplemental to "Academic Capitalism".

Important personnel changes have included the hiring of a new Director for the Office of Technology Transfer and two new administrative support personnel. The search for one of two proposed professional Licensing Managers has already been initiated. J. Winslow Young, Director of the former Office of Patent and Product Development, has left the University.

The Office of Technology Transfer has also recently relocated to new quarters which allow the expansion of personnel and operations necessary to meet the challenge of its new direction. In addition, an extensive computerization and systems improvement effort has been initiated to increase the efficiency and responsiveness of the Office's operation.

C. MAJOR FIVE-YEAR OBJECTIVES

1. Systematize invention disclosure and categorization process, and create a comprehensive licensing database to computerize the technology transfer process;

2. Hire and train specialized Licensing Managers to effectively focus on major areas of University technological expertise, especially in Engineering and Medical Sciences;
3. Develop systems and networks to facilitate a more sophisticated approach to "Academic Capitalism", involving both minimum standards for start-up licensees and assistance in meeting those standards.
4. Aggressively pursue high-return efforts toward traditional licensing and traditional royalty income.
5. Develop a routine method for liquidating portions of University of Utah Research Foundation stock holdings on a gradual basis, down to some established minimum;
6. Develop funding alternatives from federal, state or private sources to augment Technology Transfer and/or patent funds;
7. Significantly augment patenting support for commercially viable technologies;
8. Increase awareness of and commitment to the technology transfer process among faculty — through policies, written communications/reference materials, seminars/colloquia, etc; and
9. Establish and maintain a Technology Transfer Resource Library for the benefit of faculty and community businesses.

D. FIVE-YEAR PERFORMANCE PROJECTION

	(\$000s)				
	<u>88</u>	<u>89</u>	<u>90</u>	<u>91</u>	<u>92</u>
Royalty Income	\$200	\$300	\$400	\$475	\$550
Other Income	385	465	394	323	270
Oper. Expense	457	532	564	591	638
Net Income	128	233	230	207	182
Personnel FTE	6	7	7	7	7

E. F/Y 85-86 PERFORMANCE

Royalty Income: \$87,044

State Appropriation: \$81,500

Operating Expense: \$260,748

Net University Contribution [Expense - (Income + Appropriation)]: (\$92,203)

Transfer Payments to Departments: \$24,558

Invention Disclosures: 25

U.S. Patent Applications: 16

Foreign Patent Applications: 0

Issued U.S. Patents: 8

F. F/Y 86-87 BUDGET

Royalty Income: \$126,019

Other Income: \$ 28,000

Appropriations:

State	\$ 84,000
President	\$182,000
Total Revenue	\$420,019

Operating Exp.: \$374,237

Net Contribution: \$45,782

II -- WHERE WE ARE

A. In General

The University of Utah has had a well-developed technology management program for many years. Over the past several years, the University has earned a national reputation for its work in utilizing University-generated technology as the nucleus for new-business formation in Utah. More than thirty new high-technology businesses have been formed in the past two years by such mechanisms. The University has normally entered into such arrangements by accepting a combination of equity and future royalty payments as consideration. Frequently, such start-up businesses have represented a personal objective of the University researchers/inventors interested in becoming members of the licensee company. In some cases, these start-up companies have been thinly capitalized, and with less fully developed management expertise.

B. Statistical Performance -- FY 85/86

Some statistical performance measures show a decrease in effectiveness in FY 85/86, compared to the previous year:

YEAR	REVENUE	DISCLOSURES	PATENTS
FY '85	\$95,536	56	35
FY '86	\$87,045	25	8
Percent Change	- 8.9%	- 55.4%	- 72.1%

The precise reasons for this performance decline are not readily apparent. The number of new patents is largely beyond the University's direct control and reflects a combination of application activity in previous years and the innate patentability of the inventions. But licensing revenue would seem to be directly correlated with current activities, and should not normally decline so precipitously.

The most difficult decline to explain, however, is the sharp reduction in the number of inventions disclosed to the University. It is theoretically possible that the number of inventions actually created suffered such a decline, but this is a highly unlikely explanation. It is much more likely that the percentage of inventions which were disclosed through University channels is what declined. This decline may reflect a disenchantment among the faculty or a number of other causative factors. A more authoritative answer must await more methodical investigation.

Further indices of the Technology Transfer Office's performance are shown in the following Tables.

TABLE 1 -- Technology Transfer Income: This Table enumerates the sources and amounts of royalty income for the year. Of the eight licensees paying \$5,000 or more in royalties, two are "start-up" licensees and four are traditional licensees.

TABLE 2 -- Disclosures, Patent Applications and Patents: This Table shows the numerical

performance of these elements, from 1984 to the present.

TABLE 3 -- Invention Disclosures: This Table enumerates by Title and Inventor the disclosures received during the Fiscal Year.

TABLE 4 -- Patent Applications: This Table shows the total of patent applications filed during the Fiscal Year. A total of 14 patent applications were filed, 12 of which were at University expense.

TABLE 5 -- Equity: This Table shows the current equity positions in licensee companies.

TABLE 6 -- U.S. Patents: This Table shows patents issuing by the US Patent Office during FY 85-86.

[TABLES 1-6 on following pages]

C. Non-Statistical Performance -- FY 85/86

It is also relevant to paint a non-statistical picture of "Where We Are" in technology transfer. The emphasis of technology transfer over the past few years has been on new business formation within the state of Utah. This emphasis has contributed importantly to the potential economic development of the State, but suffers from the very long time-horizon of this speculative economic return.

Our nontraditional program of accepting equity positions in start-up companies in lieu of direct income in some ways may handicap the performance of the Technology Transfer function — cash income is unavailable for investing in systems and procedures for more traditional Technology Transfer activities. So while a positive general benefit has been derived, more income-producing alternatives have been under-emphasized.

It is projected in this Plan that economic development in Utah can still be supported through "Academic Capitalism" when the technologies involved are appropriate to start-up company commercialization. But with other technologies, it is likely that greater immediate benefits to the University can be accomplished by complementing that effort with a more cost-effective effort of traditional licensing to already-established, major companies.

D. Patent Performance

A major weakness in current operations is the extremely small allocation of resources to the patent process. In FY 85/86, merely \$72,000 was allotted for the securing of patent protection for our inventions. At our current average cost of roughly \$12,000 for obtaining a US patent, this amount is enough to cover only 6 patent applications. Whether the number of invention disclosures is 25 (FY 85-86) or 56 (FY 84-85), the ability to patent only six inventions is obviously a minuscule percentage of what is needed.

III -- WHERE WE SHOULD BE

A. Financial Considerations

To determine where the University of Utah should be financially requires comparison with other university programs, for the performance of other programs indicates what is possible to achieve with technology transfer. The performance of ten of the top research universities in the US is outlined below. This data shows performance roughly five years ago; while comparisons are still instructive, it should be borne in mind that performance of these universities in technology transfer has likely improved vis-a-vis the University of Utah in the interim. For example, the University of Washington has reported a five-fold increase in licensing revenue over the past two to three years, while Stanford University reports more than a doubling since 1982 -- to \$5.1 million in FY 86.

UNIVERSITY	80 RESEARCH <u>\$ MILLION</u>	82 INCOME <u>\$ THOUSAND</u>
Univ. Calif.	\$522	\$1,712
MIT	\$164	\$1,800
Stanford	\$113	\$2,350
Univ. Wash	\$112	\$ 100
Univ. Michigan	\$111	\$ 250
Cornell	\$108	\$1,345
SUNY System	\$ 84	\$ 260
Univ. Ill.	\$ 83	\$ 833
Mich. State	\$ 72	\$ 569
Penn. State	\$ 72	\$ 500
TOTAL	\$1,441	\$9,899

The performance of these universities' technology transfer programs obviously varies. If we express effectiveness as the income generated by research expenditures, we find the performance varying from a low of .08 cents revenue per research dollar expenditure for the University of Washington to a high of 2.24 cents/dollar for Stanford University. But while individual performances vary, it is not unreasonable to use the **average** of those performances -- .69 cents/dollar -- as a basis of comparison.

The University of Utah spent roughly \$56 million on research in FY 1985-86 and generated an income of \$87,045. Using the same criterion of effectiveness, we generated .15 cents/research dollar -- a performance somewhat better than the worst of the above list, but **less than a fourth** of the average performance. If Utah's income-generating effectiveness were analogous to that of other universities, we might now be generating \$300,000 to \$500,000 annually. This comparison of Utah to other universities is obviously a bit "apples and oranges", since Utah accepts founder's stock in new start-ups, which stock may prove valuable at some

time and in some instances. But there is no assurance that such founder's stock represents an equivalent value for our technology.

It is a prime objective of this Strategic Development Plan to (a) test the value of founder's stock through a controlled program of gradual liquidation, and (b) to supplement that stock with cash income from more traditional forms of technology transfer. One of the key aspects, then, of where the University of Utah should be is generating significantly greater licensing revenue than it is.

This Strategic Development Plan seeks to increase cash revenue from licensing activities from its present level of \$87,000 to a level of \$550,000 within the 5-year plan horizon.

[Note: Although viewed as a too-optimistic 5-year goal, actual performance in the 5th year was double the projection — \$1.1M]

B. Patent Considerations

The University must play a much larger role in securing patent protection for its inventions. Patent protection is especially essential for university-generated technologies for multiple reasons:

1. Embryonic Technology: University technology is typically in a very undeveloped or unproven state. Substantial further investment is normally needed to develop the university-generated concept into finished products. This investment is very difficult to obtain without offering investors the patent protection with which to recoup such investment.
2. Licensee Interest: Because of the need to recoup substantial development costs, as well as the inclination to maximize profit in general, licensees will be willing to pay a far higher price to the University for patented technologies.
3. University Interest: The University's financial and academic interests are optimized by patenting its technologies. The financial interests are optimized because its bargaining position is appreciably stronger with a patent to "place on the table" — without it, we must settle for greatly reduced income or "bargain from weakness" to obtain the licensee's funding of our own bargaining chip. The academic interests are optimized because patenting then permits unrestrained publication of the technologies — the alternative is to license "trade secrets" and thus restrict inventor publishing.

This Strategic Development Plan seeks to increase financial support of patent activities from its present level of \$72,000 to a level of \$150,000 within five years.

C. Organizational Considerations

A significant part of "Where We Should Be" is with the resources and organization sufficient to meet our primary obligations. The primary obligations of the Technology Transfer Office include:

1. Counseling faculty on the technology transfer process, on patenting, on new-business formation, etc. This includes assisting in the invention disclosure process, holding colloquia/courses on technology transfer, and creating written pamphlets and policy statements for a complete understanding of rights and obligations vis-à-vis the University.
2. Reviewing invention disclosures from faculty. This involves setting up the disclosure procedures and forms, formulating a patentability opinion on each invention, formulating a marketability opinion on each invention, determining sponsor obligations, and making required reports to sponsors.
3. Formulating a development plan for each invention. This involves establishing a "game plan" for the commercialization of each invention, based in part on the patentability and commercializability determinations made in #2 above. At least five different directions can be seen for such development plans:
 - a) If the technology appears insufficiently interesting, it can and should be released back to the inventor or to the sponsoring agency;
 - b) If the technology is interesting but requires additional research/development to demonstrate utility, then the Office should seek to secure sponsorship for such further development, often by granting option rights;
 - c) If the technology is "borderline" or appears technically interesting but without licensing interest, development can be "sub-contracted" to firms specializing in technology development — such as Research Corporation, Inc., Utah Innovation Center, or the like;
 - d) If the inventor or other local factors have the interest and ability to form a company around the technology — and the technology is appropriate to small-firm commercialization — then the Office should catalyze the formation of such a new firm; and
 - e) If the invention is protectable, commercializable, and not appropriate to small-firm development, then a traditional marketing

program to established companies in the field is indicated.

These functions require adequate staffing, adequate administrative support, and sophisticated automation to maximize the effectiveness of the personnel resources involved. Making an appropriate match between University technology and relevant industry also requires a systematic cataloguing of University inventions and a pro-active effort to identify, seek out, and "sell to" appropriate industrial partners.

This Strategic Development Plan seeks to increase staffing levels from 6 to 7 over the next five years.

IV -- ACTION PLANS

In order to meet the aggressive objectives of the Technology Transfer Office and bridge the gap between where we are and where we should be, the following action plans will be implemented.

A. Establish Computerized Technology Database:

A computerized database will be established. This database will list (1) the technology interests of hundreds of companies which have positively indicated a desire to access university technology; (2) the technology interests of Utah-based manufacturing or research companies of all sizes; (3) the technology interests of venture capital companies and start-up facilitators throughout the country; (4) all University of Utah inventions, categorized by the same criteria as the industrial interests; and (5) University of Utah research expertise and interests, again with the same categorization formula.

Such a database will be able to do an extremely effective job of matching industrial interests to available technologies or technical capacities of the Universities. Though not yet established in operating form, the nucleus of this database has already proved effective in several "matching" situations at the University.

B. Establish Organization Based on a "Product Manager" Concept:

The University has two principal centers of inventive activity. Without slighting the other areas of excellence which are not as large, a majority of our commercializable inventions arise from the Engineering Sciences and the Health/Medical Sciences. Adding specialized support to these main "pillars" will greatly improve the efficiency and productiveness of technology transfer for the University as a whole.

Rather than organize along functional lines (e.g., someone responsible for patent issues, someone for licensing issues, etc.), organization will follow a "product manager" approach. A manager will be hired for both Engineering Sciences and Medical Sciences, permitting specialization in the faculty, technologies, and industrial partners of those respective centers of activity. These Licensing Managers, like traditional Product Managers, will handle all aspects — from faculty liaison to patent management to marketing/facilitating to final license negotiations — for their respective technical areas. The Director will directly manage technical areas outside of those two centers, will indirectly supervise the activities within those centers, and will manage the overall operation of the Office.

C. Implement a Program of "Considered Preference" for Utah-Based Companies and Start-ups, Linking to Assistance Sources.

Much is to be gained from further emphasis on the use of University technology assets in support of local business development. Yet not all technology is appropriate for placing with small Utah firms, nor are all such firms equipped to effectively commercialize University technology. Hence, a policy of "Considered Preference".

When the Utah-based portion of the Technology Database is established, Utah businesses (or venture capital interests) will be made routinely aware of emerging University technologies. Such companies will be given first consideration for a license, provided the inventions are free of other obligations. However, all licenses will be conditioned upon a demonstration by the potential licensee that they possess or have access to the financial and organizational resources necessary to effectively bring the invention to market.

When the potential licensee has difficulty meeting these objective requirements, they will be put in contact with Assistance Sources which are available and which will be developed in the near future (e.g., Small Business Development Center, Innovation Center, the Utah Centers of Excellence Program, other Utah-based facilitator "networks", etc.).

D. Implement a Program of Aggressive Pursuit of Traditional Licensing Revenue Sources

When technologies are deemed inappropriate for small-business development; when no qualified Utah small business can be found; and/or when obligations to other companies exist — then systematic traditional licensing will be pursued. Such licenses should be able to generate appreciable income and establish or reinforce close connections between major industrial concerns and specific research centers at the University.

E. Establish a Program of Gradual and Limited Conversion of University Holdings in Licensee Equity

The University's ownership — through the Foundation — of equity in its licensees is no different than ownership of any other such portfolio asset. Accordingly, it is recommended that our ownership of licensee equity be managed in such a portfolio fashion, but with some restrictions because of the nature of the assets. It is specifically recommended that:

- 1) All equity interests should be held a minimum of four years. Since all these licensees are "embryo", some time is needed for the company to get on its feet. The third year of a company's life is generally regarded as a turning point — if the company still has value in the fourth year, its prospects are decent and investors may start considering a return.
- 2) The Foundation should indefinitely retain a minimum of 40% of its initial holdings. Retention of this block hedges against a stock's becoming extremely valuable many years later.
- 3) The remaining 60% should be liquidated slowly over a six-year period. The slow pace minimizes upheaval to the licensee, spreads the University's risk, and makes possible profiting from appreciation in later years. Such a program would thus liquidate only 60% overall and would do it over a total of ten years.

The financial impact of this gradual conversion can be seen from Table 7. The values assumed for these stocks are derived from an estimate of their 1986 value, compiled by William

Gaston. It is obvious that the values assumed here are extremely speculative, but a general picture of possible impact might nevertheless be helpful.

V -- FIVE-YEAR PROJECTIONS

Statistical performance of the Technology Transfer Office is projected for five years beyond the current year in Table 8. It shows substantial growth in gross revenues — to \$550,000; it shows meaningful growth in net revenues; and it contemplates the repayment of the considerable sum of \$475,000 in accumulated state and Foundation deficit. The difference between the rate of "gross" increase and the rate of "net" increase is due to bootstrap improvements in financing of the Technology Transfer function, itself. Especially significant is the growth of patent expenses and royalty payments to inventors and departments.

As with any such long-range projection, the assumptions from which it was derived should be specifically delineated. Following is an item-by-item explanation of the projections and the assumptions underlying them.

"Gross Royalties" — The most significant change over the next five years is projected to be the gross income from royalties and license-issue fees for University inventions. This reflects a greatly increased attention to traditional licensing opportunities, the establishment of sophisticated and automated marketing techniques, and a general effort to bring Utah's Revenue-per-Research-Dollar in line with other universities' experience — while at the same time retaining a devotion of resources to local business start-up opportunities. There is no question but that the projected increases are ambitious. But with the appropriate resources and backing from the University, there is no reason Utah's contribution to "Academic Capitalism" can't be supplemented to more closely approximate established income averages of other principal universities.

"Inventor Payments" — Our basic obligation is to share the revenue (after reimbursing for patent expenses) with the inventor(s). Like paying a commission on sales, this obligation is best shown as a deduction from gross "sales". University policy provides for a sliding scale of 40% – 30% to inventors; but the deduction of patent and other out-of-pocket expenses has resulted in a historical average of 27%. This average has been maintained for these projections, though it could change if the percentage of royalty payments for patent expenses changes.

"Net Royalties" — Are simply the gross royalties reduced by the obligatory payment to the inventors.

"Appropriations" -- These are allocation of state or University monies to the Technology Transfer function. After a reduction in FY 87-88 because of deficit problems, state expenditures are projected to grow at a modest rate of roughly 4%. President Peterson has committed \$150,000/year to support the Technology Transfer operation in its rapid-growth phase, and an additional \$50,000/year to help the TTO repay the \$475,000 in accumulated deficit. This support is projected to become unnecessary within the five-year planning period. The President's contribution will decline from 1989 on, and will cease when the accumulated Technology Transfer deficit has been totally repaid in 1992.

"Grant/Support" — Technology Transfer has appreciable significance to both federal and state interests, not to mention those of private enterprise. It is projected that some arrangements can be made with one or more of these potential sources to contribute grant, research or other forms of support to the development of broadly applicable technology transfer processes.

"Equity Sale" — These figures reflect the potential gain from the gradual conversion of a portion of University investments in licensee companies. The derivation of these figures is detailed in Table 7. The figures projected for Equity Sale are most conjectural, there being no experience base to determine the market value of the University's holdings.

"Salaries" — Salaries are on a Constant-Dollar basis and show minimal change over the five-year planning horizon. The five year personnel plan involves the addition of two professionals and one administrative person. One of the professionals is currently budgeted; the second should be added as soon as possible, and is scheduled for FY 87-88. The administrative support person should ideally be added then, too, but is projected to be delayed until FY 88-89.

"Benefits" — Benefits are projected at the current rate of 28% of salary cost.

"Patent Expenses" — The second major category of cost increase is projected to be patent expense. As indicated earlier, the University's current commitment to patenting its inventions is wholly inadequate, and this funding category should be increased just as rapidly as greater income allows.

"Supplies and Services" — Miscellaneous supplies and services are not projected to increase significantly, and bear a relatively constant relation to personnel.

"Travel" — Travel is likewise projected at a basically flat level, after rising to accommodate three professionals instead of one. Growth in licensing revenues demands greater visibility of the University and its technologies.

"Equipment" — After initial investment in computerizing the technology transfer operation and providing an automated infrastructure for the seven to eight projected employees, equipment expenses are seen as declining to a maintenance level.

"Payment (Transfer) to Departments" — The policy of sharing royalty income with the Departments and Colleges from which the invention came is an excellent policy which has already received endorsement from the UURF Board of Directors, and payments to Departments have already been made. This Plan assumes a more formalized approach to such payments, regularized to be 15% to the Department and another 10% to the College; the College's portion may on occasion be allocated instead to Centers of Excellence. This projection accounts for this income distribution as a "Transfer Payment", since the funds never leave the University.

Since it is a transfer, the accounting comes after determining the net contribution of the Technology Transfer operation.

"Repayment of Accumulated Debt" — Operation of the Technology Transfer (Patent & Product Development) function has developed an accumulated deficit over the past five years of near \$475,000. Some mechanism to repay this deficit is called for. This plan uses a combination of equity conversion and continued support from the President's allocation to finance the repayment of this accumulated deficit. By the end of the five-year planning period, it is projected that the accumulated debt will be paid off in full.

FINANCIAL PROJECTIONS

(000's)

	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>91</u>	<u>92</u>
<u>REVENUE</u>						
Royalty Income						
Gross Royalties	126	200	300	400	475	550
Less: Inventor Pmts	-35	-54	-84	-116	-142	-165
Net Royalties	91	146	216	284	333	385
Appropriations						
State	84	90	95	100	105	110
Pres. Allocation	182	225	225	150	75	50
Total Appropriations	266	315	320	250	180	160
Grant/Support	10	20	50	50	10	
Equity Sale	75	75	75	75	75	75
TOTAL REVENUE	442	556	661	659	598	620
<u>EXPENDITURES</u>						
Personnel Costs						
Salaries	164	170	186	186	186	186
Benefits	46	48	52	52	52	52
Total Personnel	211	218	238	238	238	238
Patent Expenses	72	100	125	150	150	175
General/Administrative						
Supplies & Services	31	25	35	40	40	40
Travel	11	15	15	15	15	15
Equipment	15	20	10	5	5	5
Total G&A	57	60	60	60	60	60
TOTAL EXPENDITURES	339	378	423	448	448	473
<u>NET INCOME</u>	103	178	238	211	149	147
<u>USE OF INCOME</u>						
Share to Departments	0	50	75	100	119	138
Repay Accumulated Debt	100	125	150	100	0	0
Prototype Financing	3	3	13	11	31	9