

DEVELOPING MINNESOTA'S MEDICAL
TECHNOLOGY INDUSTRY ...

A Report to Governor Perpich

Prepared by
The Governor's Advisory Commission
on Medical Technology

February 11, 1983

Introduction to The Work of The Governor's
Advisory Commission on Medical Technology

I. Purpose of the Commission

The Governor's Advisory Commission on Medical Technology was created by Governor Perpich to recommend policies and actions that will help stimulate the growth of the medical technology industry within the state of Minnesota.

The Commission's first directive from the Governor is to address three questions:

1. What new initiatives should state government be considering to foster the growth of the medical technology industry?
2. How best can the government, higher education and private sectors work together to promote growth of the industry?
3. Within state government, what structure or process changes would be helpful in this effort?

This report fulfills this first directive.

The Commission members believe the medical technology industry holds great potential to improve the economic vitality of our state. This potential must be aggressively developed. Minnesota already exists as an important locus of medical services, technology, and business development. Its economic contribution is significant. In all, Minnesota has over 150 manufacturing

companies working directly in the field of medical technology. These 150 companies include large and small firms producing a wide array of medical-related products. They include a number of sole proprietorships working out of basement laboratories and large corporations, such as 3M and Medtronic, that employ thousands of people each. To build upon this base, Minnesota can adopt policies which will encourage businesses to expand here, new businesses to start here, and outside businesses to locate new activities here. These policies can also support the remarkable health care institutions which have national and international prominence and which help form our present economic base in this field. Our educational system must also serve and support both of these important components and train the future workers for both sectors.

II. The Membership of the Commission

The Governor's medical technology Commission represents a diverse cross-section of the medical technology industry, health care institutions, educational institutions, venture capital companies, organized labor and other interested parties.

The members of the Commission are:

<u>Name</u>	<u>City</u>	<u>Affiliation</u>
David A. Barnes	Rochester	Mayo Clinic
Lee M. Berlin	Eden Prairie	Medical Industrial Consultants
Victor A. Bloomfield	St. Paul	University of Minnesota
Christopher J. Conway	Minneapolis	Mentor Corporation
Mark B. Dayton	Minneapolis	Commission Chairman

Commission Members (Continued)

Raymond J. Dittrich	Minneapolis	Medtronic Inc.
Edward J. Driscoll	Minneapolis	Attorney
Clyde Ingle	St. Paul	HECB
C. Jerome Jorgenson	St. Paul	United Hospitals
Arthur Kydd	Minneapolis	First Market Properties
Tobey Lapakko	St. Paul	Minnesota AFL-CIO
George A. Leone	Minneapolis	Attorney
William Maher	Mankato	Blue Earth County Commissioner
Michael Myers	Rochester	St. Mary's Hospital
Yvette Oldendorf	St. Paul	Working Opportunities for Women
Gayle Osterhus	Bloomington	ETCS
William "Buzz" Palmer	Duluth	Miller-Dwan Hospital
Mary Phillips	St. Paul	Department of Education
Robert Pozos	Duluth	UMD Medical School
Andrea Printy	Eden Prairie	LecTec Corporation
David L. Printy	Minneapolis	Morison International
Stanley Salzman	Duluth	Duluth Clinic
Joseph E. Sizer	St. Paul	Minnesota Department of Energy Planning & Development
Philip L. Solberg	Rochester	Industrial Opportunities, Inc.
Allen Tank	St. Cloud	St. Cloud Orthopedic Association
Donald C. Wegmiller	Minneapolis	Health Central Systems

Overview of the Medical and High Technology Industries

While many of America's older manufacturing industries are facing harsh economic times, the medical and high technology industries are in the midst of rapid economic growth. Over the past 25 years, employment in this sector increased 50.6 percent. During the same period of time, employment in all other manufacturing industries increased a mere 12.1 percent. Today, medical and high technology manufacturing firms employ over 40 percent of all manufacturing employees.

While the medical and high technology industries can boast an impressive 25 year growth record, their future looks even more promising. The potential for improved efficiency and product performance through technological innovation is almost unlimited. If America is to remain competitive in the international marketplace, our industries must continue to develop the technologies of tomorrow.

Not all states have benefited from the rapid expansion of these industries. Eighty-three percent of their jobs are located in 24 states. The success of these twenty-four states in attracting a large share of the high technology companies can be explained by the industry's economic development needs. These economic development needs are reflected in the results of a recent survey by the Joint Economic Committee of Congress of 691 high technology firms located throughout the United States. The survey revealed:

- o Unlike traditional manufacturing industries, high technology companies do not consider access to raw materials, access to markets and transportation systems for products as major locational determinants.

- o The five leading factors that influence the regional location choices of high technology companies are:
 1. Labor skills/availability
 2. Labor costs
 3. Tax climate within the region
 4. Academic institutions
 5. Cost of living

- o The six leading factors that influence the location choices of high technology companies within a region are:
 1. Labor skills/availability
 2. State and local tax structure
 3. Community attitudes toward business

4. Cost of property and construction
5. Good transportation systems for people
6. An ample area for plant expansion

A study by the U.S. Department of Commerce concluded the efforts of small businesses and independent inventors played a major role in the development of the high technology industry. The study, Technological Innovation: Its Environment and Management, found that small business and independent inventors were directly responsible for over 50% of all scientific and technological developments since the beginning of the century.

A similar study by the National Science Foundation found that small firms are impressively efficient innovators. During the years between 1953-1973, "small firms produced four times as many innovations per research and development dollar as medium sized firms, and 24 times as many as large businesses." The National Science Foundation also found that small firm innovations are concentrated in the development of new products; large firm innovations are concentrated in the development of new processes. While small firms tend to create jobs through product innovation, large firms tend to eliminate jobs through processing innovation.

Efforts to Promote Medical and High Technology in Other States

The bright future of the technology industries has prompted many state governments to actively promote the growth of the industries within their states. California, North Carolina, Ohio, Michigan, New York and Massachusetts are among the many states that have adopted innovative programs aimed at attracting all high technology companies.

- o In Michigan, a task force started by former Governor William Milliken has begun a concerted effort to unite the various segments of the high technology industry. The task force has recommended major policy changes and sponsored several high technology fairs.

- o Massachusetts has created a Technology Development Corporation. The Corporation is an independent state agency that provides venture capital to early-stage, high risk enterprises engaged in technology-oriented production. The Corporation has been extremely successful in attracting private investment dollars, gaining six dollars in private money for every one dollar of public money invested.

- o The Ohio Industrial Technology and Enterprise Development Grant Program will help fund small and medium-size high technology firms through an innovative royalty payback scheme. Royalties collected from products developed with the use of the Grant Program will be used to fund grants for additional product development ventures.

- o California and North Carolina have established state laboratories that conduct necessary research and development for small companies. Conducting this research in a centralized laboratory substantially reduces the amount of overhead needed by the small firm.

- o The New York Economic Development and Technical Assistance Center (EDTAC) have established programs to assist businessmen and women in the areas of business stabilization, business expansion and new ventures and provide data. The services provided by EDTAC range from bookkeeping and accounting assistance to product feasibility studies and market analysis.

- o Still other states have begun programs to encourage young elementary and high school students to strive for excellence in science and math courses. Academic awards and scholarships are among the incentives being used to encourage students to pursue careers in science and math.

Although Minnesota remains a leader in the area of technological advancements, other states have taken positive steps to improve their attractiveness to and support of the development of high technology industries in general. While Minnesota would be well advised to do the same, this report focuses on the medical sector of the high technology industry. Because of the linkage between the high technology and medical technology industries, any recommendations to help the medical technology industry will have a positive impact on Minnesota's high technology industry as well.

Medical Technology In Minnesota -
An Excellent Potential For Growth

Minnesota is already a national leader in the development of medical technology products and in their application and use in the delivery of medical services. To begin its deliberations, the Commission on Medical Technology assessed Minnesota's competitive advantages and our competitive disadvantages in the area of medical technology. It is the consensus of the Commission that Minnesota's competitive advantages have brought us to where we are today. Competition from other states requires that we take strong action to increase our advantages and reduce our disadvantages.

I. Minnesota's Competitive Advantages in the Development of Medical Technology

- o Minnesota has nationally recognized medical research facilities located at the University of Minnesota's Health Sciences Center and the Mayo Clinic in Rochester, Minnesota. The University Health Sciences Center is one of the few institutions capable of granting an advanced degree in surgery at the PhD level. Minnesota's medical schools train a significantly higher number of physicians relative to the size of our population than most other states.

- o Minnesota's health care institutions are among the finest in the country. The Rochester Mayo Clinic is the world's largest private clinic. As early as 1954, doctors at the University of Minnesota Hospital were pioneering cardiovascular surgery techniques. The University has also gained national recognition for its extensive work in the area of liver, pancreas, heart, lung and kidney transplants.

- o Minnesota is the national leader in the development and practice of regional health care and group practice.

- o The numerous medical technology companies that have been established in Minnesota have acted as incubators for many smaller medical technology companies. It is not uncommon for an employee of a large medical technology company to break with his or her employer and begin his or her own company on a much smaller scale. This spin-off effect is common in high technology areas.

- o Minnesota has an extremely talented venture capital system. Where venture capitalists in other states are reluctant to invest in early stage research and development projects, Minnesota's venture capitalists have found ways to minimize the risks of these projects. While there is still a need for more venture capital for small innovative businesses, Minnesota is far ahead of other states in providing this assistance through the private sector.

- o Minnesota has several privately funded enterprises designed to help small businesses with their common problems. The Minnesota Cooperation Office for Small Business Development is one of the more successful efforts to promote the growth of small businesses. Although they serve a very useful purpose, their available services are not widely known within the small business community.

- o Minnesota's educational system produces many individuals with the technical knowledge and skill needed by the medical technology industry. Area Vocational-Technical schools in Minnesota provide a skilled workforce and are an important resource for training future workers in the medical technology field. The University of Minnesota's medical schools in the Twin Cities and Duluth and the Mayo Clinic in Rochester produce some of the finest medical specialists to be found. The University of Minnesota's Institute of Technology produces graduates with the technical knowledge needed by the medical technology industry. Relatively strong science and math curricula in Minnesota's private colleges and state universities add to the pool of knowledge. As the demand for engineers continues to

increase, Minnesota's educational system must make every effort to increase the number of technically trained individuals available for industry.

- o Most Minnesota hospitals have made their facilities available for use in clinical tests of new medical products and techniques. The availability of clinical testing facilities is vitally important to the medical technology industry.

- o Minnesota has an outstanding work force comprised of well-educated, dedicated and hard-working people. The superior quality of our people is a major advantage Minnesota offers all businesses.

- o The people of Minnesota tend to be futuristic thinking in their general attitudes. Such a quality enables Minnesota to accept the changes necessary to adapt to an ever-changing economy.

- o Minnesotans have always been willing to actively participate in the state's decision-making process. Such participation has made it easier for the public and private sectors of the state to work together for a common goal.

These are some of the qualities which give Minnesota a competitive advantage in its effort to expand its medical technology industry.

II. Minnesota's Competitive Disadvantages in the Development of a Medical Technology Industry

While Minnesota has numerous strengths, the Commission members believe it is also important that we acknowledge our weaknesses in this field. By acknowledging our weaknesses, state government, private industry and the academic community can make a concerted effort to overcome them.

(Vote Taken)

- o While Minnesota is a good place to start a business, many members of the Commission believe it is not a good place to continue a business.

(18-2)

Taxes, cost of unemployment and worker's compensation, and perceived state attitude toward business have been described by businessmen and women as reasons for expanding outside of the state.

- o The University of Minnesota lacks a distinct Department of Biomedical Engineering. Because biomedical engineering is interdisciplinary in nature, students specializing in this area lack any real "home" within the University system. Without such a clearly defined "home," the program lacks a clear focus, and it is difficult for the University to achieve recognition in this field. Thus it is difficult for the University to offer the financial incentives (i.e. fellowships and research grants) that are needed to attract highly talented students. Many applicants for the Biomedical Engineering graduate program are turned away because of a lack of general support funds for their research. They then undertake graduate work in other states, where they contribute to the development of the medical technology industry.

- o Minnesota state government has not yet focused in on what the medical technology industry could do for the state's economy. No distinct effort has yet been made by state government to encourage the development of this industry.

- o There is a lack of communication within Minnesota's medical technology industry. There is no agency, either public or private, designed to help the medical technology industry with the coordination of ideas and accumulation of information that is necessary for a growing industry. Such an agency would be extremely helpful to the medical entrepreneur who is trying to develop, produce and market a product.

- o The state does not have a vehicle to facilitate the transfer of new ideas and technologies into marketable products. Many researchers in the state of Minnesota have been unable to find an outlet for their innovations. Adequate sharing of information does not exist between the academic community and private industry. Researchers often find the paperwork necessary to patent a product or an idea too complicated to understand. Individual entrepreneurs are often reluctant to accept the assistance of medical technology businesses in developing and marketing their products.

If Minnesota is going to become the premier medical technology production center in the United States, a real effort must be made to overcome some or all of our competitive disadvantages.

Recommendations of the Medical Technology Commission

The Commission on Medical Technology was asked to formulate a set of recommendations on how best to develop Minnesota's medical technology industry. The specific recommendations are listed below. (Recommendations were adopted by consensus agreement unless otherwise noted by vote recorded in left margin.)

(Vote Taken)

1. While most of the capital and investment decisions will be made by the private sector, the state can establish a climate that encourages these decisions. The Commission believes that the state should set forth clearly a policy that the medical technology industry is welcomed here, that its important contribution to our existing economic base is recognized and appreciated, and that the state intends to do all it can to support and assist the further growth of the medical technology industry as well as the health service institutions.

2. A comprehensive statewide inventory of the labor skills needed by our existing and growing industries must be updated and kept current. Such an inventory will help Minnesota's post-secondary educational institutions plan their curricula and training to meet the needs of tomorrow's economy and the state's employers. This activity must be ongoing because of the constant change in job needs. It should be coordinated to avoid duplication with other state and federal efforts.

3. While Minnesota's educational system has traditionally been strong, significant declines in the student-age population will place stress on the system in the 80's. At the elementary and secondary level and in post-secondary education, the state must ensure that adequate resources are provided to maintain quality education.

4. Minnesota's educational system must reflect the needs of tomorrow's industries, services and workforce. Science, math and computer science courses in Minnesota's elementary and secondary schools must be strengthened. The availability of educational opportunities for the thousands of technicians who will be employed for product development, marketing, delivery and maintenance requires attention. The Commission recommends that additional resources be established in appropriate disciplines, including the strengthening of the existing Institute of Technology. Private colleges should be encouraged to maintain and strengthen their math and science curricula and pre-engineering training programs. While private post-secondary institutions account for thirty percent of the total college graduates in the state, they provide from 48-58 percent of the state's math and science graduates.

5. Minnesota must strengthen its Biomedical Engineering curricula, particularly at the University of Minnesota and elsewhere as appropriate. A graduate fellowship program in Biomedical Engineering should be funded at the University of Minnesota, to enable admission of ten new graduate students per year. Development of this program would guarantee a better supply of trained biomedical scientists and

entrepreneurial talent in Minnesota. Support for the program should come from the state and private industry on a matching basis. The state's contribution should be funded by return of indirect costs generated from research grants.

6. The State of Minnesota should initiate an aggressive jobs training program for the unemployed. This program should retrain those workers who have little chance of returning to their old jobs. The state should work with the federal government and private industry to train these workers for jobs in medical technology and other growing industries.
7. The Commission encourages the Department of Economic Security to examine the potential benefits of proposals such as the Fraser matched-funding plan for the employment of currently unemployed in the new jobs developed in the field of medical technology.
8. The state should find a way both to encourage legitimate entrepreneurs, especially those with inventions or innovative ideas but modest personal means, and to provide public protection from unscrupulous promoters. Minnesota should examine its security regulations to assure that they achieve both purposes and do not discourage legitimate entrepreneurs from locating their businesses here.

9. Depending on revenue implications, Minnesota should consider eliminating state taxes on capital gains on investments held for three years in new small businesses. Such a measure should be designed to make investments in Minnesota's small, growing companies more attractive and would thus aid in the formation and recruitment of new companies.

(15-3)
10. The state should also consider repealing the unitary tax provision. It is unlikely to generate significant revenue. It has an unpredictable and arbitrary effect, and it has the potential to impact significantly on medical and other high technology companies.

(8-4)
11. The State of Minnesota should also consider enacting tax laws that encourage exporting products produced in Minnesota. A partial tax deferral on income received from exports should be considered. Such a deferral should be patterned after federal tax laws in the same area. Minnesota should also encourage the formation of export trading companies in Minnesota to increase exports in the medical technology field.
12. An Office of Technology Transfer should be created to facilitate the commercial application of research developments. This office should be available to faculty in the academic sector, graduate students and private entrepreneurs alike. The office should lend legal and technical expertise to individuals wanting to develop, patent and market a new product or technology. It should initially be funded by the legislature and private industry on a 50-50 matching grant basis.

Eventually, the office could be funded through the use of royalty funds from products that are successfully developed through the office.

13. Minnesota should establish an Office of Medical Technology Development within the Department of Energy, Planning and Development. This office should work with existing services in the private sector to help medical technology entrepreneurs get their businesses started and grow. The office could act as a communications center for the medical technology industry. The office could coordinate the efforts of the various segments of the medical technology industry. The office could work with the Department of Education to help develop curricula and job training programs that will prepare today's students for tomorrow's economy.
14. The State of Minnesota should begin an aggressive program of recruitment and retention of medical technology firms. This program could be coordinated by the Office of Medical Technology. The Governor, Lieutenant Governor, Commissioner of Economic Development, and leaders in the private medical and business sectors should play an active role in the recruitment and retention of these firms.
15. The Minnesota Small Business Finance Agency must be continued as an independent state agency. The Agency provides low interest financing for small businesses. This financing is made possible through the sale of tax exempt Industrial Revenue Bonds. The agency also serves as a federally funded pilot program providing low

interest financing to small businesses. The state should make the appropriation necessary to fulfill the capital reserve requirement established by the legislature.

16. Minnesota should strive to develop international medical product shows or conferences which will help to highlight our state as a national and international medical center.
17. The Governor should proclaim a Minnesota health care and health industry week. He and his administration, working with the private sector, should develop events to bring public attention to Minnesota's position in this field and its importance to our state. Emphasis should also be placed on disseminating information regarding what individuals can do for themselves to protect and improve their health and wellness.
18. The state small business setaside program is not working effectively for small businesses in the medical field. It should be revised and better implemented by the Department of Administration and state institutions so that these markets for small businesses can be made available to assist their growth.
19. A strong health care system is important to continue growth in the medical technology industry. A forum should be established to create responsible dialogue concerning the multiple and complex factors which contribute to the cost of supporting the Minnesota health care system. This forum should coordinate its efforts with those of the existing network of organizations that are addressing the issue of rising health costs. Additionally, the state should continue its support for the community based, voluntary, not-for-profit hospital system.

(12-4)

20. The development of Duluth as a medical center would be greatly enhanced by the expansion of the present Medical School to a four year school. As proposed, no new buildings would be needed, and all the hospitals would be used for clinical training. Expanding the term of the school would require an increase in the clinical faculty so that all aspects of clinical education are accomplished in Duluth, and would foster the rapid development of new advances in the medical technology industry in the area. The amount required to expand the school to a four year program is estimated to be \$2.2 million annually.
- (11-5)
21. The state should inventory and promote existing buildings that can be made available for start-ups and expansions by the medical technology industry and medical community.