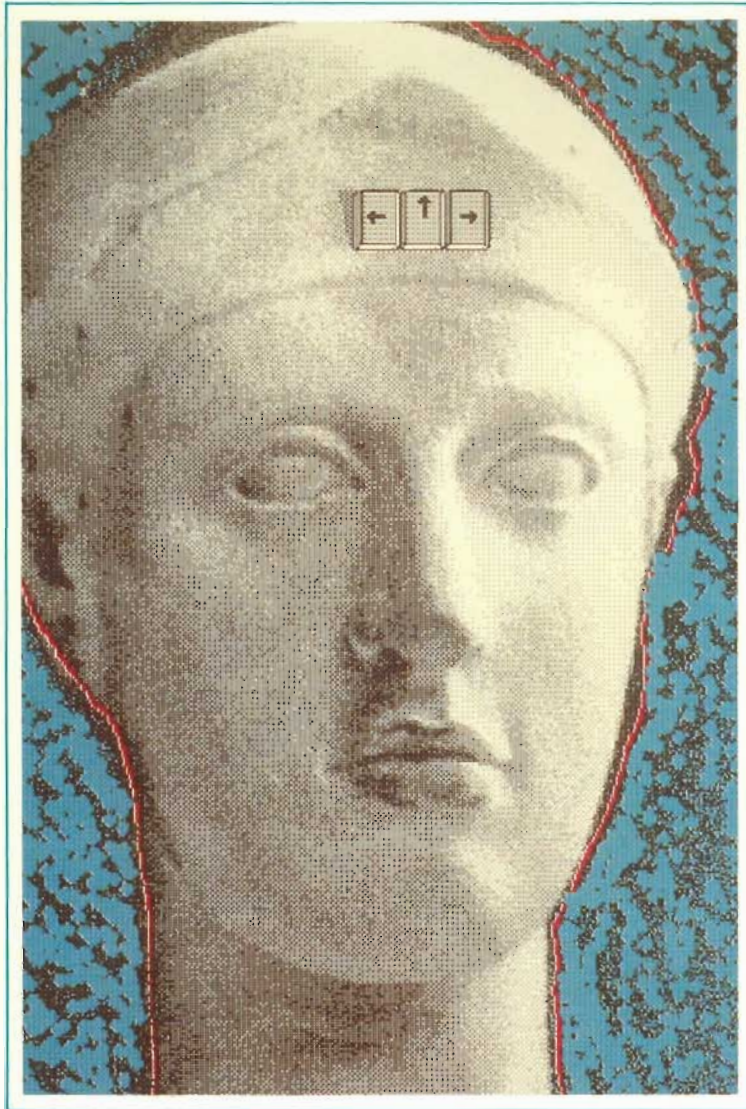


ANNUAL REPORT 1988-1989



TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

THE S. NEAMAN INSTITUTE
FOR ADVANCED STUDIES IN SCIENCE AND TECHNOLOGY

22

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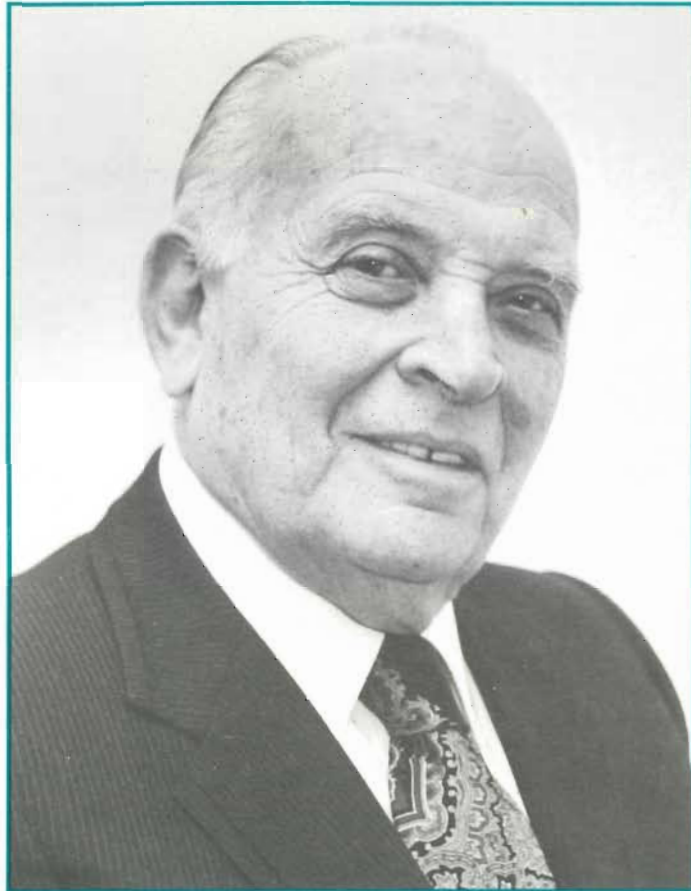
The Board of Governors congratulates the Samuel Neaman Institute on the occasion of its tenth anniversary. The Board notes with satisfaction the scope of activities through research projects, workshops and publications.

The Board of Governors extends its thanks and appreciation to Mr. Samuel Neaman, founder of the Institute, for his continuing devotion to developing the Institute into Technion's Think Tank.

*Technion Board of Governors Resolution,
June 1988.*

CONTENTS

<i>1</i>	Board of Directors and Advisory Council
<i>2</i>	About the Institute
<i>3</i>	Report of the Director
<i>8</i>	Active SNI Projects
<i>9</i>	Income and Expenditure
<i>11</i>	The Research Programs
<i>31</i>	SNI Associates and Researchers
<i>33</i>	Visiting Professors
<i>35</i>	Workshops and Seminars
<i>39</i>	English Publications
<i>53</i>	Hebrew Publications



Mr. S. Neaman

The Samuel Neaman Institute for Advanced Studies in Science and Technology

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- Project and Workshop Coordinator: Mr. David Kohn, M.Sc., M.Phil.
Administrative Assistant: Mrs. Ruth Rivkind

About The Institute

The Samuel Neaman Institute for Advanced Studies in Science and Technology is an independent public-policy research institute, established in 1978 to assist in the search for solutions to national problems in science and technology, education, economy and industry, and social development. As an interdisciplinary think-tank, the Institute draws on faculty and staff of Technion, other institutions and scientists in Israel, and specialists abroad. The Institute serves as a bridge between academia and decision makers through research, workshops and publication.

The Institute pursues a policy of inquiry and analysis designed to identify significant public policy problems, to determine possible courses of action to deal with the problems, and to evaluate the consequences of the identified courses of action.

As an independent not-for-profit research organization, the Institute does not advocate any specific policy or

embrace any particular social philosophy. As befits a democratic society, the choices among policy alternatives are the prerogative and responsibility of the elected representatives of the citizenry. The Samuel Neaman Institute endeavors to contribute to a climate of informed choice.

The Institute undertakes sponsored advanced research, formulates invitational workshops, implements continuing education activities on topics of significance for the development of the State of Israel, and maintains a publication program for the dissemination of research and workshop findings. Specific topics for research may be initiated by the Institute, researchers, government agencies, foundations, industry or other concerned institutions. Each research program undertaken by the Institute is designed to be a significant scholarly study worthy of publication and public attention.

Origins

The initiative for establishing this Institute in Israel was undertaken by Mr. Samuel Neaman. He nurtured the concept to fruition with an agreement signed in 1975 between himself, the Noon Foundation, the American Society for the Technion, and Technion, and with the ratification in 1978 by the Senate of the Technion. Mr. Neaman, a prominent U.S. businessman noted for his insightful managerial concepts and innovative thinking, as well as for his success in bringing struggling enterprises to positions of fiscal and marketing strength, has devoted his time since retirement to the activities of the Institute.

Organization

The Director of the Neaman Institute, appointed jointly by the President of the Technion and the Chairman of the Institute Board, is responsible for formulating and coordinating policies, recommending projects and selecting staff. The five-member Institute Board is chaired by Mr. Samuel Neaman and includes *ex officio* Technion Vice-

President for Development and Vice-President for Research. The Board is responsible for general supervision of the Institute including overall policy, approval of research programs, and overseeing financial affairs. An Advisory Council made up of members of the Technion Senate and distinguished public representatives reviews research proposals and consults on program development.

Funding

The Institute's activities are financed largely from the fruits of the Samuel Neaman Research Fund, located at the American Society for the Technion. This ensures freedom and independence. At the same time, contract studies for government, public and private organizations are also undertaken, provided they adhere to Institute goals and objectives.

Report of the Director

The S. Neaman Institute (SNI) is an interdisciplinary center for research and policy studies. During 1988-89, SNI projects, workshops and publications further strengthened its emerging role in both basic research and policy studies, in Israel and abroad.

SNI concentrates its efforts in four main areas: universities and education; industry, technology and science; national resource management; and health and quality of life. There are 31 active projects now underway in these four areas. Some thirty senior Technion faculty members from ten different departments are actively engaged in SNI research, and ten Technion faculty members serve on various research advisory committees. Together with them, there are six professors and senior researchers from institutions outside the Technion - Hebrew University, Weizmann Institute, Ben-Gurion University and RAPHAEL (Armament Development Authority) - engaged in SNI research, aided by eight part-time SNI assistants. From abroad, three visiting professors spent time at SNI,

researching various projects. All in all, 46 senior researchers were at work on a wide range of SNI projects.

Total research expenditures in 1988 amounted to approximately \$558,000. About 60 per cent of that sum came from accrued interest from the S. Neaman Fund principal, while the remainder came from client participation.

Along with its intensive research program, SNI sponsored and organized three international workshops:

- * Civilian Space Applications (March 1988).
- * Innovation at the Crossroads between Science and Technology (May 1988).
- * Reintroducing Design into the Engineering Curriculum (June 1989).

Several national workshops were also held, among them one on Basic and Applied Research in Plastics and Polymers in February 1989.

The Samuel Neaman Press continued its publishing program. Two books, eight extensive reports and three issues of

the biannual SNI Bulletin were published.

SNI is involved in both national and international collaborative programs. On the national scene, close cooperation exists in specific projects with the Dayan Institute at Tel Aviv University, the Jerusalem Institute for Israel Studies, and the Van Leer Jerusalem Institute. Internationally, SNI has reached an agreement with the Fraunhofer Society for System Techniques, in Karlsruhe, Federal Republic of Germany, to conduct a joint project on technology policy issues. A joint research proposal was submitted to the German-Israel Binational Fund. An agreement for cooperation also exists with Ecole Polytechnique of Paris for a joint project on "The Future Structure, Role and Management of Technological Universities"; two of their students have spent a month at SNI working on this topic. In addition, two graduate students from Nijenrode - Netherlands School of Business - are conducting their final project on Israeli competitive strategy with respect to European Economic Integration in 1992, at SNI.

During this academic year, Dr. Z. Bonen, former Director-General of RAPHAEL, joins SNI as a research fellow. He heads a major research project on "Images of Israeli Technology in the 21st Century". Professor William Resnick is coordinating SNI continuing education programs, and Professor S. Maital has undertaken the editing of the SNI Bulletin as well as participating in several other research projects.

Mr. Y. Lederfeind, Deputy Director of the Haifa Oil Refineries, was appointed by Mr. Samuel Neaman as one of his representatives on the SNI Board of Directors. Mr. Neaman himself continues his close and active involvement in the daily affairs of the Institute, helping the Director of the Institute in charting its policies and future course. Finally, SNI associates achieved awards and other distinctions during the past year. Professor S. Eisenstadt, one of Israel's foremost sociologists and director of the SNI project on "The Creation and Survival of Centers of Scientific Excellence", was awarded the prestigious Balzan Foundation Award for Sociology for 1988. The Institute Director, Professor Zehev Tadmor, was promoted by the Technion to

Distinguished Professor of Chemical Engineering. SNI Researcher Dr. Y. Shiftan was awarded first prize by the "Sah-Sah" Foundation for Transportation Pioneers for his work on the SNI project "Police Intervention in Congested Intersections". Finally, the SNI project on "Crisis Intervention in a Hospital Setting" by Dr. C. Tadmor and Professor J. Brandes, conducted at the

Rambam Medical Center, was selected by the American Psychological Association as a 'model intervention and prevention program'. There were 14 such model programs selected out of a total of 900 examined. The programs were presented to members of the U.S. Congress and health policy administrators at a special conference in Washington D.C.

*Prof. Zehev Tadmor
Director*



Active SNI Projects

Education and Universities

1. Role and Structure of Technological Universities
2. Design in The Engineering Curriculum
3. Mathematics in the Engineering Curriculum
4. Scientific Centers of Excellence - Their Creation and Survival
5. The Output and Quality of Israeli Science
6. Science and Technology Education in High-Schools
7. Mathematics and Science Video Instruction in High Schools and Preparatory Units
- 8. Supercomputers in Israel
- 9. Continuing Education and the Extended Technion
- *10. Defense Research Policies and Universities
11. Retrospective Follow-up of Gifted Children
- 12. Student Library Lending Patterns
- 13. Technological Education Curricula

Industry, Technology and Science

1. Images of Israeli Technology in the 21st Century
2. Civilian Space Applications
3. The Israeli Polymer and Plastics Industry
4. Trends in Science and Technology in the Middle East
- * 5. Technometric Analysis of Comparative Advantage in High-Tech Industries in Israel
- * 6. Policies for Promoting Industrial Development and International Competition
7. U.S.-Israel Economic Relations
- 8. Methanol in Diesel Engines
- * 9. Trends in Fertilizers and Fertilization
- *10. The Israeli Science-Based Industry

National Resource Management

1. A Comparative Study of Oil Pricing

Quality of Life and Public Policies

1. Economic Alternatives of Developing Towns
- 2. Police Intervention in Congested Intersections
- * 3. The Israeli Criminal Justice System in the 21st Century
- 4. Migration Patterns to and from Rehabilitated Neighborhoods
- 5. Electronic License Plates

* In preparation

◦ Completed

INCOME AND EXPENDITURE

1985/86 - 1988

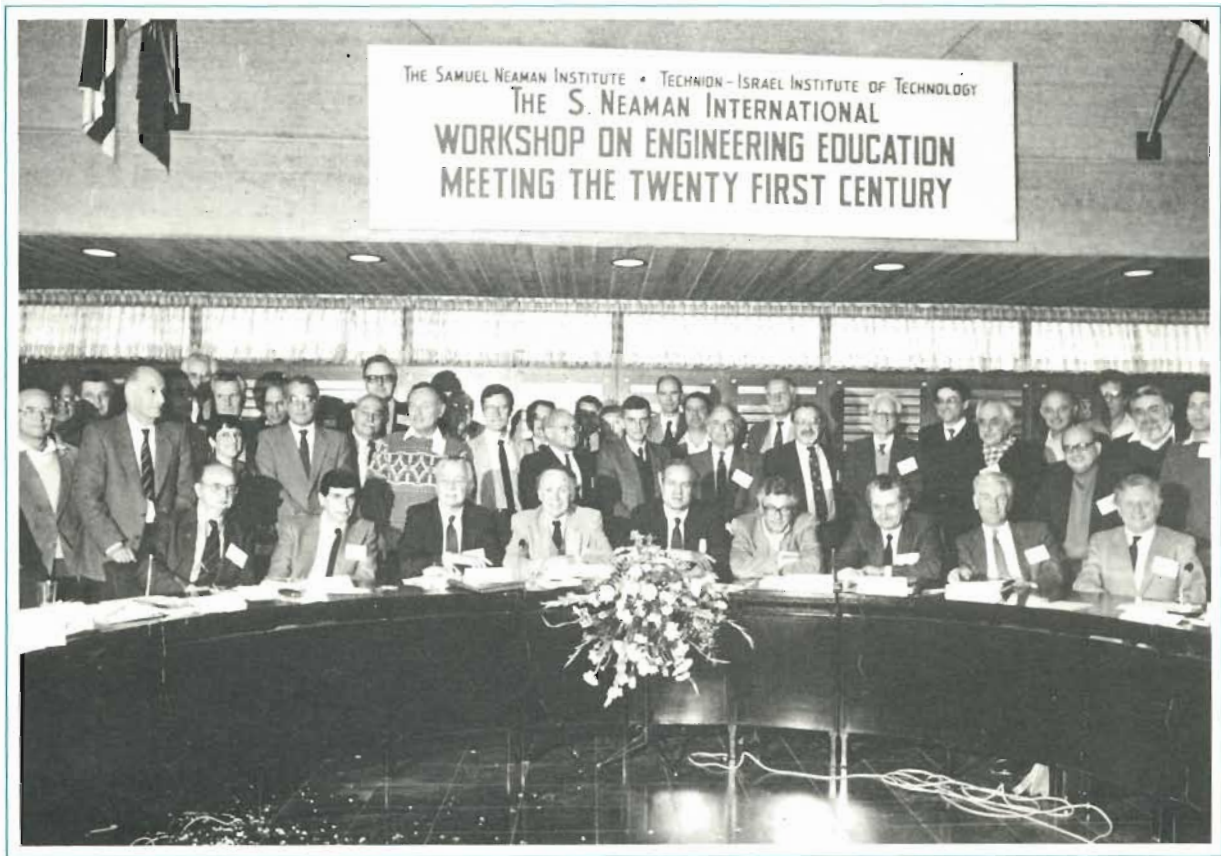
Category	U.S. Dollars		
	1.10.85- 30.9.86 (Balance Sheet) (12 months)	1.10.86- 31.12.87 (Balance Sheet) (15 months)	1.1.88- 31.12.88 (Estimate) (12 months)
<u>Income:</u>			
The Neaman Fund	320,000	400,000	320,000
Research Sponsors	176,199	208,862	327,178
Total Income	496,199	608,862	647,178
<u>Expenditure:</u>			
Education and Universities	91,477	196,532	162,272
Industry, Technology and Science	24,528	70,653	97,450
Quality of Life and Public Policy	23,308	108,523	51,262
Miscellaneous Projects	354,653	243,139	55,968
Institute Administration	50,804	127,273	177,176*
Total Expenditure	544,770	746,120	544,128

* Including \$ 64,955 for office renovation.

THE RESEARCH PROGRAMS

Overview

- I. Higher and Secondary Education in Science and Technology
- II. Science, Technology, Innovation and Industry Policy
- III. Energy and Natural Resources
- IV. Environment, Health Care and Quality of Life

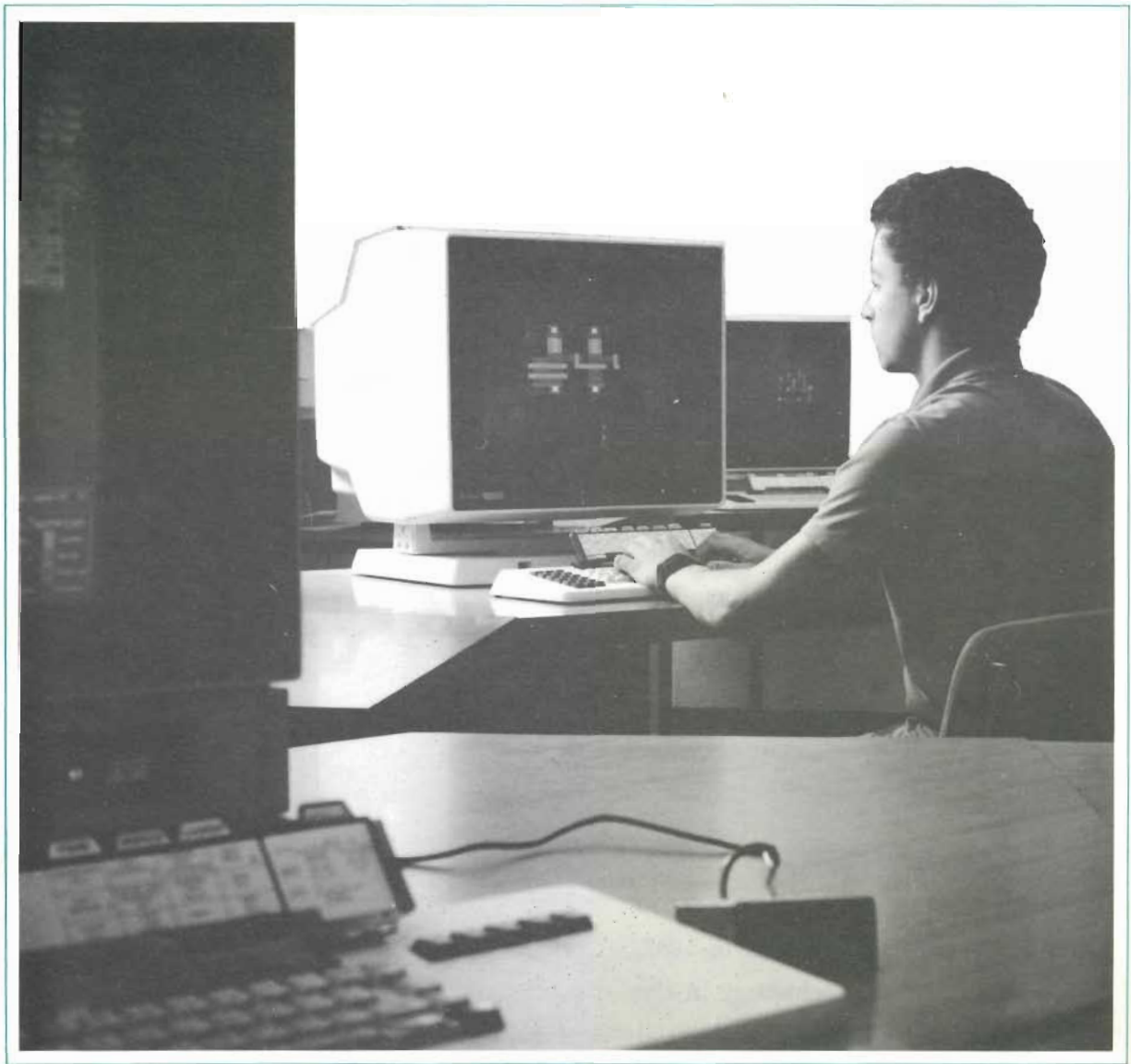


Overview

The Samuel Neaman Institute for Advanced Studies in Science and Technology is now entering its second decade of active research. Over time, a strategy has evolved to concentrate efforts on a limited number of important, interrelated areas of research and policy. The first of these relates to engineering education, structure and governance of universities, and science and technological education in secondary schools. It deals with virtually all aspects, including curriculum, methods of instruction, organization, computing facilities and scientific achievement in Israel and abroad.

Related to this topic is the second major research area, focusing on Israel's future technological image, specifically analyzing science, technology, innovation and industrial policy in Israel, and examining such questions as science-based industry, civilian applications of space, competitive strategy with respect to European economic unification in 1992, trends in science and technology in the Middle East, and policies for industrial

development and export competitiveness. Closely linked with Israeli technology and industry is the supply of natural resources - in particular, energy and water. Thus the third focus of SNI research relates to policies in national resource management. Finally, since science and technology are not goals in themselves but means to an end - ensuring Israel's security and quality of life - the fourth research topic deals with the environment, health care and the quality of life in general; under this rubric fall projects on the criminal justice system, development towns, migration patterns to and from rehabilitated neighborhoods and a crisis intervention model in a hospital setting.



I. Higher and Secondary Education in Science and Technology

The ground floor for constructing new policies in science and technology education, both at the secondary-school and university level, is an evaluation of Israel's scientific performance, past and present. Professor G. Czapski is applying quantitative measures of scientific performance, based on the number of times papers are cited. His research has four objectives: construction of a database on all Israeli-authored scientific papers; using the database to identify major areas of scientific research in Israel; development of citation-rate indices; and finally, comparing scientific activity in Israel and in other countries. Initial results offer cause for concern - a growing fraction of Israeli scientists' publications are based on work done abroad, Czapski has found, and based on citation frequency, work done abroad by Israelis is of higher quality than that done by Israelis here at home. The Universities Budget and Planning Committee as well as

the Israeli Academy of Sciences will support this ongoing project by commissioning SNI special studies.

How then can Israeli science be strengthened? Several SNI research projects address this issue. At the high-school level, a major research program focuses on science and technology education toward the 21st century, headed by Professors G. Eylam and A. Shitzer. Joint working groups, comprised of members from the Ministry of Education, universities, industry and vocational-school networks, are re-examining curricula in light of anticipated future needs. The objective is to reform Israel's large vocational high-school system to better meet Israel's needs.

A study by Professor S. Waks focused on technologists ("handasaim") and technicians. After constructing an occupational profile for these professions, Professor Waks devised a computerized model for continuous curriculum updating every five years. Parts of the model have already been implemented.

An SNI workshop on "Scientific and Technological Education in the Year 2000" revealed severe shortages of high-school physics and math teachers ("endangered species", in the words of one expert). A novel application of education technology, initiated and in part funded by SNI, is helping to remedy this shortage. In a project coordinated by Professor Mario Livio, top university instructors record lectures on math and physics on videotape cassettes, which are then distributed for use in high schools, army units and academic preparatory units. Successful implementation in six high schools and six academic preparatory units is being followed by widescale distribution throughout Israel. Future directions being explored are similar taped lectures in chemistry and English, as well as university courses for advanced placement of qualified high school students. The Agency for Advancement of Education, in the Ministry of Education has eagerly supported and assisted this project.

SNI research has addressed higher education in science and technology as well. A major program has been launched on "The role and structure of

technological universities", headed by Professor P. Singer. Among issues to be examined are: the academic and administrative organizational structure of universities, organization of academic units, governing boards, university finances, evaluation systems and university-industry relations.

The program began with visits by two distinguished experts: Professor Kenneth Keller, former President of the University of Minnesota, and Sir Claus Moser, Warden of Wadham College, Oxford University.

Linked to this research was the initiation of a special Senate meeting, initiated and planned by the Vice-President for Academic Affairs Professor Zeki Berk and chaired by SNI Director Professor Zehev Tadmor and Professor Paul Singer, held on March 12, 1988, and devoted to an in-depth re-evaluation of the Technion's own organizational system.

Mathematics is a vital tool and, in a sense, key language of science and engineering. SNI has initiated a comprehensive re-evaluation of the role of mathematics in the engineering

curriculum. The study will be conducted by Professors Micha Wolfshtein (Aeronautical Engineering), Nadav Liron (Chairman of the Department of Mathematics), Zvi Ziegler (Dean of Graduate Studies), and Lenny Pismen (Chemical Engineering). Emphasis will be placed on the re-evaluation of the mathematical foundations needed by future engineers, in light of the computer revolution. In addition, the need for and desirability of setting up a Technion Center of Computation will be examined. The study is expected to take one year to complete. Professor Ed Dubinsky, of the Departments of Mathematics and Education, Purdue University, will collaborate on this project during several planned visits to SNI.

A similar re-evaluation of engineering curriculum is CCNY Professor R. Shinnar's research on "Reintroducing design into the engineering curriculum". Since the 1950's, Professor Shinnar laments, emphasis shifted from the actual process of design and its specific needs to the basic science underlying design and methods. He is studying ways of restoring design to its

proper role in the curriculum, and makes concrete recommendations in this vein.

Two SNI studies are related to the quest for excellence in Israeli higher education. The first involves cultivation of especially gifted students, the second the establishment of "centers of excellence".

During 1968-73, gifted pupils were selected and enrolled in a special enrichment program at the Technion. A study by M. Ariel sampled 400 participants in this program and examined their background characteristics and subsequent achievements. He found that 60% completed their studies with distinction; many went on to serve in the career army and achieved impressive success in flight courses. Many urged the cultivation and involvement of gifted children through similar enrichment courses.

A study by Israel's world-renowned sociologist Professor S. N. Eisenstadt, along with Dr. S. Katz, examined "The emergence of centers of scientific excellence and their perpetuation in Israel". A case study of the Hebrew University's well-known Institute of

Mathematics examined the reasons for its attainment of excellence, stressing the importance of hiring procedures, autonomy of research given to students, and the selection of talented students for future research positions.

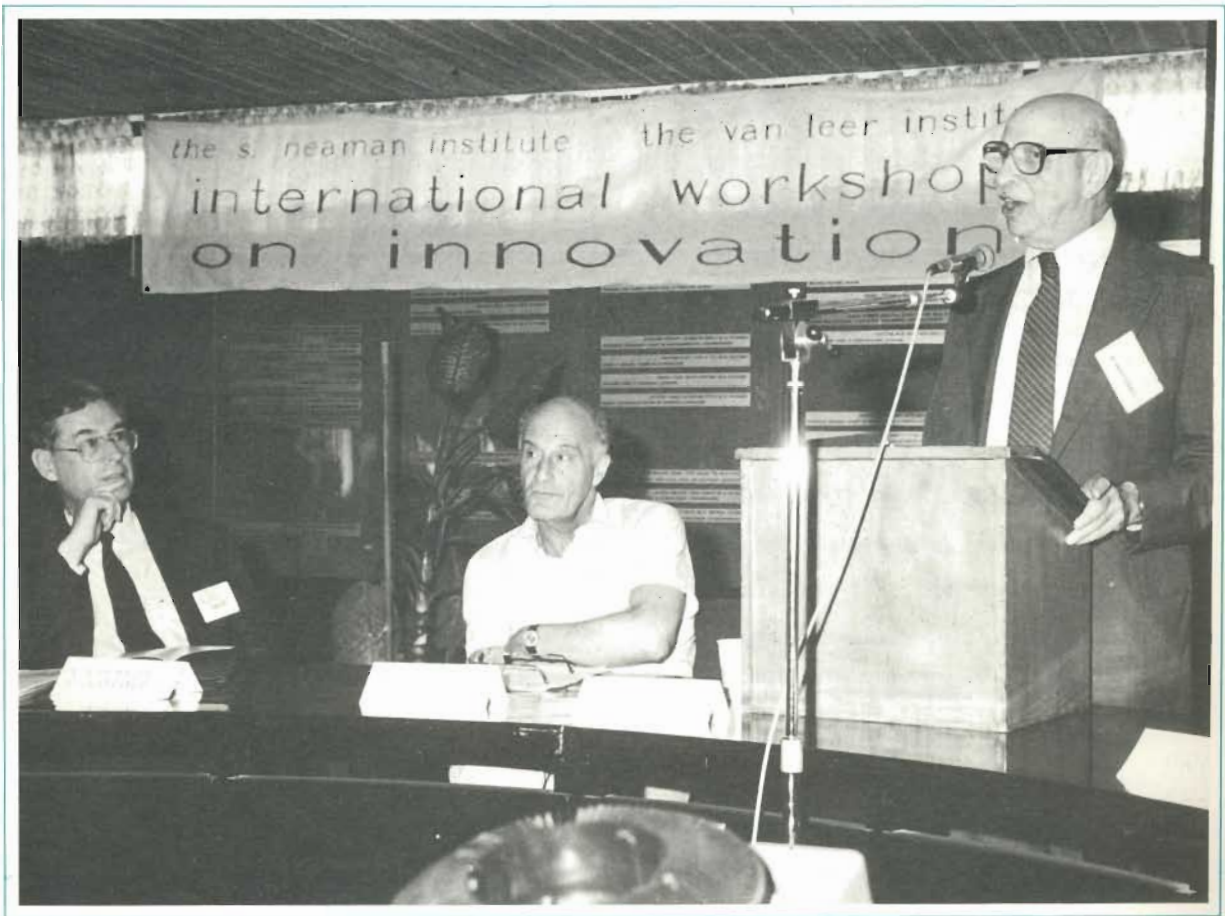
Among the increasingly indispensable tools for attaining scientific and technological excellence are supercomputers - very high-speed (and high-cost) mainframe computers. There are some 400 supercomputers now in existence, though none as yet in Israel. The role of supercomputers in Israel is the subject of a study by Professors G. Shaviv and M. Wolfshtein, "Supercomputers in Israel: Feasibility and Alternatives". Supercomputers are "among the drivers of the forefront of technology", the researchers note, and urge that they be "placed at the top of the priority list of multi-user equipment required by the academic community in Israel". Two possibilities are explored: A national center for super computing, and several distributed local centers. The national center is the best solution, they recommend, if the price and size of the central facility is above a critical minimum.

SNI studies of education policy, while examining large global issues, have not neglected questions related to the daily life of students. The high cost of textbooks has made the textbook lending library run by Michlol (the Student Bookstore) virtually the only source of such books, for many students, at a reasonable cost set at 1/7 of the book's value. An SNI report written by Eng. David Kohn at the request of the American Technion Society identifies the specific textbook needs of freshmen, sophomore, junior and senior-year Technion students and looks closely at the link between central library lending policies and the Michlol lending-library.

The education of scientists and engineers does not, of course, end with their graduation. Great importance attaches to continuing education programs. For this reason, Professor William Resnick was asked to conduct a study of "Continuing education and the extended Technion". His report was based on extensive interviews with experts in Israel and abroad, and contains detailed, concrete proposals on a new administrative framework for Continuing Education at the Technion.

A sizeable portion of total R&D in Israel is conducted within the defense industries. An SNI working group has been set up to examine aspects of the relationship between defense-oriented research and the Universities. The

group is comprised of Professors Daniel Weihs, Moshe Zakai, Zvi Ziegler, past-President Josef Singer, and Shmuel Merhav, from the Technion, along with additional researchers from outside the Technion.



II. Science, Technology, Innovation and Industrial Policy

SNI is playing an increasingly active role in shaping policies aimed at strengthening Israel's economy, in particular its main area of comparative advantage - R&D-intensive industry.

The "OMER" models are a good example of how SNI basic research has been used by a number of government ministries to formulate policies. OMER is a micro- and macro-economic planning model, funded over a period of years by SNI and built by Professors M. Avriel, R. Karni, P. Feigin and Dr. A. Breiner. OMER is particularly flexible, and can be adapted to a variety of different uses. It has found use by the Ministry of Energy (see below, Section III), the Ministry of Industry and Commerce, and the Ministry of Economics and Planning. In the latter Ministry's Five-Year Plan for 1988-1992, the OMER model was used (with the active cooperation and assistance of SNI researchers) to build the industrial-branch projections, and

proved itself indispensable in this difficult task.

Professor Arnon Dar's study of "Trends in Science and Technology in the Middle East" provides worrisome evidence that Israel's technological and scientific lead over her Arab neighbors "is shrinking at an alarming rate". Tel Aviv University's Dayan Center of Middle-Eastern Studies is collaborating in this study. Professor Dar contrasts Saudi Arabia's plan to spend \$14 billion during 1985-1990 on its universities, with the Israeli government's annual allotment to higher education of some \$300 million.

Economic independence is a perennial goal of Israel's national and economic policy. Dr. Z. Bonen (former director-general of RAPHAEL, the Armament Development Authority) is coordinating a sweeping study of the future of Israeli industry, titled "Images of Israeli Technology in the 21st Century", with the objective of spurring progress toward such independence.

Initially, studies will be done of specific technological areas. Later,

these "micro" studies will be combined and collated, to construct a comprehensive industrial and technological policy. The final report will include recommendations to government bodies and to industry itself. Linked with the "Images of Israeli technology" project are a number of ongoing studies of science-based industries and economic policy studies.

One of Israel's most successful - and perhaps least discussed - industrial branches is the plastics and polymers industry. A major SNI study is examining how best to advance this branch, responsible for about a billion dollars in annual sales. A computerized database is being constructed, that will be used to devise detailed policy recommendations on R&D, manpower, and measures to spur growth. The project coordinator is Dr. S. Konig; participating are Professors D. Vofsi, G. Pinto and Dr. E. Zuscovitch of Ben Gurion University, whose research was done in collaboration with the Louis Pasteur University in Strasbourg, France.

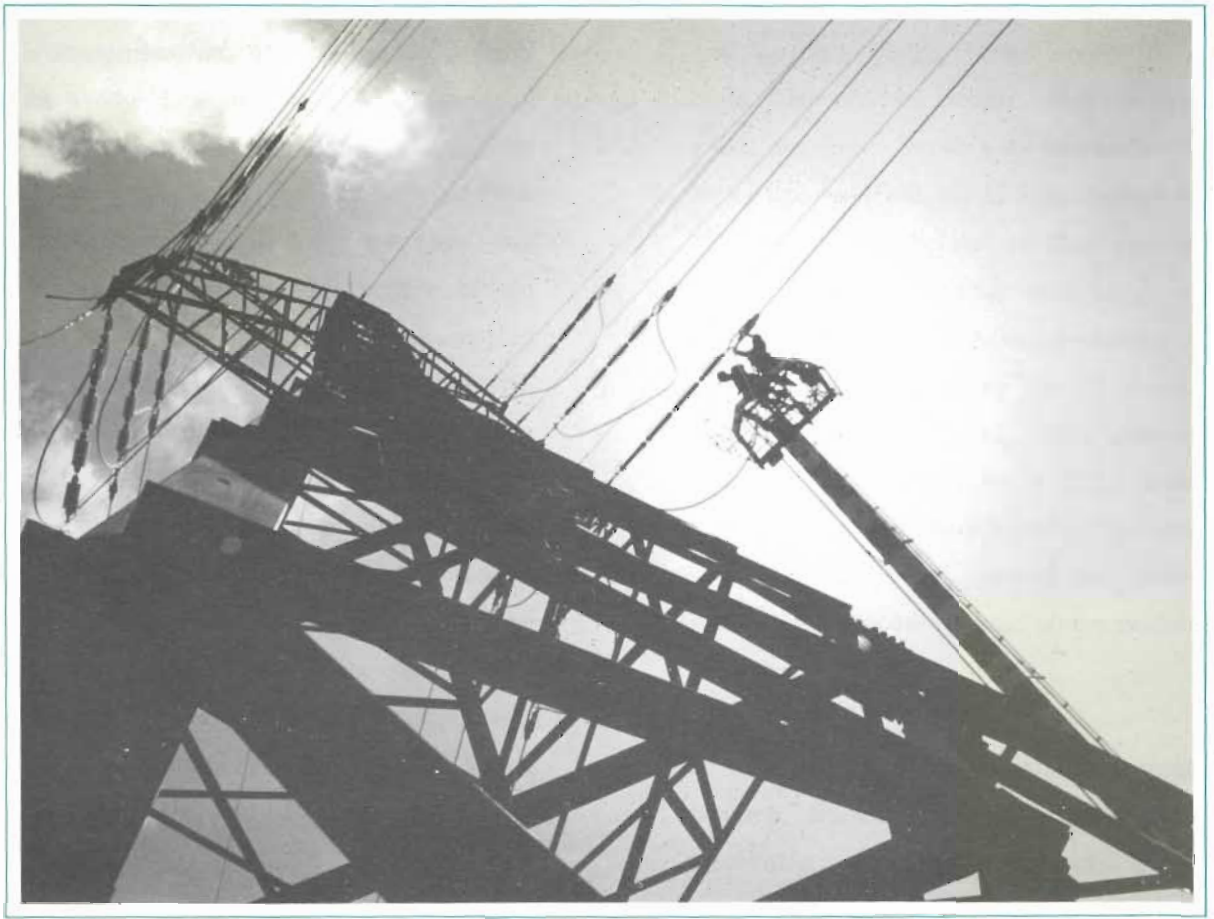
It is becoming increasingly clear that European Economic Unification in 1992,

creating a 320-million person, \$4,000 billion dollar market, will have a major impact on Israel's exports and industry. An SNI project investigating optimal competitive strategies for Israel with respect to the burgeoning Euromarket is now underway. Directed by Shlomo Maital, the project focuses on ways Israel can capitalize on a unique competitive advantage: the existence of free-trade agreements with both the United States and Europe, giving Israel access to a huge 550-million person, \$10 trillion dollar market. Serving as researcher is Irena Spangenthal, an M.B.A. student at the Netherland School of Business at Nijenrode. Reinforcing this study is the project on the political economy of U.S.-Israeli relations, by Dr. D. Naveh and Professor S. Maital. The authors foresee sweeping changes in U.S.-Israel relations, moving away from "aid" toward "trade", and urge immediate policy measures to encourage and accommodate this change.

Israel's search for new markets must become, literally, "out of this world". Currently, civilian uses of space comprise a \$10 billion a year market, which experts predict will grow rapidly to \$25 billion by the year 2000. What

role can Israel play in this exciting new frontier? Professor D. Weihs has already completed part of a large-scale study on "Civilian Applications of Space", culminating in a major international workshop. Three main areas recommended for active Israeli participation are: communications, remote sensing and earth science, and the development of scientific instrumentation.

Several research projects are in the planning stage. One of them will apply the new technique of technometrics (the quantitative measurement of technological level, for given products or processes, enabling examination of the link between the state of technology and export success) to the study of several Israeli high-tech products. In this project SNI is cooperating with the Fraunhofer Institut (ISI) in Karlsruhe, West Germany, where the technometric approach was pioneered and where an extensive technometric database exists.



III. Energy and Natural Resources

Under this rubric, fall completed and ongoing studies in three areas: energy, water and natural resources.

A number of key studies of Israel's future energy needs - in addition to a major five-year plan and a detailed study of industrial development - have relied crucially upon the OMER model, a flexible linear-programming model especially suited for examining alternate policy options, developed as an SNI project by Professor M. Avriel, together with Professor P. Feigin, Dr. R. Karni and Dr. A. Breiner. OMER was constructed during 1977-1981 and modified and updated during 1982-1985. It has proved itself an extremely useful tool for comprehensive long-range multi-sector planning. In 1986, OMER was used to construct forecasts of energy demand in Israel, and to estimate the impact upon Israel of the decline in the price of crude oil. In 1988, a macroeconomic version of OMER played a key role in construction of a national

five-year plan by the Ministry of Economics and Planning.

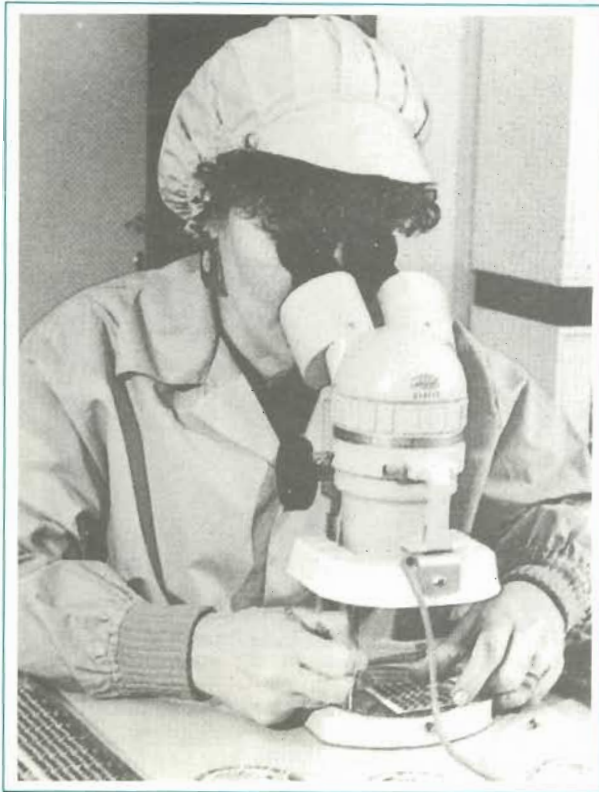
It may well be that water, rather than energy, will be Israel's - and the entire Mideast's - most pressing future constraint. The pioneering study of Water Policy for Israel by Professors U. Shamir and J. Bear, completed at the end of 1984, fulfilled its dual objectives of building a methodology for analysing water policy alternatives, and implementing that methodology to prepare a wide range of alternative policies. This SNI study enjoyed the full cooperation and participation of the Water Commissioner, and has influenced the nature of policy-making in recent years.

Israel's reliance on foreign sources for raw materials and energy make the issue of natural-resource policy an extremely important one in all discussions of public policy. Several ongoing SNI studies focus on it.

A study now being conducted by Dr. Abraham Mandel focuses on Israel's petroleum market, and examines the efficiency of pricing policies adopted since 1978. Comparisons are drawn with

other countries, and developments in the world oil market are carefully analyzed, with a view to the future course of the price of oil. A one-day seminar will be organized by Dr. Mandel, in conjunction with his research, devoted to developments in the world energy market and to the reform of Israel's domestic oil market policy. Among those who have agreed to take part are representatives of the Israel's three largest oil companies and Dr. Nathan Arad, Director-General of the Ministry of Energy and Infrastructure.

Concern over air pollution is spurring increased interest in the use of methanol as a fuel or additive. Professor A. Stotter, Dr. M. Gutman and Eng. S. Alcalay researched the use of methanol as an additional fuel for diesel engines, which are heavy polluters. Their results show a decrease in smoke level of up to 20 per cent, and an improvement in specific fuel consumption. Further research is being devoted to bus fleet testing.



IV. Environment, Health Care and Quality of Life

Research projects within this area center around four topics, distinct in nature but all closely related to the quality of life: health care; urban planning; environmental policies; and police services and criminal justice.

Health Care:

Professor L. Epstein's recently-completed study of "Community-oriented practice of family medicine" is aimed at introducing a "community of orientation to Family Medicine practice" in an urban and rural clinic of Kupat Holim. This research focuses on changes in the functioning of Kupat Holim clinics, and on introduction of community health programs. As part of the study, a computer program was written to provide rapid information about patients and their medication. Three aspects of health were singled out: hypertension (a major risk factor for two of the major causes of death, heart disease and strokes); the health of women; and the

aged, who make up a proportionately large part of the day-to-day health care load. Kupat Holim was a joint sponsor of the research.

Research funded by SNI and conducted by members of the microvascular morphogenesis unit, of the Technion's Faculty of Medicine, seeks to promote the healing of wounds by treating them with chemicals rich in so-called "angiogenic factors" (which stimulate the growth of blood vessels). Specifically, HUAF (Human Uterine Angiogenic Factors), extract F1, has been shown to be a "promising material for further trials".

Finally, a study by Dr. Ciporah S. Tadmor on "Crisis-intervention in hospital settings" developed a model for enhancing the understanding of medical and nursing staff, with respect to the specific psychological needs of their patients, and to provide hospital staff with preventive intervention techniques to attain positive outcomes to crisis situations. The program developed in conjunction with this research was successfully implemented at the Rambam Medical Center, in Haifa, during the past nine years. It was

selected as one of only 14 preventive models, out of a total of 900 models surveyed, declared by the American Psychological Association to be "outstanding and exemplary".

Urban Planning:

SNI has closely followed, and evaluated, Project Renewal - the large neighborhood-renewal program funded in part by World Jewry. A study by Drs. M. Baron and N. Carmon, and Professor U. Ben-Zion, examined empirically the impact of Project Renewal on migration patterns into and out of rehabilitated neighborhoods, by comparing individual families identified in 1972 and 1983 Population Censuses. Among the study's findings: Project Renewal "selected the socially-hardest cases for the renewal enterprise" (i.e., neighborhoods with the lowest socio-economic characteristics); and despite only minor differences between "immigrants" and "emigrants", those with 13+ years of schooling who came into Project Renewal neighborhoods were more numerous than those with similar education who left.

Along with Project Renewal, SNI has initiated research on the employment alternatives in development towns. Professor D. Shefer and Mr. A. Frenkel have completed the first stage of their study on "generating alternatives for the socio-economic development of development towns in Israel". They address, in particular, causes of high unemployment rates, finding a strong causal link between the socio-economic structure (in particular, the level of education) of the population and unemployment. Some closing of the gap in socioeconomic characteristics between development towns and other urban settlements has occurred in the past decade, the researchers found.

Police Services and Criminal Justice:

With the active cooperation of the Ministry of Police, SNI has undertaken a major study of Israel's criminal justice system as it ought to be in the 21st century. Policy recommendations will likely call for major reforms in the system. The study is directed by Professor M. Yadin.

Two projects focused more specifically on particular problem areas in police

services are "The evaluation of police control signals at congested intersections" (Drs. Y. Gur and D. Mahalal, and Mr. Y. Shiftan), and "Electronic License Plates" (Professor I. Bar-David). Both studies have attracted wide interest and attention.

The study of policy control of traffic signals at major intersections found that manual operation of such signals is often far less efficient than the automatic cycle and in fact precludes effective operation. Recommendations have been made to police officials.

The relatively new technology of AVI (Automatic Vehicle Identification) was the subject of Professor Bar-David's study. Following a successful one-day workshop on the subject, based on Professor Bar-David's findings, a Steering Committee was set up to further explore the possibility of introducing "electronic license plates" in Israel.

Samuel Neaman Institute – Associates and Researchers

Rachelle Alterman, Professor of Architecture and Town Planning, Technion

Dr. Malachi Ariel, Technion Extension Division

Israel Bar-David, Professor of Electrical Engineering, Technion

Dr. Mira Baron, Faculty of Industrial Engineering and Management, Technion

Jacob Bear, Professor of Civil Engineering, Technion

Uri Ben-Zion, Professor of Industrial Engineering and Management, Technion

Dr. Ze'ev Bonen, Research Fellow, Samuel Neaman Institute

Dr. Naomi Carmon, Department of Architecture and Town Planning, Technion

Arza Churchman, Professor of Architecture and Town Planning, Technion

Gideon Czapski, Professor of Physical Chemistry, Hebrew University, Jerusalem

Arnon Dar, Professor of Physics, Technion

Shmuel Eisenstadt, Professor of Sociology, Hebrew University, Jerusalem

Gad Eylam, Professor of Physics, Dean of Students, Technion

Amnon Frenkel, Samuel Neaman Institute

Dr. Yehuda Gur, Transportation Research Institute, Technion

Dr. Marcel Gutman, Faculty of Mechanical Engineering, Technion

Joseph Hagin, Professor of Agricultural Engineering, Technion

Dr. Reuven Karni, Faculty of Industrial Engineering and Management, Technion

Dr. Shaul Katz, Department of Sociology, Hebrew University, Jerusalem

Dr. Shmuel Konig, Israel Armament Authority

Nadav Liron, Dean, Professor of Mathematics, Technion

Mario Livio, Professor of Physics, Technion

Dr. David Mahalel, Transportation Research Institute, Technion

Dr. Abraham Mandel, Samuel Neaman Institute

Shlomo Maital, Professor of Industrial Engineering and Management, Technion

Dr. David Menashry, Dayan Institute, Tel Aviv University

Gideon Pinto, Samuel Neaman Institute

Lenny Pismen, Professor of Chemical Engineering, Technion

William Resnick, Dean, Professor of Chemical Engineering, Technion

Giora Shaviv, Professor of Physics, Technion

Daniel Shefer, Professor of Architecture and Town Planning, Technion

Dr. Michal Shemesh, Department of Teaching in Science and Technology, Technion

Dr. Yoram Shiftan, Transportation Research Institute, Technion

Uri Shamir, Professor of Civil Engineering, Vice President for Research, Technion

Abraham Shitzer, Professor of Mechanical Engineering, Technion

Aner Shoham, Samuel Neaman Institute

Paul Singer, Professor of Physics, Technion

Arthur Stotter, Professor of Mechanical Engineering, Technion

David Vofsi, Professor of Chemistry, Weizmann Institute

Shlomo Waks, Professor of Teaching in Science and Technology, Technion

Daniel Weihs, Professor of Aeronautical Engineering, Technion

Yoav Wexler, Samuel Neaman Institute

Micha Wolfshtein, Professor of Aeronautical Engineering, Technion

Micha Yadin, Professor of Industrial Engineering and Management, Technion

Moshe Zakai, Professor of Electrical Engineering, Technion

Zvi Ziegler, Professor of Mathematics, Dean of Graduate Studies, Technion

Dr. Ehud Zuscovitch, Department of Economics, Ben Gurion University

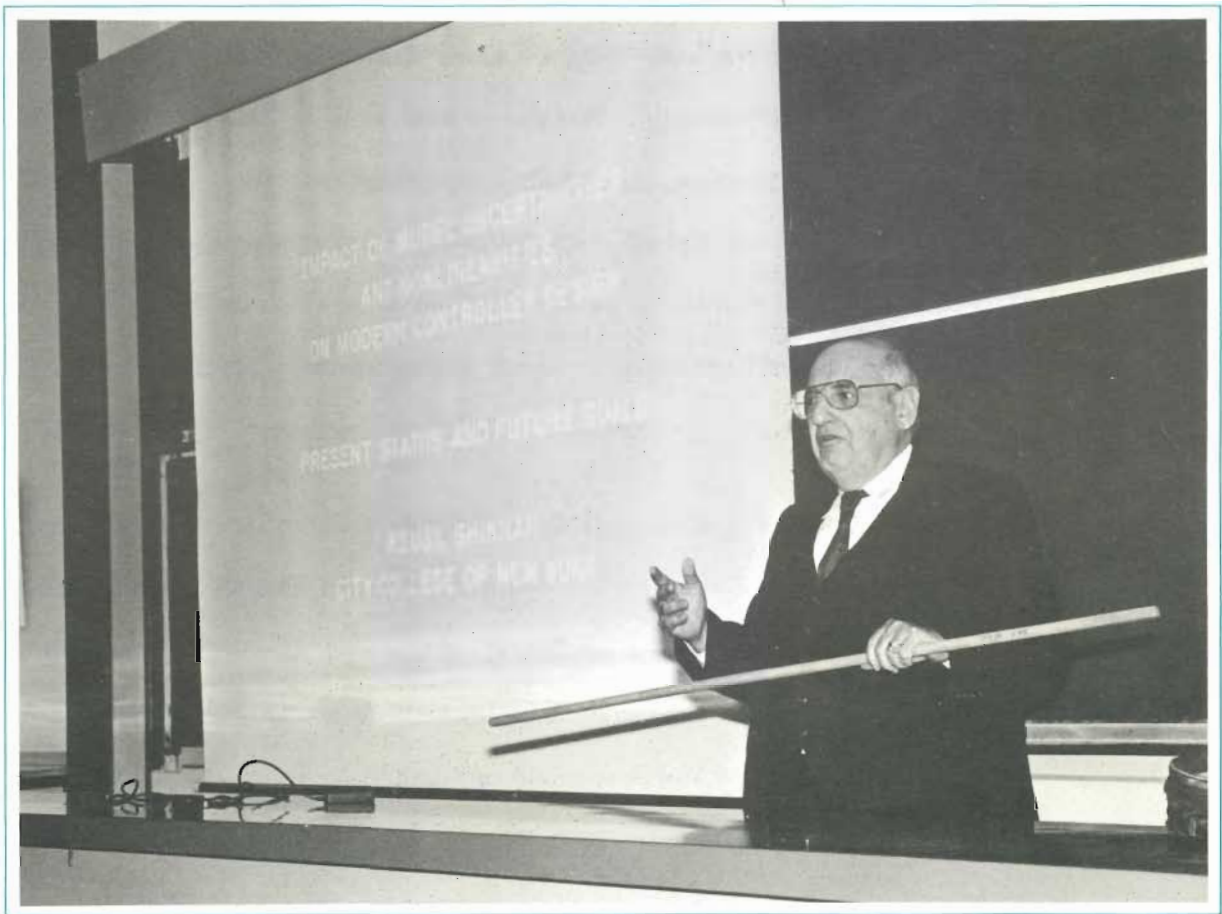
Visiting Professors

Prof. Sir Claus Moser, President, Wadham College, Oxford University, U.K.

Prof. Kenneth H. Keller, former President, University of Minnesota

Prof. Ed Dubinsky, Professor of Mathematics, Purdue University

Prof. Reuel Shinnar, Professor of Chemical Engineering, City University of New York



Workshops and Seminars

Workshops

Engineering Education 2001: Meeting the 21st Century. December 29-31, 1986.

Scientific and Technological Education in High-Schools. November 12-13, 1987.

Civilian Space Applications - Israel's Role. March 7-8, 1988.

Innovation at the Crossroads Between Science and Technology. May 23-25, 1988.

Videotaped Teaching of Physics and Mathematics. December 6, 1988.

Polymers and Plastics Industry in Israel. February 2, 1989.

Developing Sources of Employment in Development Towns in Israel. May 18, 1989.

Teaching of Mathematics and Use of Computers in High Schools. May 18, 1989.

Reintroducing Design into the Engineering Curriculum. June 12-13, 1989.

Seminars

Professor R. Shinnar, Department of Chemical Engineering, C.C.N.Y.: "Robustness and Nonlinearity in the Design of Process Control Systems", January 13, 1988.

Professor G. Czapski, Hebrew University: "Bibliometric Analysis of Israeli Science", April 1988.

Professor S. Eisenstadt, Department of Sociology, Hebrew University: "Science in Small Countries: Some Questions and Conjectures", May 1, 1988.

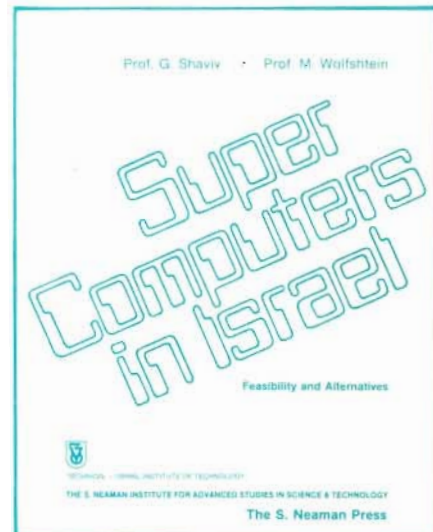
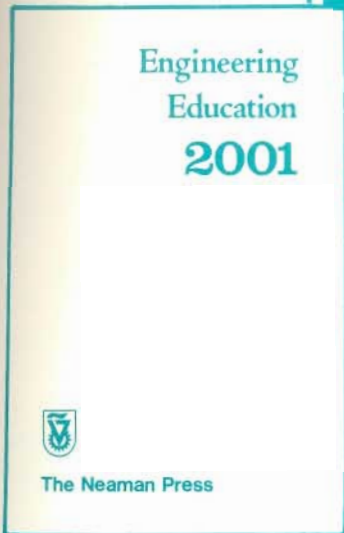
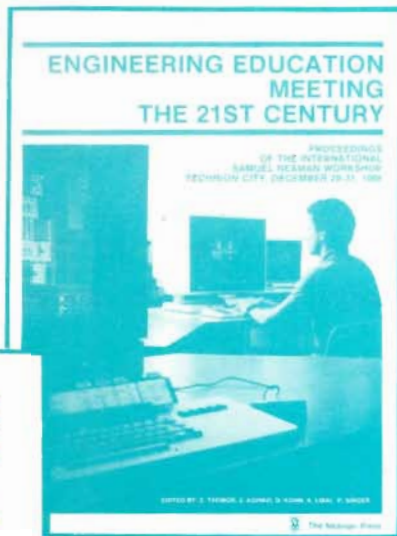
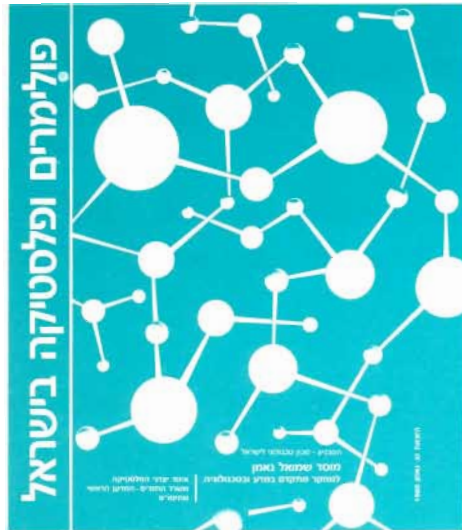
Professor G. Shaviv, Professor M. Wolfshtein, Technion: "Supercomputing in Israel: Feasibility and Alternatives", November 6, 1988.

Professor Kenneth Keller, former President of the University of Minnesota and Visiting Fellow, Woodrow Wilson School of Public and International Affairs, Princeton University: "Ethical, Economic and Technological Questions in High Cost, High Technology Medical Therapies", (jointly with the Faculty of Chemical Engineering), March 15, 1989.

Sir Claus Moser, President, Wadham College, Oxford University, "Governance of Higher Education", April 5, 1989.

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W.P. No. 4 Interorganizational coordination: Three cases in Great Britain.

W.P. No. 5 Interorganizational coordination: Four cases in Israel.

W.P. No. 6 Interorganizational coordination: Three cases (Germany, Sweden, Venezuela).

W.P. No. 7 Effectiveness in interorganizational coordination: A comparative case analysis.

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Alterman, R. "Implementing decentralization policy in Israel's Project Renewal", presented at the *International Conference on Neighborhood Rehabilitation*, March, 1986, Jerusalem.

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Shefer, D. "The effect of various means of communication on the operation and location of high-technology industries", *Int. Symp. on "Informatics and Regional Development"*, Delphi, Greece, April 2-4, 1986.

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