



Technion - Israel Institute of Technology

The S. Neaman Institute
for Advanced Studies in Science and Technology



ANNUAL REPORT
1992-1993

Annual Report 1992-1993

Technion - Israel Institute of Technology

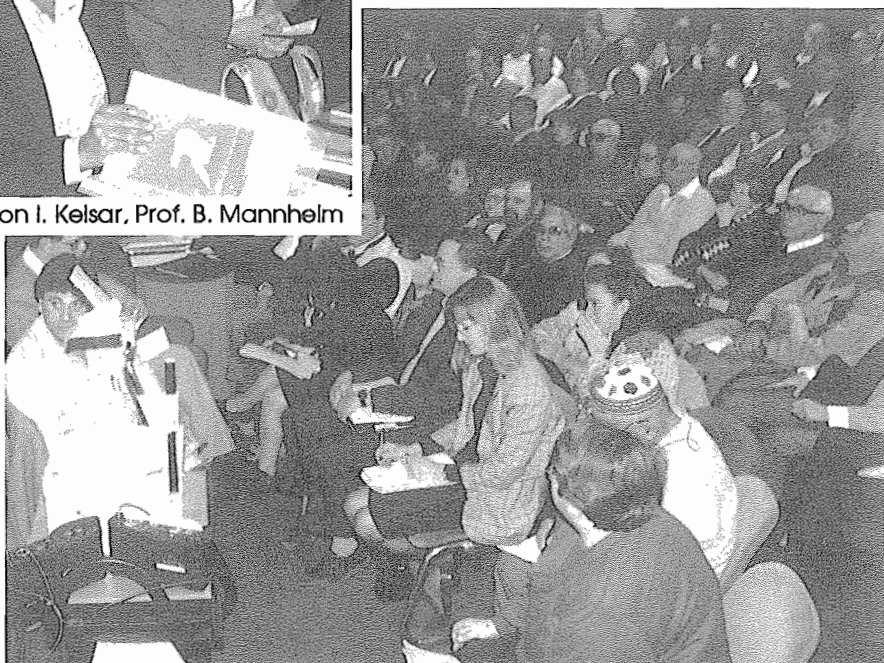
The S. Neaman Institute
For Advanced Studies in Science and Technology



Mr. S. Neaman meets Gorbachev at the 1992 Technion Board of Governors Meeting



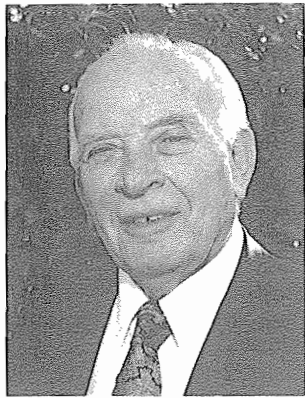
U. Agami, Minister of Transportation I. Kelsar, Prof. B. Mannhelm



Workshop on Economic and Social Aspects of Manpower Layoffs

CONTENTS

Board of Directors, Advisory Council and Staff	5
About the Institute	6
The Director's Report	8
List of Ongoing SNI Research Projects	11
SNI Researchers and Associates	37
SNI Workshops and Seminars	45
List of SNI Publications (English and Hebrew)	47



Samuel Neaman
Chairman



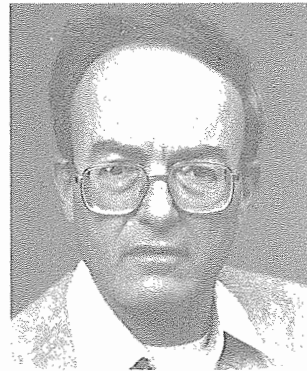
Professor Zehev Tadmor
Vice-Chairman



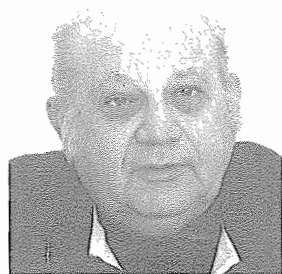
Professor Daniel Weihs
Director



Professor Paul Singer



Professor Aman Seglner



Ing. David Kohn



Ruth Rivkind



Sima Nadler



Amnon Frenkel

THE SAMUEL NEAMAN INSTITUTE
FOR ADVANCED STUDIES IN SCIENCE AND TECHNOLOGY

Board of Directors

Samuel Neaman, Chairman, Oceanside, Ca., U.S.A.
Zehev Tadmor, President, Technion
Arnan Seginer, Professor of Aerospace Engineering; Vice-President,
Technion
Paul Singer, Professor of Physics, Senior Vice-President, Technion

Director

Daniel Weihs, Professor of Aerospace Engineering, Technion

Advisory Council

Shaul Amir, Professor of Architecture and Town Planning, Technion
Aharon Ben-Tal, Professor of Industrial Eng. and Management, Technion
Michael Fry, Professor of Medicine, Technion
Gershon Grossman, Professor of Mechanical Engineering, Technion
Itzhak Hoffi, General (Res.), Head, Board of Directors, Tadiran
Amos Horev, General (Res.), Former President of Technion
Nadav Liron, Professor of Mathematics, Technion
Abraham Marmur, Professor of Chemical Engineering, Technion
Itzhak Oref, Professor of Chemistry, Technion
Bluma Peritz, Director, Graduate Library and Information School,
Hebrew University

Staff

Project and Workshop Coordinator: David Kohn, M.Sc., M.Phil.
Administrative Assistant: Mrs. Ruth Rivkind, B.A..
Book-keeping: Mrs. Sima Nadler
Senior Researcher: Amnon Frenkel, M.Sc.

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 the 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 publications.

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 publications 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 Technion, and Technion. It was ratified 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 since retirement devoted his time 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 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 partly financed by 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 research is undertaken for government, public and private organizations, provided they are in accordance with Institute goals and objectives.

THE DIRECTOR'S REPORT

The last year has been a year of political change in Israel, the U.S. and the European countries, with significant effects on policy making, and thus on policy research. A greater emphasis on peace, in the Middle East specifically, and all over the world has strongly affected all defence-related industries. As these are among the biggest, and most export oriented in Israel, the economic impact is enormous. On the other hand, environmental issues have gained in importance. These and other changes, resulting from immigration, have required new looks at both the educational and employment agencies. The Neaman Institute is working together with government and industry to help in turning these events into opportunities for growth and greater well-being for Israel's population.

Under the guidance of the Institute's Board of Directors, especially its Chairman and Founder, Mr. S. Neaman, and supported by technical advice from the Institute Advisory Committee, the SNI researchers and staff have followed the Institute's strategic approach to the definition and solution of problems in the following main areas:

- a. Industry and technology
- b. Science
- c. Education
- d. Quality of life and natural resources

In the area of **industry and technology** the institute has continued the in-depth study of various sectors of industry. This was done in cooperation with the relevant industry associations and government ministries, in order to formulate strategies for industrial development and ensure continuity of competitiveness. This year we completed the study of the Electronics Industry, which included 4 stages: mapping the industry in Israel and abroad, as well as market trends, location of potentially feasible areas for the Israeli industry, requirements of curricular changes from the higher education institutions educating engineers, in order to be able to meet these challenges, and also an effort to develop cooperation within industry in these areas. Lately a similar study was initiated for the Chemical Industry, in collaboration with the Manufacturers' Association and the Ministry of Industry and Commerce. Also, a follow-up study of the impact of changes in the Electronics Industry on the type of research personnel needed has been started.

Together with 4 leading industrial corporations, the SNI has

established the first consortium for generic R&D in the field of satellite communication, according to the Ministry of Commerce and Industry's new MAGNET Program. This is a new and promising direction for the SNI, which enables development of new industrial areas. With massive governmental support, a large (9 senior researchers) group, mainly from Technion's Electrical Engineering Department are involved in this study. Negotiations are under way for the establishment of other consortia in various areas of advanced technology.

Another workshop on the subject of improving R&D efficiency was held at the SNI, and the research for measurement of performance parameters in the Israeli industry was completed.

In the area of **science** we have continued analysis of our database of publications of Israeli scientists and citations thereof for individual searches, as well as evaluation of departments and research areas in Israel, compared to the rest of the world. We have completed a study of the plans and expectations of Ph.D's from Israel, depending on professional discipline. The translation of the first scientific book of a series of books by Nobel Prize Laureates was completed, and the book is scheduled to appear shortly in the SNI Press.

The first SNI Scientific Conference was held this year on Distributed Algorithms. The conference was a great success. The second conference is scheduled for Spring 1994.

In the area of **education** the Institute has continued the production of video courses for science in high schools and preparation for matriculation examinations. The series of lectures in high schools and academic preparatory units has also continued, in order to encourage pupils to take high level science courses and continue their studies.

The SNI has also supported the preparation of two Hebrew teaching textbooks with a technological-scientific emphasis, for new immigrant scientists and engineers. These books were very well received and even won Dori Award given by the Haifa Municipality. The SNI has also carried out a background study for the development of courses for the solution of technical and technological problems for high school intermediary level (ages 13-15) in 5 experimental schools. A study was also undertaken to

follow up young adults found at an early age to be especially gifted, to determine the effect of the special education they had received.

In the area of **quality of life and natural resources** the study of use of coal ash for artificial islands has continued. Several locations were defined and cooperation with Dutch authorities has begun in this area.

The study of the effect of technological and social development on the Israeli law enforcement system has continued. Also, we have continued the study of alternatives for municipal solid waste recycling and have initiated a new study on the recycling of wastewater.

The SNI has undertaken to formulate a national emergency plan for dealing with marine ecological disasters. Cooperation has also begun with the Society for Protection of Nature in Israel, to undertake studies on policy for the conservation of plants and animals in Israel.

This year about 90 researchers were involved in SNI projects (two thirds of whom were senior Technion faculty). The Institute has published over 20 books, reports and publications and organized seven conferences and workshops. A number of conferences organized by other Technion groups were partially supported by SNI.

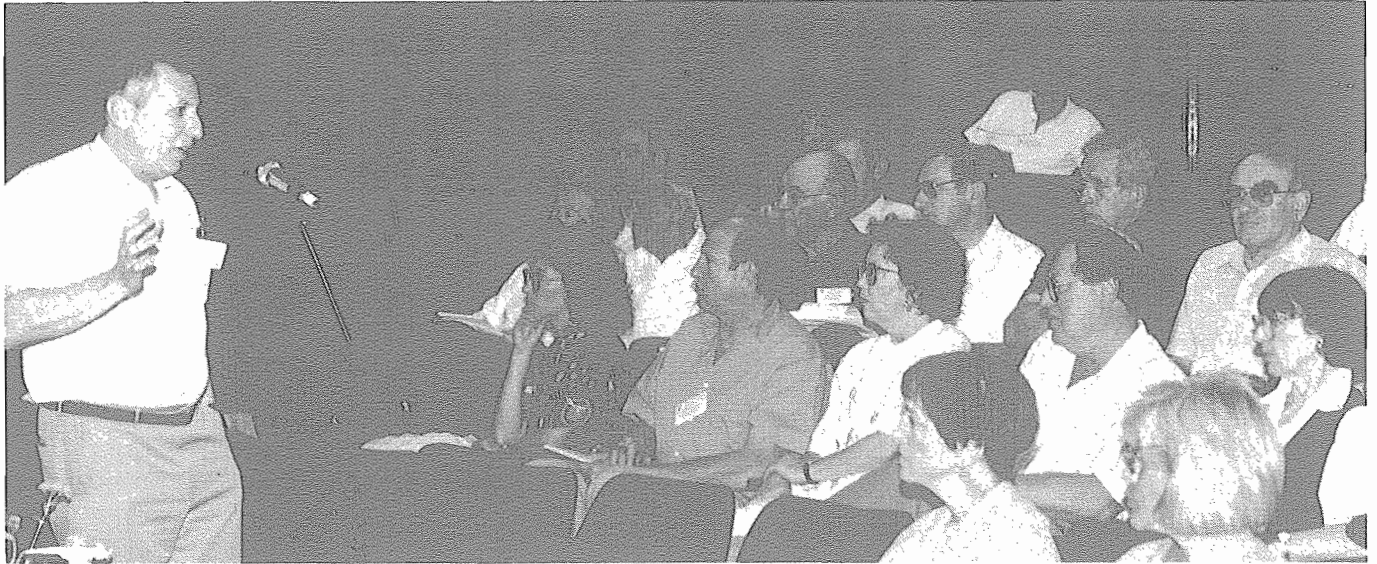
This year the SNI celebrates its 15th anniversary. During these years about 300 reports, books and other publications, half in Hebrew, appeared, as the result of the various projects performed.

Professor Daniel Weihs

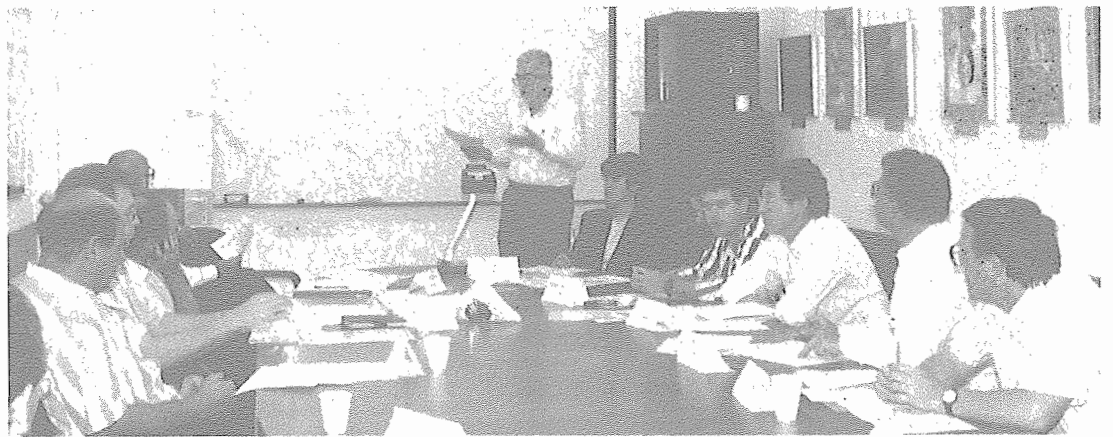
LIST OF ONGOING SNI RESEARCH PROJECTS

(Researchers and Associates, see page 37)

	Page
I. INDUSTRY AND TECHNOLOGY	
Technometric Analysis of Industrial Products (1870)	16
R&D Quality and Productivity(1950)	17
Measurement of Performance Parameters for the Israeli Industry (2020)	18
Electronics 2000 - The Israel Electronics Industry (2040)	19
Utilization of Coal Fly Ash for Land Reclamation from the Sea and Offshore Islands (2140)	23
Consortium on Satellite Communication (2200)	28
Effects of Decrease in Defense Spending on Industrial Policy (2350)	35
II. SCIENCE	
Science Indicators (1520)	13
Hebrew for Technology and Sciences (2290)	32
Distributed Algorithms (2300)	33
Evaluation Methodology for Research Productivity of Universities (2330)	34
III. EDUCATION	
Teaching of Science and Mathematics by Video (1840)	15
Career Patterns of Ph.D. University Graduates in Israel (2120)	22
Follow-Up Study on Scholastically Gifted Young Adults (2160)	25
Problem Solving in a Technological Environment (2210)	29
IV. NATIONAL RESOURCES and QUALITY OF LIFE	
Law Enforcement System in the 21st Century (1560)	14
International Amendments on the Environment and their Effect on Israel's Energy Sector (2061)	20
The Peace Process and the Jews of Egypt (2071)	21
Water Research Institute Study (2150)	24
Economic and Social Aspects of Layoffs in Israeli Industry (2171)	26
Policy Alternatives for Solid Waste Recycling (2190)	27
Whizin International Symposia on Ethics and Technology (2220)	30
Immigrant Absorption: The Interface between Research and Policy Making (2240)	31
Wastewater Reuse in the Urban Sector (2360)	36



Prof. D. Weihs opens the Whizin International Symposium on Technology and Ethics



Workshop on Measurement of R&D Quality and Productivity

1520 Science Indicators

Utilizing a variety of statistical and computerized data processing tools, the Science Indicators Project attempts to quantify the scale of operation and quality of Israeli scientific research. The processed data are supplied to several science policy decision making bodies, such as the Planning and Grants Committee of Israel's Council for Higher Education (CHE), the Israel Academy for Sciences and Humanities, the Ministry of Science and others.

During 1992 we received the ISI updated database including articles up to the end of 1991. This enabled us to perform analyses at the individual level of faculty at the Technion and other Israeli universities.

A workshop chaired by Dr. B. Peritz on Evaluation of Scientific Activity: Tools and Methods was held in the framework of INFO 92 Conference. Papers were presented by R. Kimberley (ISI, European Branch), Dr. M. Zadok (Israeli Academy of Sciences), S. Herskovic (CHE) and E. Granit (Szold Institute). The study on Cooperation between Israeli and "Foreign Researchers" was published in the recent issue of Scientometrics.

1560 Law Enforcement System in the 21st Century

This project seeks to define the objectives and expectations of the law enforcement system in future, and to specify the tools required to achieve those objectives.

In our rapidly changing world, only an organization capable of adapting to change can function efficiently. Without proper forecasting of the environment within which the organization will operate in future, timely adaptation is impossible. Simply extrapolating past changes to the future is highly questionable.

This project tries to assess the most likely future-states of Israeli society on several dimensions (e.g. economic development, social problems, political structure, etc.) Developmental trends will be explored by several teams, in a series of workshops. Experts from the major law enforcement agencies, as well as criminologists, will then consider the implications of these potential future-states for their respective fields. Along with experts in law and criminology, leading scientists in all relevant areas of the social sciences, management sciences and technology will take part.

Cooperation of law enforcement agencies outside Israel, involved in similar research activities, is anticipated.

The study is funded jointly with the Ministry of Police and the Jerusalem Center for Public Affairs.

1840 Teaching of Science and Mathematics by Video

The aim of this project is to improve the quality of teaching sciences in high-schools. The concept is to bring to the schools the best teachers at the university level to present the course material. The most practical way to achieve this goal is to video-tape an entire course in high school physics, mathematics and chemistry, using the best teachers of the Technion and then to use the video-taped lectures in high schools. The project started four years ago, and this academic year the following stages were accomplished:

(1) Additional sets of physics and mathematics courses have been distributed to about fifty high schools and a dozen preparatory schools.

(2) A course in Chemistry was prepared and distributed.

(3) A number of workshops for teachers, principals, supervisors and students have been organized, in which the program has been presented by the S. Neaman Institute.

The program is partly funded by the Association for the Advancement of Education.

1870 A Technometric Analysis of High-Tech Industries in Israel

Technometrics is the quantitative measurement of the technological quality of products, processes and services. By identifying key specifications of products, quantifying them, and comparing them through use of a common (0,1) metric -- where '0' is the simplest level and '1' is the global 'state-of-the-art' -- it is possible to compare objectively Israel's products with those of other nations.

During the third year of the project, the following results were obtained:

- * Two papers made use of a system of indicators that quantify the innovation process, from start (basic research) to finish (export of science-based goods). It was shown empirically that in comparison with European nations, Israel is highly efficient in using its R&D resources to achieve scientific and technological excellence (measured by publications, citations, and to some extent patents), but is quite inefficient in translation this excellence into export comparative advantage.
- * Data were collected on pressure, temperature, and force sensors -- their prices and technical specifications. Technometric comparisons of Israeli-made sensors, vs. those of Germany, U.S., Japan and other countries are being prepared.
- * Work is continuing on using "voice of the market" techniques to identify sources of product value.
- * A technometric benchmarking model for second-generation R&D investment was constructed, which aims to guide decision-makers in ways to optimally invest time and resources in product and process improvement.

Papers on the research project were presented to the Management of Technology Seminar, at the MIT-Sloan School of Management, at the 10 World Congress of the International Economics Association, in Moscow, Russia and at the Research Department of the Bank of Israel.

1950 R&D Quality and Productivity: Measurement and the Improvement Process

This study is a continuation of the workshop on "R&D Productivity" held at the S. Neaman Institute in January 1991. One of the key questions raised, dealt with the definition and measurement of "Quality in Design". As a consequence, a second workshop was held in May 1992, involving 15 representatives from ten science-based Israeli companies.

Results of the workshop classified Quality in Design characteristics into four groups:

- 1) Structure - Modularity, configuration controllability, documentation, paralleling, milestone definition, expansion and flexibility.
- 2) Methodology - Review process, self improvement, appropriate technology base and reusability.
- 3) Expressiveness - Focus, explicitness, completeness and consistency.
- 4) Behavior - Testability, predictability, controllability and the enhancement of creativity.

The workshops provide a unique forum for R&D scientists to explore fundamental issues in R&D activities. A third follow-up workshop is planned for May 1993, which will examine various approaches for improving the R&D design process. A measurement system will provide the necessary feedback mechanism for the R&D improvement process.

2020 Measurement of Performance Parameters for the Israeli Industry

Encouraging industrial investment is of special interest to Israel. It is important to have available well defined quantitative measures, by which one can assess the effectiveness of the investment. In this research, several measures, that should be useful for this purpose, are proposed and values of these measures for large Israeli companies are presented.

There are two related but distinct issues involved in developing such measures. The first is that of calculating an inflation-adjusted rate of return on the industrial investment. While such rates are widely used within companies prospectively in assessing particular new investments, they are not public knowledge, nor can they be ascertained directly from the actual performance of companies as described by their accounting reports.

This research presents a method for imputing these rates from accounting data, and results are obtained for major industries in the chemical, electrical, pharmaceutical, textile and aerospace sectors, with emphasis on the export oriented industries.

The second issue is that of measuring the contribution of industrial companies to the Israeli economy. A new concept is introduced, that of Net Investment. It is defined as the difference between the total cumulative investment of the company and cumulative reinvested cashflow, and as such, represents the external investment in the company. The contributions of the Israeli companies to the GDP are computed and related to the companies Net Investments. This ratio is also an effective way to evaluate the contribution of government subsidies to the development of those companies.

The methods and the major findings were presented in a seminar and a report was issued. The study was partially funded by the Ministry of Industry and Trade.

2040 Electronics 2000 - The Israeli Electronics Industry

This project, which was carried out in conjunction with the Electronics Industry Association was completed this year and consisted of four stages:

- a. The Electronics Industry in the World and in Israel,
- b. Identification of Areas and Subjects of Interest,
- c. Engineering Education Trends in the Electronic Engineering,
- d. Summary of Activities of the Steering Committees.

The last two stages were completed this year as follows:

The study on engineering education investigated the developments and changes in curricula abroad and in Israel. Special attention has been paid to the dynamic nature of the curricular structure of the engineering programs. The study suggests a methodology for supporting curricula decision making.

The study of joint generic R&D programs and technological infrastructure included two parts. In the first part an industry survey was carried out which resulted in the preliminary identification of three options:

- i) A center for ASIC development, ii) fast small digital processors, iii) digital receiver technology.

The committee on digital receiver technologies led to the decision by several companies to form a R&D consortium. As a first step, a plan for setting up the consortium will be prepared. The work of the committee on fast processors has led to a preliminary specification of the processor. Hopefully after further discussions, this will also lead to an R&D consortium in this area.

2061 International Amendments on the Environment and Their Effect on Israel's Energy Sector

Accelerated consumption of fossil fuels produces increasing amounts of combustion products and pollutants which cause environmental damages on local and global scales. The need for internationally-coordinated action to reduce such damages has recently gained priority on the international agenda. Some amendments aimed at reducing global pollution have already been drawn, and more are expected to follow. From an Israeli point of view, compliance with these amendments will invariably require modifications in Israel's various sectors of the economy, and especially in the energy sector.

The S. Neaman Institute has initiated a one-day symposium on "International Amendments on the Environment and Their Effect on Israel's Energy Sector. The symposium aims at:

- * Increasing awareness to environmental considerations among decision-makers and the public.
- * Stimulating environmental action in the energy sector.
- * Providing forum for exchange of information and ideas for those active in the energy and environmental sectors.

The program consisted of two sessions. The first included reviews of international amendments on air and water quality, presentations on energy and environmental policies and a lecture on the economic aspects of compliance with environmental regulations. The second session included presentations by representatives from various organizations in the energy sector.

The symposium was co-sponsored by the Ministry of Energy and Infrastructure, the Ministry of the Environment and the Israel Oil Refineries.

2071 The Peace Process and the Jews of Egypt

Egypt is the only Arab country until now that has made peace with Israel. This research examines the attitude of Jews of Egypt in Israel towards the Israel-Egypt Peace Agreement. It will attempt to determine whether the fact that Egyptian Jews who lived in Egypt in the past and have an eastern-western cultural background, believe in the possibility of reaching similar Peace Agreements with other Arab countries: Jordan, Syria and Lebanon, and with the Palestinians.

The research is based on a field survey, with the aid of a questionnaire, which encompasses 500 Israelis of Egyptian background, from various income levels and places in Israel, who have left Egypt since 1948,

The two main areas of focus of the study are: the collection of information concerning the attitudes of Jews of Egypt in the survey towards the peace process, and the preparation of material based on the study, for the teaching of "peace studies" in higher education and in secondary schools.

The study is partially funded by Israel's Foreign Ministry.

2120

Career Patterns of Ph.D. University Graduates in Israel

The purpose of the present research is to investigate the career patterns of Ph.D. graduates, in particular in light of the potential competition in the labor market with the immigrants from the Soviet Union, holding Ph.D. degrees.

Participants in this study were eight hundred Ph.D. graduates in engineering and sciences in Israel, who received their degree in 1987, 1989 and 1992. They were asked to fill out a research questionnaire which was distributed by mail.

The questionnaire included biographical data, information on the work setting and job opportunities, career variables including motives, goals, career commitment and satisfaction, career achievement including status of employment, publications, prizes etc. 300 participants in the study returned the completed questionnaire.

Of all respondents, 25% graduated in 1987, 30% in 1989 and 45% in 1992. 26% graduated in mathematics and physics, 19% in engineering and 55% in life sciences. 62% of the respondents were males with average age 38.6 years. 61% were born in Israel, 13% in the US and Western Europe, 16% in East Europe and 10% in Asia, Africa or South America.

2140

Application of Fly Ash for Construction of an Offshore Island in Israel

The project considers the application of Coal Fly Ash (CFA) for the construction of an offshore island in the coastal region of Tel Aviv. Three design options for the construction of a 1 sq.km. island 800 m off the shore line are outlined. The demand for fill material is shown to exceed by far the expected rate of ash supply from local power stations. Preliminary design and cost estimates indicate that the caisson retained construction method with compartmentalization is promising both on technological and economic grounds. The price of construction of the island can be less than half and possibly as low as one third of the expected sales value of the reclaimed land. Construction of the 1 sq.km. caisson-retained island with compartmentization is estimated at \$509 million or \$640,000 per dunam with an estimated sales value of at least \$1.5 million per dunam and probably higher. Due to its limited availability the ash will be used to form a compacted fill layer mostly above sea level. This provides an additional environmental safeguard. Finally other uses of the ash in the form of aggregates and as a replacement for cement are considered.

The project is partially funded by the Israeli Electric Company.

2150 Water Research Institute Study

A study to examine efficient ways of conducting and coordinating Water Research in Israel was conducted. A team from various Technion departments worked for three months and submitted a report at the end of February 1992.

The main findings and recommendations, based in part on a questionnaire circulated to all staff members active in water research, were:

There exists a substantial activity in water research at the Technion, for many years, in several departments. Technion is, and should remain a leader in the field of water research, concentrating on areas in which it has expertise and are important to Israel's water sector.

During the last 15-20 years there has been a serious decline in Technion's ability to conduct water research, due to shortage of resources.

The SNI team recommended that a Water Research Institute (WRI) be set up, and provided a list of necessary facilities, equipment, staff, and budget, along with a draft of the recommended charter for the Water Research Institute. The Technion Senate approved the creation of the Water Research Institute, based on the recommendation of the S. Neaman Institute report. Efforts are in progress to secure the resources for the WRI.

Follow-Up Study on Scholastically Gifted Young Adults

The S. Neaman Institute and the National Institute for Testing and Evaluation (NITE) initiated a joint study on giftedness in young adults.

The definition of giftedness, adopted in this study, is based on the upper one percent of the population of applications to higher education in Israel on the total score on the Inter-University Psychometric Entrance Examination (constructed and administered by NITE), or graduation cum laude at the Technion, or participation in programs offered to extremely scientifically talented children by the Weizmann Institute.

The main research questions are as follows:

1. What are the characteristics of Israeli gifted young adults (as defined by several scholastic aptitude definitions)?
Are there differences between gifted and other (non-gifted) young adults on the above mentioned variables?
2. Can giftedness be considered as a stable characteristic of the individual? What is the proportion of gifted young adults who were defined as such in their childhood? How many of those who were identified as gifted in their childhood can be considered as such in their early adulthood?
3. Can we differentiate among the gifted, between achievers and under-achievers? Is under-achievement correlated with the above mentioned variables?

A detailed questionnaire was sent to the above groups, including a control group of "ordinary" youngsters. More than 1700 of them cooperated and the results will be reported within the next few months.

2171

Economic and Social Aspects of Manpower Layoffs in Israeli Industry

One of the main internal problems on the Israeli national agenda is that of the high rate of unemployment. The S. Neaman Institute has therefore held a workshop on the subject on January 21, 1993, in conjunction with the Haifa Histadrut (General Federation of Labor), to discuss the social and economic aspects of manpower layoffs. Professor Bilha Mannheim, the chairperson of the workshop pointed out that this was the third workshop held by the S. Neaman Institute on various aspects of labor relations. She maintained that Israel will have to cope with the implications of massive unemployment until 1996. Following are highlights of the presentations.

Uri Agami - Secretary of the Haifa Histadrut, emphasized the importance of cooperating with academia in order to discuss these problems and try to find solutions.

Israel Keisar, the Minister of Transportation and former Secretary General of the Histadrut, pointed out that during the forthcoming years Israel must create 500,000 new jobs due to growth as a result of the Aliyah.

Professor Shlomo Maital spoke about Israel and the international economy and discussed the problems of recession in various countries, and its implications for Israel.

Dr. Zehava Rosenblatt of Haifa University presented results of a research carried out at the Technion on manpower layoffs in the electronic industry. The research found that layoff strategies did not proceed according to a rational model.

Mr. Arie Sahish, Deputy Director of the Haifa Port discussed the impact of automation on manpower layoffs in ports. For instance, in Haifa Port the number of tenured employees has decreased from 2000 to 500 from 1969 to 1991 due to technological change and more effectiveness is still to be achieved.

Dr. Dov Zohar pointed out ways to cope with the stress related to layoffs, from the point of view of individuals who are faced with the threat of losing their job.

2190

Evaluation of Alternative Policies for the Recycling of Municipal Solid Waste

The study aims at the development of optimal approaches for the recycling of municipal solid waste (MSW).

The study comprises a fact finding stage. The different approaches practiced by other countries are being studied, including regulations and economical aspects.

The experience of recycling projects in Israel will be evaluated. The different alternatives will be tested as to their economical, environmental and public acceptance aspects.

The suitability of the different alternatives to the condition prevailing in Israel will be evaluated. Alternatives will be presented toward a policy decision by the proper governmental and other agencies.

The study is carried out by a team of researchers from Technion and Haifa University, and is partially funded by the Ministry of the Environment.

2200

Consortium: "Earth Stations for Satellite Communications"

Communication via satellites has grown rapidly in recent years, as technological developments enable to broaden usage of satellite communication and bring it to the "small business" sector (banks, offices, department stores), as well as to the consumer market.

The consortium on Earth Stations for Satellite Communications was founded by Raphael, Israel Aircraft Industries, Elisra, Gilat and the S. Neaman Institute to establish a joint venture that will enable the Israeli industry to compete in this market.

The research and development activities that are included within this framework are:

1. New access methods to the satellite channel.
2. Advanced modulation, coding and compression techniques.
3. Development of low cost front end units (antennas, microwave components and application of specific integrated circuits - ASICS).

In addition to these research activities, the S. Neaman Institute organized three workshops.

1. An initial meeting, where the participating firms presented their plans for research and development within the consortium framework.
2. A technical workshop for the various professional groups: communication systems, communication networks, signal processing and VLSI, antennas and microwave.
3. A workshop on the INMARSAT mobile satellite system.

2210 Problem Solving in a Technological Environment

The teaching of problem solving in a technological environment requires planning, developing and evaluating. Even though the technological problem can be presented as a configuration that bears resemblance to either science or maths, its solution must nevertheless include a practical purpose that goes beyond the "lab solution", offered by scientific experiments.

Projects, relevant to the students' environment, serve as the back-bone of the curriculum motivating them to study more maths and science. The technological project intends to impart to the student tools for thinking and skills which are seldom offered by learning other subjects.

In the framework of this research, a course in "Problem Solving in a Technological Environment" was developed for Junior High School students. A teacher training course was implemented using teachers from five schools. This course equipped them to successfully introduce this year the Technology curriculum (contents and teaching methods) in their respective schools.

2220

Whizin International Symposia on Ethics and Technology

The first in a projected series of International Symposia on Ethics and Technology, was held at the Technion in June 1992, as a cooperative venture of the Technion and the University of Judaism in Los Angeles. The impetus for organizing a series of annual symposia devoted to the exploration of the interface between ethics and technology was provided by the Whizin family, generous donors to both the sponsoring institutions.

The Symposium was organized by the Samuel Neaman Institute as an "in-house conference" designed primarily to familiarize the members of two such disparate academic institutions with the problems that have to be confronted jointly and to map out a common frame of reference for dealing with them.

Four sessions were held, in each of which presentations by faculty members of both institutions were followed by a lively discussion. The first session, entitled *Technology and Ethics: outlining the issues*, was opened by Prof. David Lieber, President of the University of Judaism, and Mr. Bruce Whizin, representing the donor family. Three Technion professors, Shmuel Merhav, Harriet Gershon and Ori Better, then raised ethical problems that arise in their various disciplines.

The principal lecturer in the second session, *Ethics and Technology: philosophical perspectives* was Prof. Elliott Dorff (U.J.) and the respondent was Prof. Alexander Barzel (Technion).

The third session, entitled *Probing Classical Sources for Ethical Commitments* and devoted to ethical principles in Judaism, was opened by Dr. Daniel Gordis (U.J.) and continued by Prof. Chanoch Jacobsen (Technion).

Judge Amnon Carmi opened the fourth and final session, *Alternative Perspectives on Genetic Engineering*, and Prof. Miriam Cotler (U.J.) responded. The Symposium was summarized by Prof. David Gordis (U.J.).

The second Whizin International Symposium is scheduled to be held at the University of Judaism in Los Angeles.

2240

International Workshop: Immigrant Absorption: The Interface between Research and Policy Making

Immigrants are moving in large numbers from the East to the West and from the South to the North, and the waves are expected to grow in the years to come. A common perception is that immigrants are a liability and not an asset to the absorbing society, a threat to the quality of life of the resident population. Can one assist immigrants become a positive force in economic development and contribute to the social enrichment of their target society? Can one reduce the conflict between oldtimers and newcomers? These are two of the challenging questions that will be addressed in a workshop organized by the S. Neaman Institute.

Invited experts from several countries, including USA, Canada, Australia, European countries and Israel, and from various disciplines, including urban planning, sociology, economics, political sciences, and human geography, will meet for two days of presentations and discussions and one day of touring immigrant absorption enterprises in Israel.

The workshop goals are as follows:

- to present the accumulating knowledge in their disciplines regarding the absorption (or non-absorption) of immigrants in industrialized and developed societies;
- to analyze the implications for policy making directed to enhance cultural, social, political and economic integration, taking into consideration the well-being of the individual immigrants as well as the welfare of the absorbing society with its various groups of citizens.
- to develop an agenda for research that will strengthen the interface between immigration research and policy making, while considering the differences between the various countries.

The workshop was carried out in conjunction with the Center for Urban and Regional Studies at the Faculty of Architecture and Town Planning, and was supported by the Estates of the late Ladislav and Vilma Segoe.

2290 Hebrew for Technology and Sciences

In 1992 two textbooks *Hebrew for Technology and the Sciences (for the intermediate level)* and *Hebrew for Technology and Sciences (for the advanced level)* were published in the framework of this project. These books were written specifically for the teaching of Hebrew to new immigrants whose professions are related to the sciences and to the various engineering and technological fields.

Both books are based on a unique method of instruction which was designed and developed by the Hebrew Unit of the Department of General Studies. This method utilizes identified language patterns resulting from the project's research data. The contents include specially selected texts, scientific vocabulary and varied original exercises targeted to achieve specific language skills and learning outcomes.

The two volumes were awarded the 1992 General Dori Prize by the Haifa Municipality. The judges commented: "These two volumes answer a real and pressing need and will certainly contribute to immigrant population's adjustment and employment, as well as to the Israeli economy and industry".

Since publication, the books serve as a textbook at the Technion for all Hebrew language instruction. They have also been adopted by the network of Israeli Technical Colleges, Vocational High Schools, technical retraining programs, pre-academic studies and the like. An updated edition will be published in 1993.

2300 Workshop on Distributed Algorithms (WDAG)

The Series of Workshops on Distributed Algorithms is intended to provide a forum for researchers and other parties interested in distributed algorithms and their applications. The aim is to present recent research results, explore directions for future research, and identify common fundamental techniques that serve as building blocks in many distributed algorithms. The *Sixth Workshop on Distributed Algorithms* (WDAG 92) followed five successful workshops in Ottawa, Amsterdam, Nice, Bari and Delphi.

The workshop was selected by the S. Neaman Institute as the first to receive sponsorship under the program to support scientific meetings related to research carried out at the Technion. WDAG 92 was held in November 1992 in Haifa. Twenty four lectures were presented at the workshop by computer scientists from Europe, the United States and Israel. In addition, Prof. J. Misra, a world-renowned scientist from the University of Texas at Austin, delivered an invited address, titled "What is a Distributed System".

The papers described original results in all areas of distributed algorithms and their applications, including distributed graph algorithms, distributed combinatorial algorithms, design of network protocols, routing and flow control, communication complexity, fault-tolerant distributed algorithms, distributed data structures, distributed data base techniques, replica control protocols, distributed optimization algorithms, mechanism for safety and security in distributed systems and protocols for real-time distributed systems.

The Proceedings of the workshop was published by Springer-Verlag, Lecture Notes in Computer Science, Vol. 647.

Prof. Adrian Segall and Prof. Shmuel Zaks of the Department of Computer Science at the Technion, co-chaired the Conference.

2330 Evaluation Methodology for Research Productivity of Universities

The objective of the exploratory study was to develop a methodology to estimate research productivity of academic units, which may be used also for disciplines where bibliometric data are not available.

Four science departments in two universities participated in this study. Questionnaires were sent to each academic staff member covering publications, direction of research, applications and peer recognition. In addition, bibliometric data for each member of the staff in these departments was collected from the ISI Israeli database, for approximately the same period covered by the questionnaires.

A large number of correlations was tested. The best correlation with bibliometric data was for a sum of peer recognition items.

The project was concluded and a final report was issued.

2350 Effects of Decrease in Defense Spending on Industrial Policy

Military spending has fallen significantly during the last decade. Defense expenditure of Israel that was \$8.4 billion in 1984, decreased to \$ 3.9 billion in 1992.

This decrease compelled Israeli defense industry to seek civilian applications for its manufacturing facilities. But the conversion is hampered by a management that is not tuned to civilian markets, by the attitudes of its work force, and by other "cultural" aspects.

At a higher level, we confront the fact that defense R&D ceased to be the main source for technical expertise and for technological know-how.

Our research is concentrating on the Israeli technology base, i.e. studying its features and monitoring recent changes in its structure. The findings will be used to suggest policies that compensate for the slimmer defense R&D budget to strengthen the national technology base. Implications will refer to universities as well as to industry.

2360 Wastewater Reuse in the Urban Sector

Water is a scarce resource in Israel and there is competition between municipal and agricultural water use. With the increase in Israeli population, demands on water resources for urban use are increasing. Reaching the limits of our readily available water resources, water reclamation and reuse have become a beseeched option for conserving and augmenting water supplies. Indeed, reuse of treated sewage effluent for agricultural irrigation has been practiced in Israel for some time now.

The purpose of this project is to study the feasibility of extending water reclamation and reuse beyond merely agricultural irrigation to urban uses in municipalities throughout Israel.

Many urban uses can be satisfied with water of less than potable water quality. The economics of source substitution with reclaimed water are site specific. The project outlines a systematic approach to planning for nonpotable reuse, assess costs and benefits for reuse alternatives and draws major technical and nontechnical issues involved in water reclamation and reuse programs. This will serve as a basis for a workshop in which different aspects of nonpotable water reuse will be evaluated under the common goal of meeting our future water demands in the best possible manner.

SNI RESEARCHERS AND ASSOCIATES

- * Active in current research program (program number in brackets)

- * *Ami Abu*, The S. Neaman Institute (1520)
- Ilana Adler*, Center for the Improvement of Teaching, Technion (1840)
- * *Ada Aharoni*, Ph.D., S. Neaman Institute (2071)
- * *Yair Aharoni*, Professor of Business Management, Tel-Aviv University
- Ramon Albalak*, Ph.D., S. Neaman Institute
- Haim Alkalai*, Ph.D., Consultant
- Rachelle Alterman*, Professor of Architecture and Town Planning, Technion
- Malachi Ariel*, Ph.D., Unit for Youth Activities, Technion
- * *Yoram Avnimelech*, Professor of Agricultural Engineering, Technion (2190)
- Mordechai Avriel*, Professor of Industrial Engineering and Management, Technion
- * *Ofira Ayalon*, Faculty of Agricultural Engineering, Technion (2190)
- * *Israel Bar-David*, Professor of Electrical Engineering, Technion
- Adir Bar-Lev*, Professor of Electrical Engineering, Technion
- * *Tuvia Bar-Noy*, Ph.D., The S. Neaman Institute (1520)
- Mira Baron*, Ph.D., Faculty of Industrial Engineering and Management, Technion
- * *Rivka Bar-Shai*, Ph.D., The S. Neaman Institute (1840)
- * *Alexander Barzel*, Professor Emeritus of General Studies, Technion
- Jacob Bear*, Professor of Civil Engineering, Technion
- * *Michal Beller*, National Institute for Testing and Evaluation, Jerusalem (2160)
- * *Nurith Ben-Bassat*, Ph.D. Department of General Studies, Technion (2290)
- * *Zvia Ben-Horin*, Department of General Studies, Technion (2290)
- Uri Ben-Zion*, Professor of Industrial Engineering and Management, Technion
- Ze'ev Berl*, Ministry of Industry and Trade
- Abraham Berman*, Professor of Mathematics, Technion
- * *Ori Better*, Professor of Medicine, Technion (2220)
- * *Ze'ev Bonen*, Ph.D., Research Fellow, S. Neaman Institute (2410)
- Alexander Burcat*, Professor of Aerospace Engineering, Technion
- * *Naomi Carmon*, Professor of Architecture and Town Planning, Technion (2240)



Dr. Ada Aharoni



Dr. M. Beller



Prof. Y. Avnimelech



Dr. N. Ben-Bassat



Prof. G. Czapski



Prof. E. Darel



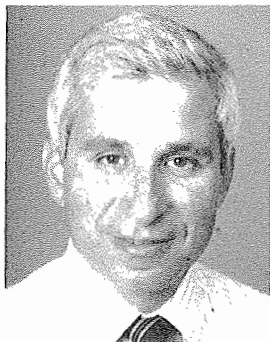
Dr. G. Fortuna



Dr. D. Frenkel



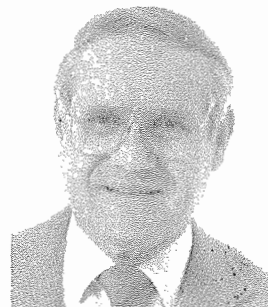
Prof. G. Gilbar



Prof. G. Grossman



Prof. A. Halevi



Prof. M. Heymann



Dr. S. Kenig

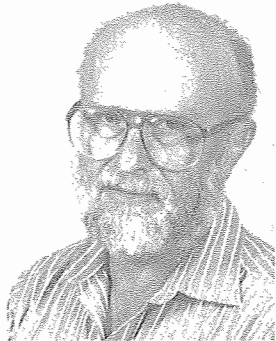
- Michael Cais*, Professor of Chemistry, Technion
- * *Amnon Carmi*, Judge (2220)
 - Arza Churchman*, Professor of Architecture and Town Planning, Technion
 - * *Gideon Czapski*, Professor of Physical Chemistry, Hebrew University, Jerusalem (2330)
 - Arnon Dar*, Professor of Physics, Technion
 - * *Ezey Darel*, Professor of Industrial Engineering and Management, Technion (1950)
 - * *Israel Dror*, Consultant (2350)
 - * *Shmuel N. Eisenstadt*, Professor of Sociology, Hebrew University, Jerusalem
 - * *Joseph Er-El*, Ph.D. Consultant (2061)
 - * *Miriam Erez*, Professor of Industrial Engineering and Management, Technion (2120)
 - Gad Eylam*, Professor of Physics, Technion
 - * *Shai Feldman*, The S. Neaman Institute (1520)
 - Nahum Finger*, Professor of Industrial Engineering, Ben Gurion University
 - * *Gilead Fortuna*, Ph.D., The S. Neaman Institute (2020)
 - * *Amnon Frenkel*, The S. Neaman Institute (1870, 2041)
 - David Frenkel*, Ph.D., Consultant
 - * *Harriet Gershon*, A/Prof. of Medicine, Technion (2220)
 - * *David Gershon*, Professor of Biology, Technion (2220)
 - Gad Gilbar*, Professor of Middle East Studies, Haifa University
 - Amos Gilboa*, Consultant
 - Moshe Goren*, Consultant
 - Menahem Gottlieb*, Consultant
 - * *Daniel Gofer*, Professor of Industrial Engineering and Management, Technion (2300)
 - Dan Granot*, Consultant
 - Gershon Grossman*, Professor of Mechanical Engineering, Technion
 - Haled Gumid*, The S. Neaman Institute
 - Yehuda Gur*, Ph.D., Transportation Research Institute, Technion
 - Joseph Hagin*, Professor of Agricultural Engineering, Technion
 - * *Amitai E. Halevi*, Professor Emeritus of Chemistry, Technion (2220)
 - * *Erez Harel*, The S. Neaman Institute (1870)
 - Frank H. Herbstein*, Professor of Chemistry, Technion
 - * *Sara Hershkovitz*, Ph.D. Unit of Strategic Planning, Jerusalem Municipality. (1560)



Mrs. A. Lapin



Ms. M. Navot



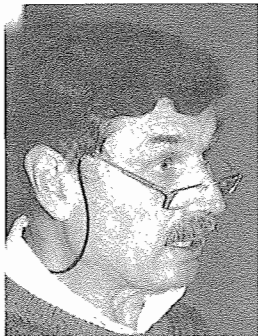
Prof. A. Lempel



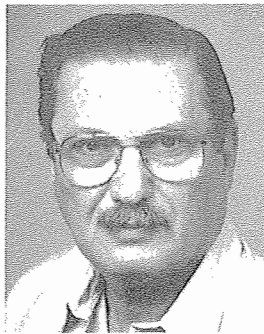
Prof. S. Maital



Prof. M. Livio



Prof. Y. Oref



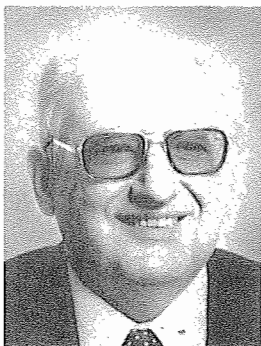
Prof. J. Rom



Prof. A. Rosen



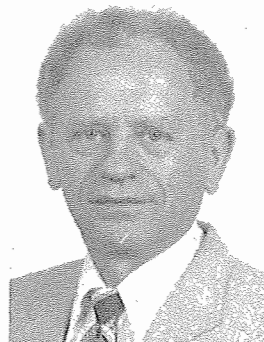
Prof. G. Shelef



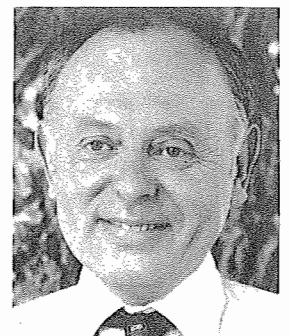
Prof. R. Shinnar



Prof. D. Vofsi



Prof. S. Waks

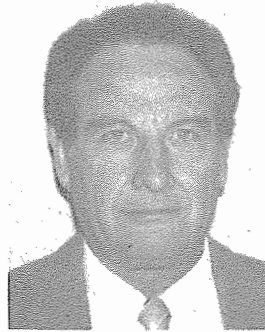


Prof. Z. Ziegler

- Michael Heymann*, Professor of Computer Engineering, Technion
Meira Itzkowicz, Ph.D., Data Processing Unit, Technion
- * *Chanoch Jacobsen*, Professor of Industrial Engineering and Management, Technion (2220)
 - * *Elisha Kali*, Assoc. Professor of Social Work, Tel-Aviv University (1560)
- Reuven Karni*, Ph.D., Faculty of Industrial Engineering and Management, Technion
- * *Shaul Katz*, Ph.D., Department of Sociology, Hebrew University, Jerusalem
 - * *Uri Katz*, Professor of Biology, Technion (2100)
 - * *Ephraim Kehat*, Professor of Chemical Engineering, Technion (2380)
- Shmuel Kenig*, Ph.D., Israel Armament Authority
Zvi Kohavi, Professor of Computer Sciences, Technion
- * *David Kohn*, M.Phil. S. Neaman Institute (1520)
 - * *Yehuda Kott*, Professor of Civil Engineering, Technion (2150)
 - * *Mordechai Kremnizer*, Professor, Dean of Faculty of Law, Hebrew University (1560)
 - * *Samuel Lehman-Wilzig*, Ph.D., Communications Dept., Bar-Ilan University (1560)
- Abraham Lempel*, Professor of Computer Engineering, Technion
Ehud Lenz, Professor of Mechanical Engineering, Technion
Miri Lerner, Ph.D., Tel Aviv University
- * *Yehuda Leviatan*, Assoc. Professor of Electrical Engineering, Technion (2200)
- Avinoam Libai*, Professor of Aerospace Engineering, Technion
Nadav Liron, Professor of Mathematics, Technion
Mario Livio, Professor of Physics, Technion
- * *David Mahalel*, Ph.D., Transportation Research Institute, Technion (2260)
- Abraham Mandel*, Ph.D., S. Neaman Institute
- * *Shlomo Maital*, Professor of Industrial Engineering and Management, Technion (1870, 2470)
 - * *David Malah*, Professor of Electrical Engineering, Technion (2200)
 - * *Bilha Mannheim*, Professor of Industrial Engineering and Management, Technion (2171)
 - * *Shmuel Merhav*, Professor Emeritus of Aerospace Engineering, Technion (2220)
- Joseph Miltz*, Professor of Food Engineering and Biotechnology, Technion



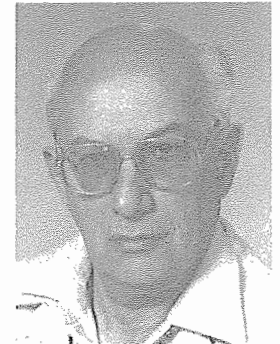
Ms. O. Ayalon



I. Dror



Prof. M. Erez



Prof. E. Kehat



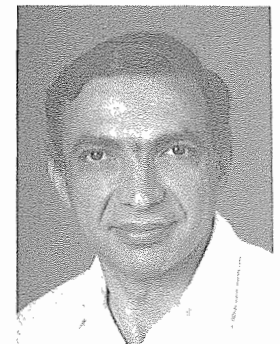
Dr. C. Oren



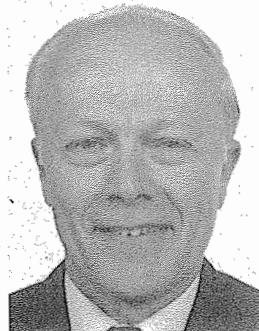
Dr. E. Plotnik



Prof. I. Ravina



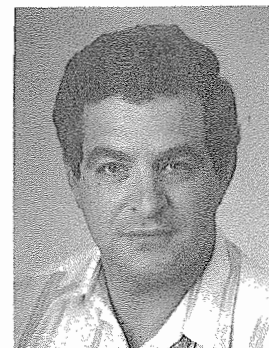
Prof. A. Segall



Prof. U. Shamir



Prof. M. Shechter



Prof. S. Zaks

- * *Simon Mizrahi*, Professor of Food Technology and Bioengineering, Technion (2150)
Michael Moore, Professor of Education in Science and Technology, Technion
- * *Michal Navot*, The S. Neaman Institute (1560)
- * *Eduardo Noah*, Engineer, The S. Neaman Institute (2010)
Eliahu Nissim, Professor of Aerospace Engineering, Technion
- * *Ariel Orda*, Ph.D., Department of Electrical Engineering, Technion (2200)
- * *Carmel Oren*, National Institute for Testing and Evaluation, Jerusalem (2160)
Yitzhak Oref, Professor of Chemistry, Technion
- * *Rachel Paltieli*, Department of General Studies, Technion (2290)
- * *Bluma Peritz*, Ph.D. Hebrew University (1520)
Gideon Pinto, Consultant
Mordechai Perl, Professor of Mechanical Engineering, Technion
Leonid Pismen, Professor of Chemical Engineering, Technion
- * *Eli Plotnik*, Ph.D. The S. Neaman Institute (2200)
Kenneth Preiss, Professor of Industrial Engineering, Ben Gurion University
- * *Giora Rahav*, Professor of Sociology, Tel Aviv University (1560)
Arie Ram, Professor of Chemical Engineering, Technion
- * *Dan Rom*, Professor of Civil Engineering, Technion (2360)
Josef Rom, Professor of Aerospace Engineering, Technion
- * *Raphael Rom*, Assoc. Professor of Electrical Engineering, Technion (2200)
Uri Rappaport, Professor of History, Haifa University (2330)
- * *Israella Ravina*, Professor of Agricultural Engineering, Technion (2150, 2360)
David S. Reti, The S. Neaman Institute
Aviv Rosen, Professor of Aerospace Engineering, Technion
Michael Rubinovitch, Professor of Industrial Engineering and Management, Technion
Yaakov Rubinovitz, Professor of Industrial Engineering and Management, Technion
- * *Adrian Segall*, Professor of Computer Sciences, Technion (2300)
Gershon Segelman, Ph.D., Consultant
- * *Rafael Semiat*, Professor of Chemical Engineering, Technion (2150)
- * *Shlomo Shamai (Shitz)*, Assoc. Professor of Electrical Engineering, Technion (2200)

- * *Uri Shamir*, Professor of Civil Engineering, Technion
Dani Shavit, The S. Neaman Institute
Dan Sharon, Ph.D., Advisor to Minister of Education and Culture
Edna Shaviv, Professor of Architecture and Town Planning, Technion
Giora Shaviv, Professor of Physics, Technion
- * *Mordechai Shechter*, Professor of Economics, Haifa University (2190, 2360)
Daniel Shefer, Professor of Architecture and Town Planning, Technion
- * *Gedalia Shelef*, Professor of Civil Engineering, Technion (2140)
Michal Shemesh, Ph.D., Dept. of Teaching in Science and Technology, Technion
- * *Moshe Sherer*, Ph.D. Social Work, Tel-Aviv University (1560)
Yoram Shiftan, Ph.D., Transportation Research Institute, Technion
- * *Reuel Shinnar*, Professor of Chemical Engineering, CCNY (2020)
Abraham Shitzer, Professor of Mechanical Engineering, Technion
Aner Shoham, The S. Neaman Institute
Kim Shuster, The S. Neaman Institute
Samuel Sideman, Professor of Bio-Medical and Chemical Engineering, Technion
- * *Moshe Sidi*, Assoc. Professor of Electrical Engineering, Technion (2200)
Michael Silberman, Professor of Medicine, Technion
Paul Singer, Professor of Physics, Technion
Ciporah S. Tadmor, The S. Neaman Institute
Zehev Tadmor, Distinguished Professor of Chemical Engineering, Technion.
- * *Tsila Tuviana*, Department of General Studies, Technion (2290)
David Vofsi, Professor Emeritus of Chemistry, Weizmann Institute of Science
- * *Reuven Waks*, Consultant (2380)
- * *Shlomo Waks*, Professor of Teaching In Science and Technology, Technion (2040)
- * *Daniel Weihs*, Professor of Aerospace Engineering, Technion
- * *Ami Wolanski*, Ph.D. Ministry of Education (1560)
Micha Wolfshtein, Professor of Aerospace Engineering, Technion
Michael Yoeli, Professor of Computer Sciences, Technion
Abraham Zaks, Professor of Mathematics, Technion
- * *Shmuel Zaks*, Professor of Computer Sciences, Technion (2300)
- * *Moshe Zakai*, Professor of Electrical Engineering, Technion (2300)
- * *Zvi Ziegler*, Professor of Mathematics, Technion (2300)
- * *Yoram Zimmels*, Professor of Civil Engineering (2140)

WORKSHOPS and SEMINARS 1990 - 1993

Professor Tibor Braun, Lorand Eotvos University, Budapest.
"Tackling the Measure of Science - 20 Years Later," January
1990 (jointly with the Israel Academy of Sciences and
Humanities - Jerusalem).

Training and Continuous Education for Science Teachers.
February 5, 1990

Excellence in Scientific Education, April 5, 1990

Teaching by Video, June 10, 1990.

Prof. Zehev Tadmor, Prof. Uri Shamir (Moderators), "Policy
Research and Technology Transfer at the Technion", June
19, 1990.

Prof. Reuel Shinnar, Dept. of Chemical Engineering, CCNY,
"The effectiveness of crime control by temporary
incapacitation in prison - quantitative models", June 21,
1990.

R&D in the Plastics Industry, October 18, 1990.

Raising R&D Productivity, January 3, 1991

Plastics in Agriculture, March 25, 1991.

Energy Alternatives in View of the Gulf War, May 2, 1991.

Science Indicators, May 13, 1991.

Trade Unions and the Industries of the Future
Session I April 14, 1991
Session II July 2, 1991

The Electronics Industry - Directions and Potential, July 11,
1991.

Medicine and Engineering: New Horizons for Advanced
Technology, December 8-9, 1991.

Recycling of Glass, February 6, 1992.

2nd International Workshop on Civilian Space Applications,
February 19, 1992.

The Domination of the Car: The End of the Road, Dr. Meyer
Hillman, Policy Studies Institute, London, April 13, 1992.

The Incompatibility of Economic Growth and Preservation
of the Environment, Dr. Meyer Hillman, Policy Studies
Institute, London, April 14, 1992.

Measurement of R&D Quality and Productivity, May 5, 1992

Info 92 - Evaluation of Scientific Activity: Methods and Tools,
May 19, 1992.

Seminar on Measurement of Performance Parameters for
the Israeli Industry, June 9, 1992.

Consortium on Earth Stations for Satellite Communication:

- I. R&D plans within the Consortium framework, June 11,
1992.
- II. Technical Workshops for Professional Groups, June 25,
1992.
- III. INMARSAT mobile satellite system, September 9, 1992.
- IV. Communication Networks, February 2, 1993.

Electronics 2000, June 25, 1992.

Whizin International Symposium on Technology and Ethics,
June 17-19, 1992.

WDAG International Workshop on Distributed Algorithms,
November 2-4, 1992.

Economic and Social Aspects of Manpower Layoffs,
January 21, 1993.

Physics - Laboratory Demonstrations, February 1, 1993.

International Amendments on the Environment
and Their Effect on Israel's Energy Sector, April 29, 1993.

Immigrant Absorption: The Interface between Research
and Policy, May 30-June 2, 1993.

SNI - LIST OF PUBLICATIONS* - 1990 - 1992

English Publications

Hagin, J., Segelman, G. *Trends in Fertilizers and Fertilization: Intensive Greenhouse Tomato Production as a Model for Fertilizer Development Recommendations*, February 1990.

Alterman, R. *A Retrospective View of Israel's 'Project Renewal' - Lessons for Planning for New Immigrants in the 1990's*, June 1990.

Moore, M., *Absorption of Soviet Jewish Engineers; A descriptive Analysis*, 1990.

Drori, A., Finger, N., Golany, B., Lenz, E., Preiss, K., Rubinovitz, Y., Shoham, M., Bonen, Z., *A Survey on the Penetration of Advanced Production Systems and Factory Automation into the Israeli Industry*, October 1990.

Liron, N., Pismen, L., Wolfshtein, M., Ziegler, Z. *The Impact of Computers on Teaching and Research in Mathematics and Related Subjects*, October 1990.

Frenkel, H.D. *The Polymer Industry in Israel and the World: Present Status and Future Prospectives*, November 1990.

Granot, D., Itzkowitz, M. and M. Yoeli, *Computing and Computer Applications in Arab Countries, Report No. 6, Project No. 161*, December, 1990.

Friedman, A., *An Examination of the Wage System of Technion Professors - Current Problems and Solutions*, May, 1991.

Frenkel, H.D., Kenig, S. *The Plastics Industry in Israel - Current Economic Status and Future Alternate Economic Outlook*, August, 1991.

Kohn, D., *Absorption of Soviet Immigrants at the Technion*, December, 1991.

* The list of previous publications is available separately.

Peritz, B.C., *Science Indicators and the Evaluation of Scientific Activity*, March 1992.

S. Sideman (Ed.) Proceedings of the International Workshop on *The Interaction between Medicine and Engineering*, March 1992.

D. Weihs (Ed.) Proceedings of the Second International Workshop on *Civilian Space Applications*, April 1992.

E. Kehat, Y. Aharoni, D. Kohn, G. Czapski, E. Nissim, U. Rappaport, *Evaluation Methodology for Research Productivity of Universities*, August 1992.

G. Fortuna, R. Shinnar, *Measurement of Performance parameters for the Israeli Industry*, August 1992.

A. Segal, S. Zaks (Eds.) *Distributed Algorithms, WDAG '92*, Springer Verlag, Lecture Notes in Computer Science Series, No. 647, November 1992.

Frenkel, A., Maital, S., Koschatzky, K., Grupp, H., "Estimating and Partitioning Sources of Value in Technologically-Sophisticated Products", Working Paper, SNI, 1993.

E.A. Halevi, D. Kohn, *Technology and Ethics*, Proceedings of the Whizin International Symposium, Haifa, June 17-19, 1992. March 1993.

Papers Published in Scientific Literature

Waks, S. "A Theory for High-Tech Curriculum Updating", *European Journal of Eng. Ed.* Vol. 15, No. 4, 1990.

Carmon, N. (Ed.) *Neighborhood Policy and Programmes - Past and Present*, St. Martin's Press, New York, 1990.

J. Hagin, G. Segelman & A. Shaviv, *Strategy for Development of Fertilizer Solutions for Greenhouse Tomatoes*, Fertilizer Research, Vol. 26, pp. 53-60, 1990.

D. Mahalel, Y. Gur & Y. Shifan, *Manual versus automatic operation of traffic signals*, Transp. Res. A Vol. 225A, Nos. 2/3, pp. 121-127, 1991.

Czapski, G., Frenkel, A., Kohn, D., Shoham, A., "Cooperation between Israeli and Foreign Researchers", *Scientometrics*, Vol. 25, No. 3 , pp. 381-400, 1992.

Grupp, H., Maital, S., Frenkel, A., Koschatzky, A., "The Relation between Scientific and Technological Excellence and Export Sales: A Data Envelopment Model and Case Study of Israel and European Countries", Working Paper, *Review of World Economy*, 1992.

Maital, S., Frenkel, A., Grupp, H., Koschatzky, K., "Exporting Goods -- or Knowhow? An Empirical Comparison of the Relation between Scientific Excellence and Export Performance for Israel and Europe", *Bank of Israel Review*, 1993.

Reiss, T., Frenkel, A., Koschatzky, K., Maital, S. "Technometric Evaluation and Technology Policy: The Case of Biodiagnostic Kits in Israel. *Research Policy*, 1993.

Educational Video Tapes

1. High-School Physics: Mechanics - Prof. Mario Livio
2. High-School Physics: Electricity - Prof. Mario Livio
3. High-School Algebra - Mr. Giora Harubi
4. Vectors - Prof. David Zilag
5. Differential Calculus - Prof. Ron Aharoni
6. Trigonometry - Mr. Giora Harubi
7. Chemistry - Dr. Riva Bar-Shai

פרסומים בעברית Hebrew Publications

ש. מיטל, א. ספנגטל, האחדות השוק האירופי ב-1992: עמדות והשקפות בתעשיית הפלסטיקה והפולימרים, ינואר 1990.

י. דרור (עורך), סדנא לאסטרטגיה ענפית - תכנון אסטרטגיה ומדיניות ברמת ענף תעשייתי, 1990.

א. ברמן, (עורך), סדנא: הכשרה והשתלמות מורים למדעים ולמתמטיקה, 1990.

א. ברמן, (עורך), טיפוח המצוינות בחינוך המדעי, אפריל 1990.

עתידינו המשותף - אקולוגיה ועולם המחר, 1990

ר.י. אלבלק, חומרים פלסטיים: שווקים וטכנולוגיה - מיפוי עולמי, אוגוסט 1990.

ג. גילבר, א. וינקלר ומ. נבות, התפתחות מערכות ההשכלה הגבוהה במדינות ערב, 1965-1988 - המימד הכמותי, דו"ח מס. 7 (לשימוש פנימי), פרויקט מס. 161, דצמבר 1990.

ד. שרון, תכנית עסקית - המכללה ליזמות וליצוא בתפן, דצמבר 1990.

ו. ברל, תעשיית הפלסטיקה בישראל - תמונת מצב, ינואר 1991.

י. דראל, הגברת הפריון במו"פ, סיכום סדנא, פברואר 1991.

ד. כהן, א. שליב, ב. תורן, עקרונות ושיטות תכנון כח אדם, מרץ 1991.

א. מנדל, מחירי יבוא נפט גולמי ומחירים של מוצרי נפט בשער בתי הזיקוק - ישראל לעומת מערב אירופה, 1980 - 1988, מרץ 1991.

מ. אריאל, מחקר מעקב רטרוספקטיבי על תלמידים מחוננים הנמצאים בראשית הקריירה, מרץ 1990.

ח. אלקלעי, א. רם, פלסטיקה בסביבה - אקולוגיה, אפריל 1991.

י. מילץ, נ. פזי, מ. גורן, מ. פוטרמן, שמושים וכווני התפתחות בפלסטיקה לארצה, חקלאות ובניה, יוני 1991.

א. רוזן, י. רום, התשתית האווירונוטית בארצות ערב, יוני 1991.

אמנון פרנקל, ענר שהם, גדעון שפסקי,
שיתוף פעולה מחקרי של ישראלים עם חוקרים בחו"ל, 1991

רחל אלטרמן, ארזה צירצ'מן,
התכנית לשיקום השכונות - הניסוי הגדול ולקחיו, 1991

א. בורקט, (עורך), ניצול אנרגיות חלופיות לאור המשבר במפרץ הפרסי,
אוגוסט 1991.

א. פרנקל, ש. מיטל, תעשיית הדיאגנוסטיקה בישראל, הערכת הרמה
הטכנולוגית באמצעות שיטת הטכנומטריקה, אוגוסט 1991.

- מ. אריאל, מחוננות ומצוינות, אוגוסט 1991.
- מ. גוטליב, אגרופלסטיקה - ניתוח שיווקי, ספטמבר 1991.
- ע. אהרוני (עורכת), האיגוד המקצועי והעשיות העתידי, נובמבר 1991.
- ש. קניג, ד. כהן, תעשיית הפולימרים והפלסטיקה בישראל - מצב קיים וחלופות עתידיות, אוקטובר 1991.
- א. שמעוני, תעשיית האלקטרוניקה בעולם ובישראל - מגמות כלכליות וכיוונים עתידיים, דצמבר 1991.
- ר. פלטיאלי, צ. בן-חורין, עברית לטכנולוגיה ולמדעים (לרמה הבינונית), ינואר 1992.
- נ. בן-בסט, צ. טביאנה, עברית לטכנולוגיה ולמדעים (לרמה המתקדמת), ינואר 1992.
- ז. בונן, א. פרנקל, אלקטרוניקה 2000: איתור תחומים ונושאים בעלי ענין. אפריל 1992.
- ט. אלפנדרי, ד. שפר, הגירה אל ומערי פיתוח בישראל, יוני 1992.
- א. דראל, ז. בונן, ד. מאירסדורף, הגברת הפיריון במו"פ, מאי 1992.
- ש. וקס, אלקטרוניקה 2000 - התפתחויות בחינוך ההנדסי הגבוה בתחום האלקטרוניקה, יוני 1992.
- ע. שביב, י. קפלוטו, קוים מנחים לתכנון אקלימי אנרגטי של מבני מגורים, אוגוסט 1992.
- ג. שלף, י. צימלס, הקמת איים מלאכותיים בחופי ישראל תוך שימוש באפר פחם, פברואר 1993.
- א. וידר, ד. שפר, מרכזי ידע ומיקום תעשיות עתירות ידע, מרץ 1993.

פרסומים בכתבי עת בעברית Publications in Hebrew Scientific Journals

- ד. כהן, "הוראת המדעים בסיוע קלטות וידאו", על"ה 8, מרץ 1991.
- מ. פוטרמן, "חומרים פלסטיים בבניה - מגמות והתפתחויות", בשדה הבניה, בולטין 92/7, סדרה 12.

7.12



Technion - Israel Institute of Technology

The S. Neaman Institute

For Advanced Studies in Science and Technology

Technion City, Haifa 32000, Israel. Tel. 04-237145, 292329. Fax. 972-4-231889