



מוסד שמואל נאמן

למחקר מתקדם במדע ובטכנולוגיה



**Samuel Neaman Institute**

for advanced studies in science  
and technology

## ANNUAL REPORT 1995-1996



Technion - Israel Institute of Technology

# Annual Report 1995-1996

Technion - Israel Institute of Technology

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



Mr. S. Neaman unveils the plaque

## THE DEDICATION CEREMONY OF THE S. NEAMAN INSTITUTE BUILDING

Greetings by Technion President.

(from left to right): Prof. D. Weihs, Prof. A. Solan, Prof. A. Seginer,

Mr. U. Galil, Prof. Z. Tadmor, Mr. S. Neaman, Mrs. C. Neaman, Mr. E. Shimoni

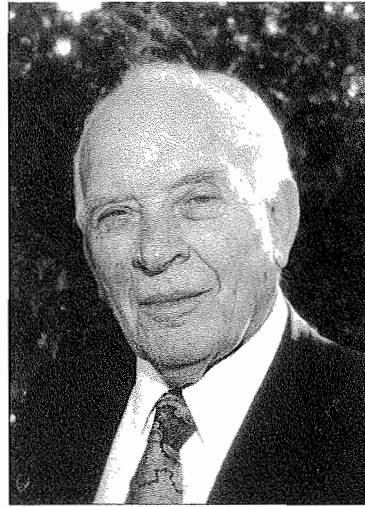


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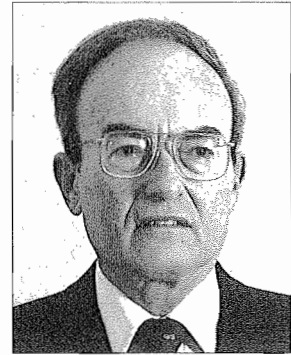
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Prof. Zehev Tadmor  
Vice-Chairman



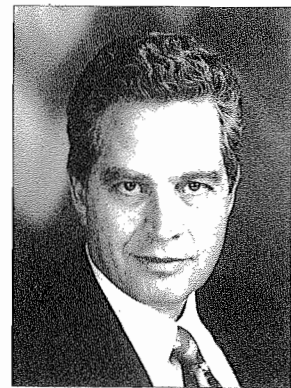
Samuel Neaman  
Founder and Chairman



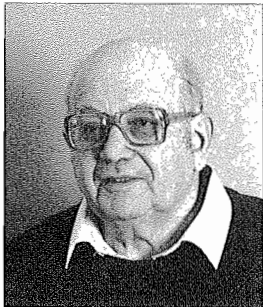
Prof. Arnan Seginer



Prof. Alexander Solan



Prof. Arnon Bentur



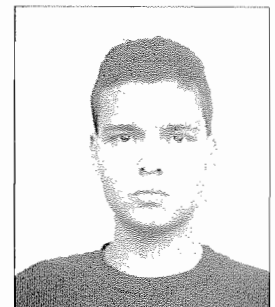
Ing. David Kohn



Ruth Rivkind, B.A.



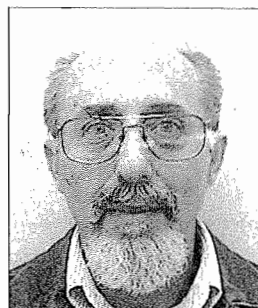
Sima Nadler



Miron Rozenkranz



Amnon Frenkel, M.Sc.



Shimon Lange, M.Sc.



Dr. Daphna Getz

**THE SAMUEL NEAMAN INSTITUTE**  
**FOR ADVANCED STUDIES IN SCIENCE AND TECHNOLOGY**

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Zehev Tadmor, Vice-Chairman, President, Technion  
Arnon Bentur, Professor of Civil Engineering,  
Vice-President, Technion  
Alexander Solan, Professor of Mechanical Engineering,  
Senior Vice-President, Technion

**Director**

Arnan Seginer, Professor of Aerospace Engineering, Technion

**Advisory Council**

Michael Fry, Professor of Medicine, Technion  
Itzhak Hoffi, General (Res.)  
Amos Horev, General (Res.), Former President of Technion  
Abraham Marmur, Professor of Chemical Engineering, Technion  
Bluma Peritz, Professor of Library and Information, Hebrew University  
Itzhak Oref, Professor of Chemistry, Technion  
Daniel Shefer, Professor of Architecture and Town Planning, Technion  
Ezra Zeev, Professor of Electrical Engineering, Technion

**Staff**

Project and Workshop Coordinator: David Kohn, M.Sc., M.Phil.  
Administrative Assistant: Mrs. Ruth Rivkind, B.A..  
Book-keeping: Mrs. Sima Nadler  
Information Coordinator: Miron Rozenkranz  
Researcher: Amon Frenkel, M.A.  
Consortium Coordinator: Dr. Daphna Getz  
Consortium Coordinator: Shimon Lange, 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, on scientists from other institutions in Israel, and on specialists abroad. The Institute serves as a bridge between academia and decision makers in government, public institutions, or industry, 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 research, organises invitational workshops and 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 by the Chairman of the Institute Board, is responsible for formulating and coordinating policies, recommending projects and appointing staff. The Institute Board is chaired by Mr. Samuel Neaman and includes ex-officio Technion's Senior Vice-President 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 income from 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 it is in accordance with Institute goals and objectives.



## DIRECTOR'S REPORT

The past year, which was also the last year in office of the previous Director, Professor Daniel Weihs, witnessed the continued growth and development of the Samuel Neaman Institute. Financially the Institute did even better than in the previous year. The turnover in 1995 topped one million dollars and the total income was close to a million dollars without the support from the Neaman Fund.

Two major events marked the end of the Institute's year: The permanent home for the S. Neaman Institute was finally finished at the end of 1995, and the Institute moved into its centrally-located beautiful building in January 1996. The event was celebrated in a special ceremony attended by Mr. and Mrs. Samuel Neaman, their friends, Technion Board members and faculty, and Institute researchers and staff. The ceremony was followed by a panel discussion on the "Contribution of Technology to the Future of Israel", and dinner.

The new Institute building covers 1,600 square meters of offices for researchers, seminar rooms, library, auditorium and an administration wing. With the new building, the Institute will finally be able to extend its activities that were previously limited by lack of space for research associates, and will be able to house its activities under one roof.

The second highlight this year was the visit to Technion and the Institute by the Netherlands Prime Minister, accompanied by several ministers and some 40 businessmen. The purpose of the visit was to get a first hand report on the SNI-Netherlands joint Artificial Islands project. SNI was honored by the interest of such a highly placed person, and by the Prime Minister's commitment to include the Institute and its researchers in the next stages of the project of constructing artificial islands along the coast of Israel.

1995 saw the Institute's predictions come true. Israel's decision makers unanimously agreed that with the change of priorities due to the peace process, Israel's

future will be decided by its performance in the international market. Because of lack of natural resources, Israel's main resource is its brain power and the quality of its scientists and technologists. They will develop the new technologies and products that will entrench Israel in the global economy. The Neaman Institute's main objective of driving the industry-academia interaction, became nationally recognized.

The emphasis in the Institute's research activity last year was, therefore, on the Industry-University joint R&D consortia. These associations operate within the framework of a special program supported and managed by the Chief Scientist's Office in the Ministry of Industry and Trade. Each consortium comprises several industries, plus at least, one research institute, that conduct together generic precompetitive R&D in preferred areas.

Last year two new consortia were approved so that SNI participates as a full member in four consortia:

**1. Ground stations for satellite communication - a consortium of 5 industries plus SNI**, that develops the generic technologies required for low-earth-orbit satellite communication terminals, VSAT terminals for point-to-point data communication; portable terminals for voice and data communication; transponders for geostationary satellites, and terminals/end units for satellite telephone service for remote regions.

**2. Digital communication - a consortium of six companies plus SNI**, that develops the generic technology for personal and cellular PCS/PCN communication; cordless home telephones; wireless office communication; paging; and wireless business data LAN & WAN communication.

**3. Quarter micron technologies - a consortium of three companies plus SNI**, that develops vacuum technologies, inspection systems and software systems, all essential for the manufacturing, inspection and control processes for sub-sub-micron microelectronics.

#### **4. Multimedia technologies - a consortium of six companies plus SNI**

involved in the development of hardware and software necessary for the production and editing of multimedia material, its compression and coding, and its transmission and routing for on-line customer service

The last two consortia were approved at the turn of 1995. In addition to the above, the Institute is also actively involved in the organization of several new consortia in the following areas:

1. Laser diodes and diode-pumped laser;
2. Desalination technologies;
3. Magnesium technologies;
4. Non-chromium plating.

With the rapid development of technology and its effects on the environment and on the quality of life, these latter areas are becoming increasingly important and the Institute is devoting to them and increasing part of its attention.

As part of this program the Institute, with partial support of the Ministry of Health, is conducting several research programs in epidemiology, jointly with the Epidemiology and Public Health Department (a joint Technion-Kupat Holim department) at the Carmel Medical Center. The programs are:

**1. Chernobyl-related health problems.** Illnesses and mortality rate since 1986 are studied among 12,000 immigrants who came from this radiation contaminated region. The US Congress has approved a \$5M grant to extend this program in Israel and into the Ukraine and Bielorussia.

**2. A national program for early diagnosis of breast cancer.** Some 500,000 women were screened.

**3. Central registration of severe infarcts.** Every suspected infarct case in the three general hospitals in Haifa is registered.

In environmental policy, the Institute is continuing the research on economic incentives for municipal solid

waste policy and has finished the study of reuse of reclaimed wastewater in the urban sector.

Another project in the area of quality of life was the project on the law enforcement system for the next century, that was finished this year. This was a joint project with the Internal Security Ministry and the Jerusalem Center for Public and State Issues.

The workshop on Air Pollution from particles was a large success and led to tighter pollution standards that are going to be enacted by the Ministry of Environmental Quality.

In the other areas in which the Institute is involved, two joint projects with the Fraunhofer Institut of Karlsruhe, Germany, supported by G.I.F. are conducted at SNI. One studies the technometric method, and the other studies the growth of high-tech industries into less developed areas.

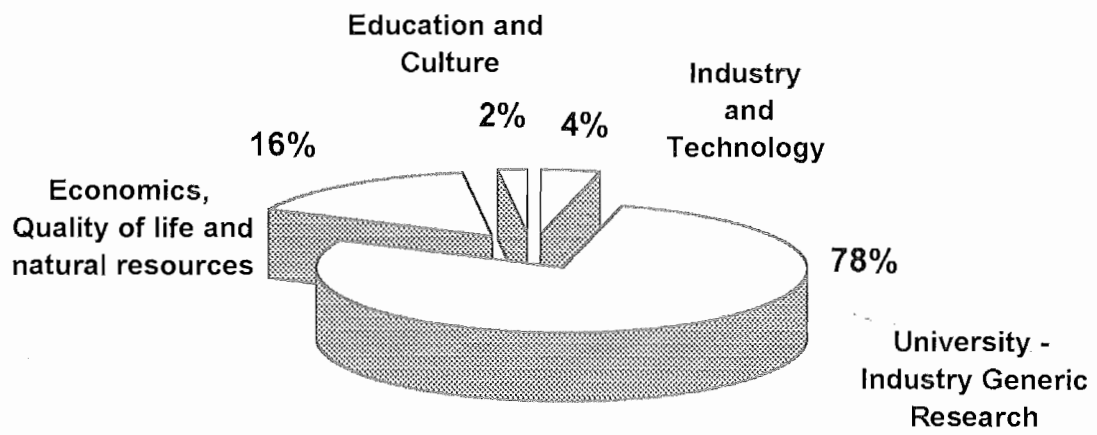
The first stage of the study on the solvency of the Israeli banks was finished and its results serve the investment committee of the American Technion Society. The ATS is interested in an additional stage of the program.

This year the Institute organized or co-sponsored six workshops and published proceedings, reports and memoranda.

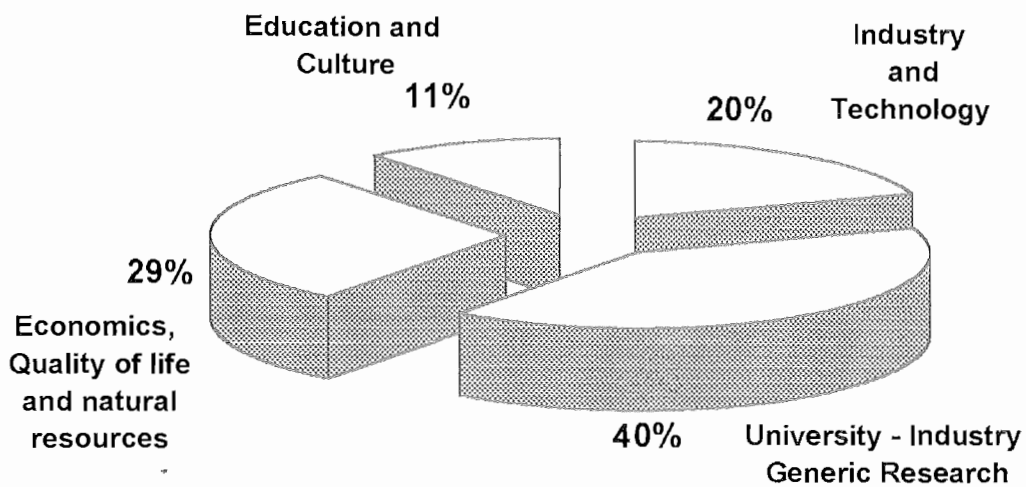
On a more personal note, this is my first Director's report. Actually this report covers the last year of Professor Weihs' Directorship. I would like to recognize Professor Weihs' leadership and his significant contribution to the growth of the Institute. We wish Professor Weihs success in his new post of Dean of Graduate Studies. I also wish to express my thanks to the Institute's staff that helped to smooth the transition between the Directors, and especially Sam Neaman whose continuous and invaluable guidance eased my entering into office.

Professor Arnan Seginer  
Director

## Budget according to areas of activity



## Manpower distribution according to areas of activity



Total manpower = 56

## LIST OF ONGOING SNI PROJECTS

(Names of Researchers and Associates appear on page 31)

### I. UNIVERSITY-INDUSTRY GENERIC RESEARCH CONSORTIA

- 16 - Multimedia On-Line Services Technology Consortium (2910)
- 18 - Quarter Micron Technologies Consortium (2840)
- 24 - Digital Communication Consortium (2410)
- 26 - Ground Stations for Satellite Communication Consortium (2200)

### II. RESEARCH PROJECTS

- 15 - The Solvency of the Israeli Banks (2990)
- 17 - Myocardial Infarction Register (2900)
- 20 - Economic Incentives in Municipal Solid Waste Management Policy (2780)
- 21 - Technometric Benchmarking (2740)
- 19 - Early Detection of Breast Cancer (2710)
- 22 - Spatial Diffusion of Industrial Innovation and Regional Development (2510)
- 23 - Follow-Up of the Immigrant Population from the Chernobyl Area (2490)
- 25 - Immigration and integration in Post-Industrial Societies : Theoretical Analysis and Policy-Related Research (2240)
- 27 - Utilization of Coal Fly Ash for Construction of an Offshore Island in Israel (2140)
- 28 - Teaching of Science and Mathematics by Video (1840)
- 29 - Law Enforcement System in the 21st Century (1560)

## 2990 THE SOLVENCY OF THE ISRAELI BANKS

During the past years, Israeli banks have undergone a marked expansion process, have become considerably more profitable and proved themselves able to keep up with the rapid growth of the economy and its constant demand for more diversified and sophisticated banking services.

Improved controls imposed by the Bank of Israel, the country's central bank, and especially its requirements for capital adequacy, have become much more detailed and demanding. Today the monthly reports of the banks to the Banking Supervision Department of the Bank of Israel give a much more accurate picture than ten years ago of the utilization of the banks' own capital and the various types of deposits held by them, the fluctuation of deposits, credits and especially credit security, interest rates, management of funds, liquidity and profitability.

It can thus be concluded that the financial reports of the banks, as audited by the Bank of Israel, convey a picture of much more conservative and responsible banking practices than in the past. The system, however, was able at the same time to maintain the degree of flexibility and resourcefulness required by Israel's economic reality.

This study was sponsored by the A.T.S.

## 2910 MULTIMEDIA ON-LINE SERVICES TECHNOLOGY CONSORTIUM

The Consortium on Multimedia on-line services technology was founded by six companies: Optibase, Enigma, Gilat, Scitex, Quicksoft and Vicon, jointly with the Samuel Neaman Institute, in order to develop generic multimedia technology for users of information services networks, mainly Internet.

The rapid growth of Internet user populations has created a unique business opportunity since the introduction of the PC. Internet is becoming the universal communication platform of information services and it is integrated in all other information services.

The research program of the consortium members is focused on four main topics: authoring tools, integrated services for Internet servers, broad band communication infrastructure, and tools for end users.

The technologies and products that will be developed are designed to give answers to specific niches in the information market. The S. Neaman Institute coordinates the academic research, and the data-base of the consortium and organizes workshops where research results of all programs, industry and university alike, are presented.



## 2900 ACUTE MYOCARDIAL INFARCTION REGISTER

The aim of the study is to measure the incidence of acute myocardial infarction in the well defined area of greater Haifa. In addition, it is meant to evaluate risk factors and the clinical course of this event.

All new cases of acute myocardial infarction, reporting to any of the three general hospitals in Haifa, are recorded. The suspected cases are evaluated according to the Monica criteria. All cases are interviewed and medical data are extracted from the medical files. All data are then computerized. In order to cover the truer incidence and avoid a survivors-selection effect, the study also involves the evaluation of all sudden death events for the plausibility of a coronary background.

In the first 5 months of operation, 507 definite cases were detected, and 218 additional ones are suspected.

The study is funded by the Medical Research Fund and Health Services Infrastructure Development at the Ministry of Health.

## 2840 CONSORTIUM FOR QUARTER MICRON TECHNOLOGIES

Quarter Micron technologies are a milestone in the production technologies of integrated circuits, paving the way for technologies that enable production of electronic circuits at quarter micron and smaller scale. Among these components are dynamic memory chips of 256MB, advanced microprocessors and microcomputers and integrated circuits for specific application (ASIC).

The consortium was established in order to answer the need for precompetitive, generic R&D, integrating industry and academia, as well as for building an infrastructure for existing industries and for new industries to be established in the future.

The industrial companies focus on three areas: inspection systems, processing systems, and software and communication systems. In the framework of the Israeli Consortium for Generic Research of Quarter Micron Technologies, three Israeli companies are incorporated: A.G. Associates Israel (AG), Opal and Orbot Instruments, together with the Neaman Institute for Advanced Studies in Science and Technology at Technion. The corporation's academic research will be carried out at Technion, the Hebrew University and Tel Aviv University.

Opal and Orbot Instruments operate in the inspection system area. In the field of processing systems, AGI produces rapid thermal systems for wafer processing. The systems produce the extremely thin layers required for production of integrated circuits. AGI's systems are world leaders in quarter micron technologies.

The industrial R & D is supported by the existence of a core of researchers in academic institutions who carry out research with the aid of graduate students and additional employees under the umbrella organization of the S. Neaman Institute. 66% of the Consortium's budget is funded by the Chief Scientist's Office in the Ministry of Industry and Trade, and the industrial members contribute the last third.

## 2710 EARLY DETECTION OF BREAST CANCER

The aim of the study is to enhance the use of mammography by the female population in Israel, to promote high quality in the medical and human aspects of the diagnostic process and to achieve an as high as possible mortality-reduction effect from breast cancer in the Israeli female population.

The National Israel Early Breast Cancer Detection Program has been operating for 4 years. During this period, 26 mammography units were recruited to participate in the program and are providing diagnostic work-up under strict quality criteria.

More than 330,000 women have been examined in the National Program sites since 1992, of them more than 60% were referred for routine screening. The program also involves the evaluation and quality assurance of all breast tissue reports from all the pathology and cytology institutes in Israel.

In the last 12 months 1097 new cases of breast cancer have been evaluated and diagnosed in the program's centers, of them close to 200 as a result of routine screening in the target population. The mortality among these women is expected to decrease by about 30%.

The study is funded by the Israel Cancer Association and is run under the mandate of the Ministry of Health.

## 2780 ECONOMIC INCENTIVES IN MUNICIPAL SOLID WASTE MANAGEMENT POLICY

The main objectives of the research are :

1. Develop an economic model for minimum waste-management costs, including related external costs,
2. Study economic incentives for waste management.

Solid waste management includes, beside direct costs, environmental costs (i.e. leachates from landfills, air pollution from incineration plants or waste water from paper recycling plants). There are different schemes for weighting the different impacts of each waste disposal alternative (i.e. landfilling, incineration, recycling).

Using LCA (life cycle analysis) as a management tool that describes and quantifies environmental impacts, can help the policy makers in choosing the right waste management alternative. After the best economic and environmental alternative is chosen, economic incentives to achieve the goals can be used.

Economic incentives in solid waste-management policies in several western countries were studied. Some of these incentives can be implemented in Israel as part of a nationally integrated waste-management policy.

## 2740 TECHNOMETRIC BENCHMARKING

This project constructs an integrative decision-support model, to aid managers of science-based companies (especially entrepreneurial startups), based on the technometric benchmarking approach. The model seeks to provide quantitative tools for decision making in all stages of the innovative process, including: R&D management, including reconfiguration of existing products; strategic planning, marketing and distribution. The research will be conducted in close cooperation with many of the Dimotech companies at Technion and with the Technion Entrepreneurial Incubator.

At an opening workshop the preliminary model was presented and modes of cooperation discussed with the participating companies. A technometric benchmarking anthology had been prepared in advance of the Workshop for distribution to participants.

The research is sponsored by G.I.F. - German Israel Foundation for Science Research and Development.

## 2510 SPATIAL DIFFUSION OF INDUSTRIAL INNOVATION AND REGIONAL DEVELOPMENT

The objective of this three-year research project is to identify the spatial diffusion of industrial innovation and to examine its effect on regional development in Israel. This will lead to the identification of the general and country-specific aspects of spatial diffusion processes.

The desire to develop peripheral regions exists in many countries throughout the world, particularly in those countries where a wide socio-economic gap exists between core and peripheral regions. These gaps often exacerbate spatial social and political unrest in the country. To foster the economic growth of peripheral regions, it is necessary to create employment opportunities which will attract the population to migrate and settle in these regions.

In Israel this desire has been translated into public policies aimed at developing the Northern Galilee and the southern Negev regions. In Germany, government programs in the form of investment allowances and development of industry-related infrastructure, were designed in order to promote the economic growth of lagging regions.

This study represents a first attempt to carry out a cross-country study concerning the diffusion of innovation in space and their impact on regional growth and development.

At the end of the first year we have accomplished a thorough literature survey, identification of the sample of firms and interviewing most of the 200 firms belonging to the fast growing industries situated in the Northern region, including the Haifa Metropolitan Areas.

This study is sponsored by the G.I.F - German-Israeli Foundation for Science Research and Development.

2490 FOLLOW-UP OF THE IMMIGRANT  
POPULATION FROM THE CHERNOBYL AREA

The aim of the study is to evaluate the magnitude of health effects possibly related to radiation exposure from the Chernobyl nuclear reactor.

Immigrants to Israel from areas in the former USSR, where increased Cesium<sup>137</sup> levels were measured following the 1986 accident in the Chernobyl nuclear reactor, were asked to participate in this study. The number of participants accrued thus far is about 10,000. All participants provided self-reported information on their exposure and on their health status before and after the accident.

Two control groups are employed: one includes immigrants from non-radiation areas such as Moscow and St. Petersburg, to serve as baseline data. The second consists of immigrants from the radiation inflicted areas who did not register with the study center. This latter group will be used as a control for possible selection bias into the study group due to a volunteer effect.

A very high rate of self-reported diseases among the study group is evidenced in the validation process of these reports which is under way. These mainly include various thyroid problems but also benign and malignant tumors.

Among the 155 "liquidators" (clean-up and rescue teams) evaluated thus far, 6 cases of mortality have been reported. Of these 4 died of cancer. Thyroid disease has been noticed in a relatively high proportion of the cases (11.4%).

## 2410 DIGITAL COMMUNICATION CONSORTIUM

This Industry-University consortium aims to develop pre-competitive generic technologies that will contribute to a variety of products in the rapidly increasing digital communications market and in particular in the personal communication market.

The S. Neaman Institute played an important role in the process which led to the establishment of the consortium. The program was approved and first funded in 1994 by the Chief Scientist's Office in the Ministry of Industry and Trade. This funding covers 66% of the total funding, the rest is supplied by the member companies. The consortium includes six companies: Elta, Tadiran, Rafael/Galram, Gilat, Shiron and DSPC, in addition to the S. Neaman Institute.

The program includes five research projects that are performed in the laboratories of the members. Each project involves the cooperation of several companies working closely together. In addition several academic research programs are conducted by Technion researchers under the auspices of the S. Neaman Institute.

The S. Neaman Institute role includes responsibility for the academic research, organization of workshops and management of the Consortium data center which accumulates both relevant external information and all the R&D results generated by the consortium members.



2240 IMMIGRATION AND INTEGRATION IN POST-INDUSTRIAL SOCIETIES: THEORETICAL ANALYSIS AND POLICY-RELATED RESEARCH

In May 1993 an international workshop was conducted at Technion, under the auspices of the S. Neaman Institute jointly with the Klutznick Center for Urban and Regional Studies and with the financial support of the Ladislav and Wilma Segoe Fund. The symposium was on "Immigration and Absorption: Advanced Research and its Implications on Policy Determination". 35 researchers, about half of them from North America, Europe and Australia participated. Some of these were requested to rewrite their presentations according to specific instructions.

During the past 18 months a strict evaluation process of these papers was conducted with the purpose of publishing a book on the subject. 12 papers were selected which contain specific theoretical and applicable conclusions. A preface and introduction by the editor were added, and the book was accepted for publication by MacMillan Academic Press. The book, due to appear by mid-1996, is entitled: "Immigration and Integration in Post-Industrial Societies, Theoretical Analysis and Policy Related Research", Carmon Naomi, ed., London: MacMillan Press, 1996 (ISBN 0-333-65113-8, hardcover; 0-333-65114-6, paperback).

## 2200 GROUND STATIONS FOR SATELLITE COMMUNICATION CONSORTIUM

Communication via satellites has grown rapidly in recent years, as technological developments have broadened its accessibility. It is now also available to the "small business" sector (banks, offices, department stores), and to the consumer market.

The consortium of Ground Stations for Satellite Communication was founded by Raphael, Israel Aircraft Industries, Elisra, Gilat and the S. Neaman Institute to establish a joint venture that will enable Israeli industry to compete in this market. The consortium is supported by the Chief Scientist of the Israeli Ministry for Industry and Trade and the companies involved.

The academic research activities of the consortium are the responsibility of the S. Neaman Institute. Subjects covered in 1995 include:

1. Advanced modulation, coding and compression techniques for efficient utilization of the satellite channel.
2. New access and routing methods between ground stations and satellites
3. Image and data compression and image processing for satellite communications.
4. Antennas for low-cost front end units for ground stations.

In addition to this research, the Institute is responsible for constructing and management of the database in satellite communications for use by all consortium members.

In 1995 several workshops and technical meetings of consortium researchers were organized by the S. Neaman Institute, among them workshops on communication systems, communication networks, antennas and microwave communication.

2140

## UTILIZATION OF COAL FLY ASH FOR CONSTRUCTION OF AN OFFSHORE ISLAND IN ISRAEL

Two important factors have been recognized to enhance the materialization of the offshore island project. The first is the persistent increase in the price of prime land in Israel, particularly in the Tel Aviv area. The second is the scarcity of available land reserves that leaves only one option of gaining land from the sea. This unique situation, and the increasing attractiveness of the project within the framework of coastal development in Israel, has been officially recognized by the governments of Holland and Israel, in an agreement which was recently signed in Jerusalem by their respective Prime Ministers, Mr. Wim Kok and Mr. Simon Peres.

This international recognition of the project by Holland that shares similar needs for land in coastal areas, has been the culmination of the efforts made over the years by the research team to bring the project into being. Although a model of only one island has been worked out and shown to be feasible, the interest has grown to a system of islands. Environmental and economic issues, transportation, construction technologies, availability and utilization of fly ash and dredged sea-bed materials as fill materials, and potential effects of earthquakes were considered.

Artificial reefs in the periphery of the island can add an asset to the local marine environment. Updated economic data and forecasts indicate that even under conservative estimates the project will become increasingly attractive toward the turn of the century.

## 1840 TEACHING OF SCIENCE AND MATHEMATICS BY VIDEO

This project is aimed at improving the quality of science teaching in high schools. The concept is to have course material presented in the schools by the best teachers at university level. The most practical way to achieve this goal is to videotape entire courses in high-school physics, mathematics and chemistry, presented by the best teachers from Technion and other institutions. These videotaped lectures are then supplied for use in high-schools. The project began eight years ago, and in this academic year the following activities were performed:

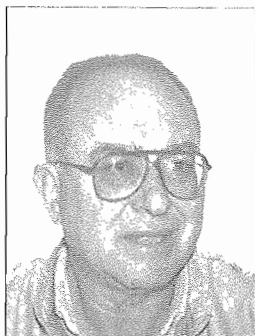
- (1) Additional sets of physics and mathematics courses were distributed to high-schools and university preparatory units.
- (2) A course in intermediate Calculus was prepared.
- (3) A number of workshops for teachers, principals, supervisors and students were organized, in which the program was presented in addition to lectures on advanced physics.

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

## 1560 LAW ENFORCEMENT SYSTEM IN THE 21ST CENTURY

This project, jointly sponsored by the Ministry of Police, the S. Neaman Institute, and the Jerusalem Center for Public Affairs, seeks to define the future objectives of the Israeli law enforcement system and to specify the tools required to achieve those objectives. The first stage of this project has involved the exploration of developmental trends within the Israeli society, by teams of experts in various fields. This stage of the project was basically completed. Comprehensive reports were written on the societal issues facing Israel; on science and technology that are relevant to Israel's law enforcement agencies; and an assessment of future impact of Israeli politics and government on law enforcement. In the present stage criminologists and experts from the major law enforcement agencies consider the implications of the possible scenarios envisioned for each relevant field, on the Israeli law enforcement system.

## SNI RESEARCHERS AND ASSOCIATES



Prof. Y. Avnimelech



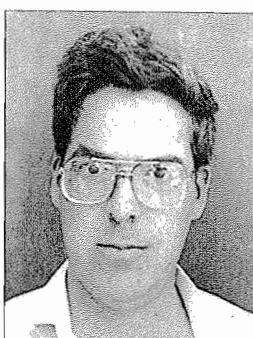
Ms. O. Ayalon



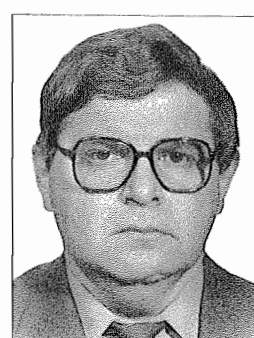
Prof. M. Livio



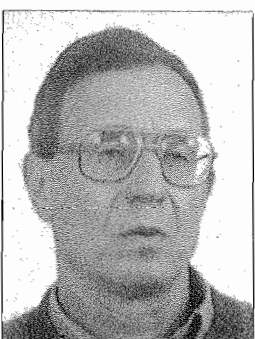
Prof. S. Maital



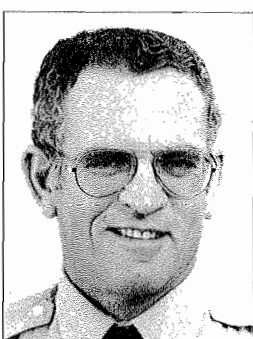
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## WORKSHOPS and SEMINARS 1993 - 1996

Consortium on Earth Stations for Satellite Communication:

- I. Communication Networks, February 2, 1993.
- II. Annual General Meeting, October 27, 1993.
- III. Seminar on Communication Techniques for Satellites,  
Professor Joachim Hagenauer, LNT, TU Muenchen, January 5-6, 1994.
- IV. Technical Workshops for Professional Groups, January 6, 1994.
- V. Antennas and microwave Technical Meeting, July 6, 1994.
- VI. Annual General Meeting, November 6, 1994.
- VII. Communication Networks, April 26, 1995.
- VIII. Antennas and Microwave Technical Meeting, May 29, 1995.
- IX. Technical Workshop for Professional Groups, October 26, 1995.
- X. Presentation of Academic Research, December 14, 1995.
- XI. Communication Networks, March 7, 1996.

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.

Physics - Laboratory Demonstrations, February 3, 1994.

The Economics of Peace, Professor Gad Gilbar, February 16, 1994.

The Chemical Industry 2000, Prof. E. Kehat, February 24, 1994.

Consortium for Digital Communications:

1. Technical Workshop for Professional Groups, April 21, 1994.
2. Technical Workshop for Professional Groups, April 2, 1995.
3. Technical Workshop for Professional Groups, December 4, 1995.

Signal and Image Representation in Combined Spaces, May 8-10, 1994.

Conference on Shore Extensions and Artificial Islands off the Coast of Israel, June 16-17, 1994.

1995 Whizin International Symposium: The Moral Toll of the Information Superhighway, February 5-7, 1995.

Physics - Laboratory Demonstrations, February 6, 1995.

Seminar for Physics Teachers in Colleges - February 23-24, 1995.

Science Education and Career Selection, April 30, 1995.

Recycling of Obsolete Electro-Mechanical Products, April 3, 1995.

Community Aspects of Hyperlipidemia and Atherosclerosis, May 10, 1995.

The Next Generation Information Technologies and Systems (NGITS), June 27-29, 1995.

Multimedia Workshop, January 4, 1996.

Seminar for Physics Teachers in Colleges, January 17, 1996.

Physics-Laboratory Demonstrations, February 6, 1996.

## SNI - LIST OF PUBLICATIONS\* - 1993-1996

### English Publications

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

S. Maital, A. Frenkel, H. Grupp, K. Koschatzky, *Toward a Dynamic Technometric Benchmarking Model for Strategic Innovation and Second-Generation R&D Investment*, Working Paper, The S. Neaman Institute, Jan. 1993.

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

Peritz, B.C., *Further Investigation in the Evaluation of Scientific Activity*, May 1993.

S. Maital, H. Grupp, A. Frenkel, K. Koschatzky, *A Technometric Analysis of Comparative Advantage in Selected High-Technology Industries in Israel*, Final Report, Vol. I - II, October, 1993.

N. Carmon, (Ed.), *Immigrants - Liability or Asset? Innovative Research and Policy Implications*, May, 1993.

E. Kehat, R. Wachs *The Chemical Industry 2000*, Phase A, December, 1993.

D. Shimshoni, *Human Resources Policy in an Age of Change*, 1994 (Internal Report).

Workshop on *Signal and Image Representation in Combined Spaces* (Abstracts), May 1994.

D. Chillag, S. Gepstein, N. Movshovitz-Hadar, M. Perl, A. Rosen, *Report of the S. Neaman Institute Committee on the Advancement of Teaching at Technion*, June 1994.

\* The list of previous publications is available separately.

E. Kehat, R. Wachs, *The Chemical Industry 2000*, Phase B, November 1994.

N. Gomelski, D. Simmons-Cohen, *An Evaluation of the Promotion of Immigrant Entrepreneurship in the Haifa Area*, December 1994.

N. Gomelski, D. Simmons-Cohen, *Entrepreneurial Theory and Practice: Immigrant Opportunities*, December 1994.

E. Kehat, R. Wachs, *The Chemical Industry 2000 Potential for Future Growth*, March 1995.

S. Maital, H. Grupp, eds., *Technometric Benchmarking: Towards an Integrative Operational Model for Management of Technology and Innovation in Science-Based Startups. Selected Readings*, January 1996.

#### **Papers Published in Scientific Literature**

Adler, I. Kohn, D., *Teaching Sciences by Video*, Hypermedia in Vaasa, '93, May 24-26, 1993.

Frenkel, A. Reiss, T., Koschatzky, K., Maital, S. "Technometric Evaluation and Technology Policy: The Case of Biodiagnostic Kits in Israel. *Research Policy*, 23, 281-292, 1994.

Carnon, N. and Baron, M. "Reducing Inequality by means of Neighborhood Rehabilitation: An Israeli Experience and its Lessons", *Urban Studies*, Vol. 31, No. 9, 1994.

S. Maital, A. Frenkel, H. Grupp, K. Koschatzky, "The Relation between the Level of Technological Complexity and Its Dispersion across Firms: An Empirical Study of High-Tech Products in the United States and Japan", *J. of Evolutionary Econ.*, 4: 273-288, 1994.

H. Grupp, S. Maital, A. Frenkel, and K. Koschatzky, "A Data Envelopment Model to Compare Technological Excellence and Export Sales in Israel and European Community Countries", *Research Evaluation*, Vol. 2, No. 2, 87-101, 1994.



S. Maital, A. Frenkel, H. Grupp, K. Koschatzky, "The Relation between Scientific and Technological Excellence and Export Performance: Theory and Empirical Results for 7 E.C. Countries", *Science and Public Policy*, Vol. 21, No. 3, 138-146, 1994.

A. Frenkel, H. Grupp, K. Koschatzky, S. Maital, "Technometric Approach to Technology Assessment", *International Journal of the Management of Technology*, special issue on *Technology Assessment*, special issue, 1995.

C. Tadmor, J. Brandes, Biopsychological Profiles of Pregnant Women at High or Low Risk to Encounter Preterm Birth, *Journal of Community Psychology*, Vol. 22, July 1994.

S. Maital, "Peace, Trade and Technology in the New Mideast", *Technology and Science*, 17(2) 1995, pp. 143-157.

#### Papers Presented at Scientific Conferences

G. Rennert, S. Shapiro, H.S. Rennert, *The Israeli Chernobyl Health Effects Study (ICHES)* presented at the 19th Annual Meeting of the American Society of Preventive Oncology, Houston, Texas, March 8-11, 1995.

#### Educational Video Tapes

1. High-School Physics: Mechanics - Prof. Mario Livio
2. High-School Physics: Electricity - Prof. Mario Livio
3. High-School Algebra - Giora Harubi, M.Sc.
4. Vectors - Prof. David Chillag
5. Calculus - Prof. Ron Aharoni
6. Trigonometry - Giora Harubi, M.Sc.
7. Chemistry - Dr. Riva Bar-Shai
8. Intermediate Calculus - Lea Inger, M.A.

## פרסומים בעברית

Hebrew Publications

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.

ג. גילבר, התפתחות מערכות ההשכלה הגבוהה בשבע מדינות ערביות 1965-1988, מאי 1993.

ד. כהן, א. הראל, מגמות ביקוש למהנדסי אלקטרוניקה ובוגרי מדעי המחשב, יולי 1993.

ב. מנהיים, ד. כהן, היבטים חברתיים וכלכליים בצמצום כח-אדם, יולי 1993.

א. דראל, ז. בונן, ד. מאירסדורף, איכות ופריון במחקר ופיתוח, יולי 1993.

ה. גרופ, א. פרנקל, ש. מיטל, תהליך החדשנות הטכנולוגית: האם לישראל יש יתרון יחסי במוצרים עתירי ידע? אפריל 1993.

י. אראל, הערכות משק האנרגיה לשיפור איכות הסביבה, אוקטובר 1993.

א. ישראלי, ניתוח השוואתי של המבנה האקדמי במוסדות האוניברסיטאיים להשכלה גבוהה בישראל, דצמבר 1993.

כ. אורן, פוטנציאל לימודי גבוה וממושך: פרופיל השגי, סביבתי ואישיותי של מחוננים שאותרו בשנות ה-20 לחייהם, דצמבר 1993.

א. אילון, מ. שכטר, י. אבנימלך, ניתוח חלופות לאיסוף ומיחזור פסולת עירונית מוצקה, פברואר 1994.

א. אילון, מ. שכטר, י. אבנימלך, מדיניות מיחזור פסולת מוצקה בישראל - ניתוח חלופות, דו"ח מסכם לשנת 1993, פברואר 1994.

מ. ארז, ה. הרמתי, דפוס קריירה ותעסוקה של מסיימי תואר שלישי בהנדסה ובמדעים באוניברסיטאות בישראל, מאי 1994.

ג. פורטונה, ר. שנער, מדדים להערכת אפקטיביות ההשקעה בתעשייה הישראלית יוני 1994.

ג. שלף, י. צימלס (עורכים) הכנס לשלוחות ים ואיים מלאכותיים נוכח חופי ישראל (תקצירי הרצאות) יוני 1994.

ד. ויס (עורך), התעשייה האווירונוטית בישראל - הווה ועתיד, יולי 1994.

ד. כהן, מגמות ביקוש לכח אדם מקצועי בחברות המאוגדות בארגון בתי התוכנה בישראל, יוני 1994.

ח. קוסטינר, א. פרנקל, תפקידו של מכון הקרמיקה והסיליקטים ותיפקודו, יוני 1994.

פ. זיאקוב, עורך מדעי - א. כץ, הלוגיקה של החי, הוצאת כתר ומוסד ש. נאמן, יולי 1994.

ד. רוס, י. רבינא, א. להב, שימוש בקולחים במגזר העירוני, דו"ח התקדמות מס. 1, אוגוסט 1994.

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א. רוזן, ש. גפשטיין, נ. מובשוביץ-הדר, מ. פרל, ד. צילג, קידום ההוראה בטכניון, נובמבר 1994.

א. אילון, מ. שכטר, א. כספר, ניתוח כלכלי של חלופות לטיפול בפסולת מוצקה, ינואר 1995.

ד. רוס, י. רבינא, א. להב, שימוש בקולחים במגזר העירוני, דו"ח סופי, מרץ 1995.

נ. גבריאלי, א. פרנקל זיהום אויר מחלקיקים: האם התקן הישראלי נותן הגנה מספקת לבריאות הציבור, יוני 1995.

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