Samuel Neaman Institute

FOR ADVANCED STUDIES IN SCIENCE AND TECHNOLOGY

ANNUAL REPORT 2000-2001

POLICY FOR PROGRESS

Technion - Israel Institute of Technology

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ANNUAL REPORT 2000-2001

The S. Neaman Institute Building ►

Mr. Samuel Neaman
The Founder

This is the first Samual Neaman Institute annual report in the 21st Century. Coincidently, and not inappropriately, this is the year that the deciphering of the Human Genome was completed and published in full for the benefit of all, symbolizing in many respects the ushering in of a new age. An age of great opportunities and great risk. We are at a crucial crossroads in human development. On one hand the historical fusion of science and technology and the consequent ignition of the on-going scientific-technological revolution offers the prospect of innumerable breakthroughs in both science and technology. We are increasingly capable to manipulate quanta, genes and bits - these most fundamental components of matter, life and communication, to our advantage. And, yet on the other hand the risks of the inconsiderate use of technology and science by mankind places its very future at risk. The very troubling signs of global warming, the growing gap between the "haves" and "have nots" within nations and among nations, between developed and underdeveloped nations, and between north and south, that seems to be a by-product of scientific-technological-economic progress, and the lack of humankind capability to cope so far with the ethical dilemmas of scientific progress, are ample warning signs for the risks ahead.

In our own country, subsequent to political upheavals, the renewal of violence and the setback in the peace process, we are beginning this new century still with hopes untarnished but perhaps with more caution and less expectations. Israel's future is intimately intertwined with the new global world, with the high-tech revolution emanating from the foregoing fusion of science and technology, with a world in which human knowledge is the foremost national wealth, and education the secret formula to achieve it. In this new world - the only one that Israel can survive and indeed excel in it - the role of national policies in education, science, technology, research and development, higher education, industrial development, infrastructure, environment, economics, and their complex nonlinear interactions with each other becomes not only highly desirable, but absolutely mandatory. Hence the role of a think-tank such as ours, as envisioned by our founder Mr. Samual Neaman decades ago, also becomes critical to the nation. And, the extensive research program created by the Director of the Institute Professor Arnon Bentur target almost every issue of importance in such a national policy. This I believe is self-evident from even a cursory review of this annual report.

In conclusion I would like to express thanks and appreciation first and foremost to our Founder Mr. Samuel Neaman who while approaching "gvuroth" as we say in Hebrew continues with relentless intellectual curiosity his daily active involvement with the Institute and its programs, while at the same time in response to our needs he has also increased his financial support to the Institute. I am delighted to announce here that his truly unique life story stretching over most of the 20th century and revolving about creating the State of Israel and making significant contribution to secure its continuing existence and successes, will soon be published. I would also like to thank Professor Arnon Bentur for his creative leadership in shaping a focused and excellent program serving the need of the nation. I would also like to express my own thanks and convey the Board's appreciation to all the devoted and very talented researchers and employees of the Institute. Special thanks to Mr. David Kohn who for many years among his many other responsibilities also edits and publishes our annual reports.

Professor Zehev Tadmor
Chairman of the Board

DIRECTOR'S REPORT

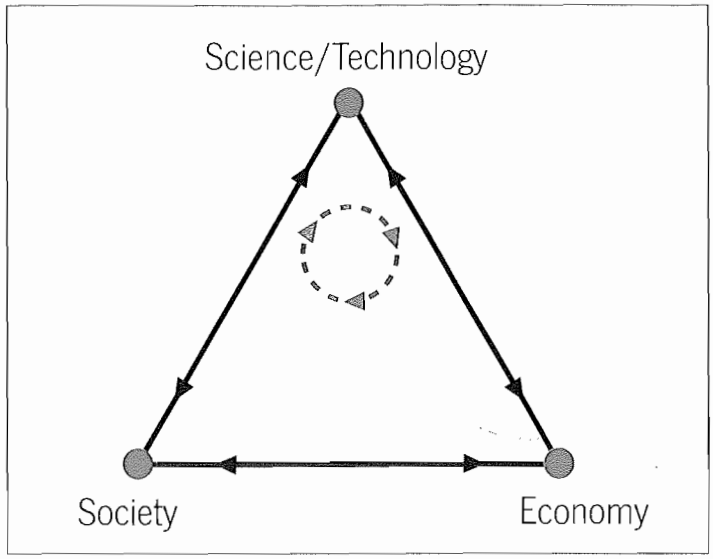
Introduction

The Samuel Neaman Institute was founded in 1978 by Mr. Samuel Neaman who contributed the resources for this purpose. The document establishing the Institute, authorized by Technion Senate defines clearly the Institute's areas of activity, from which the vision and goals of the Institute are apparent. The following are quotations from this document:
"The S. Neaman Institute is established to help seek solutions for national problems in economic, scientific and social development in the State of Israel."
"The choice of subjects of activity will be determined by the desire to seek solutions for the country's problems for the medium and long-term, using the scientific and technological human resources at Technion, and recruiting teams composed of Technion and other experts for limited time periods, to concentrate their efforts in the areas described".

Objectives and Scope of Activity

The main emphasis in the professional activity of the Neaman Institute is in the interface between science and technology, economy and society (as schematically in the scheme). Therefore the natural location for the Institute is at the Technion, which is the leading technological university in the country, covering all the areas of science and engineering. This multi-disciplinary research activity is more important today than ever before, since science and technology are the driving forces for growth and economic prosperity, and they have a significant influence on the quality of life and a variety of social aspects. This is the unique nature of the S. Neaman Institute as a policy study institute.

An additional important aspect of this interface is the impact on scientific and technological research and the determination of priorities in these areas. The tight interrelations between science and technology, economy and society create a complex system of reciprocal feedback, with the result that scientific and technological development are not as independent today as they used to be in the not too distant past. They are increasingly affected by economic and social needs. Therefore the understanding of these interrelations is an important element in the determination of research policy and areas of research in universities and scientific institutions. We witness these developments today in the European Union's Fifth R&D Framework Program, which emphasizes scientific and technological research on the basis of societal needs. It is thus vital that the Neaman Institute conduct such activities to advance R&D policy for institutions dealing with science and engineering, such as the Technion.



Structure and Mode of Operation

The S. Neaman Institute is located on the Technion campus and enjoys the infrastructure of this institution. Nevertheless the Institute is legally and administratively an independent not-for-profit organization. This enables it to be effective in fulfilling its goals, providing it with the flexibility to establish research and expert teams including also representatives from universities and agencies outside the Technion, required for such interdisciplinary activity. The S. Neaman Institute, therefore, absorbs its power from the Technion, but its independent and objective status enables other researchers to take part in its various projects.

Professional Activity

Most of the projects undertaken by the Institute, were the initiatives of the S. Neaman Institute and/or other agencies. These were generally not continuous multi-annual projects.

A single exception is the management of the academic partners within the industry-academia Consortia under the MAGNET program established by the Chief Scientist of the Ministry of Industry and Commerce. The S. Neaman Institute currently coordinates eight such projects, in addition to the establishment of databases and information centers for the various consortia.

The program of activities envisaged for the following years includes continuation as well as change with respect to the past. The initiative for a wider and continuous program in various relevant topics of national policy, has been implemented and it is currently at the onset of its second year. Special emphasis was given in the first year to R&D policy and technological innovation. The program was initiated by the S. Neaman Institute with the aim of establishing

on on-going activity that will include in-depth studies and application activities in order to influence decision-makers.

The area of national policy studies related to science and technology has become the core activity of the S. Neaman Institute. It will be supported and complemented by additional activities connected with industry and activities designed to increase awareness in the general public and that of the decision-makers in particular, in order to implement these policy studies.

Core Activities

Within the core activities for national policy the S. Neaman Institute will concentrate on four main areas directly related to science and technology. The following is a short review of these areas.

1. Science, Technology and Economy

Policy studies in this area are based on study and analysis of the interaction between technology and economy, with attention to professional human capital and the integration of universities within the national technological innovation system. For the purpose of in-depth activities in these areas cooperation was established with the Eitan Berglas School of Economics at Tel-Aviv University. Special emphasis will be given to R&D policies and technological innovation. Sevearl research projects and technology forecasts have been completed and their results have been presented to the general public and to decision makers.

2. Infrastructure, environment and national planning

This area is of the utmost importance for a modern country. The advancement of a modern country requires attention to technological development and economic growth as well as quality of life, environment and developing national infrastructure such as transportation and communication. The emphasis is on policy and national projects where interaction is required between experts in science and technology and experts in economy and social sciences. Key projects include, amongst others, National Environmental Priorities for Israel and National Planning, and Israel 2020 to Israel 2050 which is currently it its first stages.

3. Technology-Society Interactions

Seed activities in the area of technology-society interactions have been implemented, with the objective of building up the expertise required for policy studies in these fields. The specific topics addressed include technology for the elderly and the irnpact of technology on school structure.

4. University education and human capital

The activity in this area interfaces and often overlaps with activities in the first area. Science, technology and economic growth are tightly linked with development of human resources and integrating the research abilities of universities within national technological innovation system. Several studies on university technology transfer and university-industry relations have been initiated.

Application and Support Activities

Within the framework of the application and support activities a notable contribution of the S. Neaman Institute is the participation in the consortia program of the Chief Scientist of the Ministry of Industry and Commerce, the Magnet Program. The S. Neaman Institute manages the academic partners of eight active consortia, and for support it has established and operates seven data centers.

The implications of the research and professional activities of the S. Neaman Institute are intended to radiate externally towards the national system, as well as have an inward impact - to the Technion. The external impact is to be achieved by various mechanisms such as seminars and workshops, academic guest program, policy papers presented to decision makers and publications and databases. The impact within Technion is taking place by the initiation of policy studies where Technion faculty are involved, and by means of workshops, seminars and inviting experts from abroad. This is intended to expose the Technion faculty to the complexity of the technological innovation system, where scientific research and technological development are an important but not an exclusive element. This exposure is intended to strengthen Technion's ability to develop research in general and funded research in particular.

Professor Arnon Bentur, Director
The Samuel Neaman Institute for Advanced Studies in Science and Technology

LIST OF PROJECTS

New Beginnings

9. The Future Research University of Israel
11. University-Industry Relations: Policies Guiding University-Industry Technology Transfer
12. Enhancing Industrial Innovation Through University Transfer of New Technologies
13. Financing Innovation Schemes: The Israeli Experience
14. Sustainable Energy: Wind Energy
15. Aging and Technology: Internet for the Elderly
16. The Operation Room of the Future
17. The "School+" Project
18. Infrastructure Policies
19. First International Pre-Incubator Workshop (USINE)

Ongoing Projects

20. The Science, Technology and Economy (STE) Program
24. The Zvi Grinliches Research Data Center
26. National Environmental Priorities of Israel - 2001
27. Smart City - A pilot study of a framework for the development of community networks
28. OPET Israel (Organization for the Promotion of Energy Technology)
29. Technology Forecasting: Delphi Survey
30. From "Israel 2020" to "Israel 2050"
31. Cultivation of Excellence in Mathematical Teaching
32. The Green Campus
33. Molecular Epidemiology of Colorectal Cancer (MECC)
34. Workshop on: "Feature Based Innovation: A systematic approach for managing new product development, from idea to market"

Consortia

35. The S. Neaman Institute Information Center
37. Development of Magnesium Technologies Consortium
38. The Israeli Software Radio Consortium (ISWR)
40. Information Superhighway In Space Consortium (ISIS)
42. Quarter-Micron Technology Consortium
43. Large Scale Rural Telecommunication Consortium (LSRT)
45. Streaming Rich Media Messaging Consortium (STRIMM)
46. Wafer Fab Cluster Management Consortium (WFCM)
48. Consortium for Industrial Software Tools (CONSIST)
49. Digital Printing Consortium (DPI 2000+)

THE FUTURE RESEARCH UNIVERSITY OF ISRAEL

An international working group was established by the S.Neaman Institute to study in depth: **"The Future Research University of Israel -Structure, Organization, Operation & Governance"**. The members of the working group are: Professor Henry Rosovsky former Dean of Harvard College at the Harvard University, Professor Sheldon Rothblatt Professor of History at the University of California at Berkeley, Professor Martin Trow Professor of Public Policy the Goldman School of Public Policy and The Center for Studies in Higher Education at the University of California at Berkeley, Sir Claus Moser, Professor Alex Keynan Professor of Biology the Hebrew University and Senior Advisor to the President of the Israel Academy Sciences and Humanities, Professor Hanoch Gutfreund former President of Hebrew University and Professor of Physics, Professor Elia Leibowitz, Professor of Physics at the Tel Aviv University , Professor Arnon Bentur Director of Neaman Institute and Professor of Civil Engineering, and Professor Zehev Tadmor Professor of Chemical Engineering, former President of Technion and Chairman of the Board of the Neaman Institute.

The rationale of the study stems from the profound changes that took place both in the higher education system in Israel and in its social, cultural and political environment over the past decades. These developments triggered the Israeli Government to instruct the Planning and Budgeting Committee (P&BC) of the Council of Higher Education to establish a Public Commission to look into the organization and Governance of the Israeli Universities.

The Commission headed by Judge Maltz submitted its report last year, and made a series of useful, however not binding, recommendations regarding the role and structure of the boards of governors, the councils, and the senates. However, the Commission was not mandated to make a thorough and in depth analysis of the research university as a whole.

A step in this latter direction was recently taken by the Israel Academy of Sciences and Humanities. The Academy, concerned about the foregoing developments in the Israeli higher education and the threats posed to the universities by social and political developments in the Israeli society, jointly with the Planning and Budgeting Committee of the Council of Higher Education established a Committee to study in some depth the future of the Israeli Research Universities. In this framework two international workshops took place and three subcommittees were established: one dealing with technology transfer, the second with budgeting issues and the third with university relations with the society at large. The work of the Committee and subcommittees continues.

However, neither was this committee, as was the case with the Public Commission, requested to carry out an in-depth and complete reexamination of the research universities. Rather the objective of both committees is to recommend improvements of the current structure.

However, we believe that the foregoing developments in the Israeli higher education systems, the quickly changing Israeli social and political scene, as well, and perhaps more importantly, the profound global technological, scientific and economic changes that emerge at the dawn of the 21st century, **demand a thorough and complete reevaluation of the research university as a whole**. The challenge is how to meet the needs and tasks of the new emerging era while retaining the character, goals and ideals of the classical research university. How will the future research university look like? What will be its disciplinary distribution? How will it interact with industry and society? What will be its size? How will it be organized? What will be its missions?

This study is estimated to last about two years and will conclude with an international workshop.

UNIVERSITY-INDUSTRY RELATIONS:

POLICIES GUIDING UNIVERSITY-INDUSTRY TECHNOLOGY TRANSFER

RESEARCHERS:

PROF. D. SHEFER

DR. A. FRENKEL

Transferring the results of university research to industry assumes a wide variety of forms, including know-how, trade secrets, software, tangible research products and patented inventions. Technology transfer may utilize a variety of mechanisms, including the use of faculty as consultants, the funding of research projects, hiring of graduate students and licensing of patents and other products. All of these activities create linkages with industry that are important to the faculty and the long-range needs of the university. Some of these activities function smoothly and require relatively little intervention; others require active support on the part of the university to ensure that essential elements of the technology transfer process will function effectively.

The objectives of this research project are: to present an overview of the dynamic change in the character and extent of the research conducted at the university and sponsored by the university; to describe and analyze the policies, rules and regulations currently being adopted at the different universities in order to protect economic and academic objectives; to explore the degree to which the academic staff of the university (including graduate students) engage in research sponsored by industry; to describe and analyze the extent to which academic staff engage in consultation and other innovative activities, directly in industry (not through university financed research).

Sponsor: The Israel Academy of Science and Humanities

ENHANCING INDUSTRIAL INNOVATION THROUGH UNIVERSITY TRANSFER OF NEW TECHNOLOGIES

RESEARCHERS:

PROF. D. SHEFER

DR. A. FRENKEL

Closer integration of the universities in the national innovation system is in the interest of the universities since it enhances teaching and research at the universities, and demonstrates the universities' contribution to the economic welfare of the state, thus justifying continuous public support for these institutions.

For more efficient integration of the universities into the economy, there is a need to develop more effective mechanisms without adversely affecting the universities ultimate goals of teaching and doing basic and applied research. These are complex mechanisms and require a delicate balance between often-conflicting objectives. Continuous changes in the economic environment call for flexible and dynamic mechanisms capable of accommodating changes over time.

The objective of this research project is to develop policies and tools that will facilitate the transfer from universities to industry of new technologies. Thus the universities will become more relevant to the social and economic life of the country. The research will examine barriers to technology transfer, formulate new mechanisms, and develop tools for control and follow-up. The latter will serve as a basis for updating and revising the processes as needed, in order to adjust and realize them in response to the dynamic and changing environment in which we live.

In addition to short-term benefits derived from technological transfer there also exist benefits accrued to the universities and their faculty. In the long-term it is paramount to take these benefits into account. This 'spillover effect' affects the economy and the society at large and the quality of teaching and research at the universities in particular.

Sponsor: Ministry of Science

FINANCING INNOVATION SCHEMES: THE ISRAELI EXPERIENCE

RESEARCHERS:

PROF. D. SHEFER

DR. A. FRENKEL

In order to create a venture capital industry it is necessary to analyze success stories such as "Yozma" Venture Capital and the Technological Incubator program. There are two extraordinary Israeli success stories that led to the creation and development of hundreds of innovative technology-based firms. The objective of this research project is to develop a methodology with which an innovative financing system will be created in regions where venture capital sources are lacking. Subsequently, it will be possible to formulate a most effective scheme that will create the Venture Capital industry.

The geographical concentration of potential entrepreneurs in specific high-tech industrial branches will be analyzed with regard to the innovative milieu and financial needs. Subsequently, the most suitable financial instruments and public incentive programs will be formulated considering the legislation requirements for the implementation of such a program. Finally it is expected that the outcome of this study will be disseminated to policy-makers throughout Europe.

Sponsor: European Union 5th Program

SUSTAINABLE ENERGY: WIND ENERGY

PROJECT LEADER:

PROF. A. ROSEN

Wind energy is a growing sustainable energy source and its use is increasing considerably. In order to make the energy economical, the turbines are gathered into farms that may include tens of large turbines. Most of the wind-farms are located on land. During the last ten years a few offshore wind farms were built, and more are planned, mostly in Europe. The main reasons for going offshore are the shortage of appropriate open spaces in Europe (with its very densed population), objections of neighbours and environmentalists (the NIMBY phenomenon-Not In My Back Yard), and last but not least, the strong winds over seas and oceans. Thus in spite of the fact that building a wind farm at sea is more expansive (foundation problems, severe corrosion, the transfer of electricity to the land etc.), offshore wind farms are becoming feasible.

Israel has good wind energy resources. One wind farm operates on the Golan Heights, while others are planned. Yet because Israel is one of the most population densed countries in the world, and at the same time has a long seashore, it is natural to study the feasibility and economics of offshore wind farms in Israel.

The purpose of the research is to review the status of offshore wind farms over the world, the existing technology and future developments. In addition an assessment of the offshore wind energy resources of Israel will be performed. Based on these two studies the economics of building offshore wind farms in Israel will be investigated.

Sponsor: Ministry of National Infrastructure

AGING AND TECHNOLOGY: INTERNET FOR THE ELDERLY

RESEARCHERS:

DR. N. BITTERMAN

I. SHALEV

The population of the developed countries that is over 65 has grown dramatically, and continues to expand as a result of an increase in life expectancy and decrease in birth rate.

Old adults today are forming an active population with better health and education, having considerable free time, and more income per capita than younger people do, making them an important market for consumer products. It is the challenge of the new century how families, businesses and governments will respond to the needs, preferences and lifestyle of the growing number of older adults. Policymakers must now go beyond discussion of health and economic security to anticipate the aging boom, and the role of technology in responding to the needs of the aging society.

The older population is increasingly exposed to computers and various forms of computer technology, both from interest and from necessity. Computers and advanced technology can improve dramatically the social and economical life quality of older people as individuals and of the community as a whole.

Computers and especially the Internet are becoming an integrated part of our daily life, both at work environment, household, education, commercial and health facilities, and communication between people (e-mail, chats, virtual groups, etc). Daily activities including banking, shopping, information search (such as news, weather, health), hobbies, and developing a second career by e- learning can be carried out from everywhere, at any time of the day with the use of the Internet. The Internet can avoid social and mental isolation and increase independence and self-confidence of the old population. However, the benefits emerging from new technology including computers and Internet depend upon the adaptation of the new technology to the possibilities of old people and their willingness to use the new technology.

The S. Neaman Institute decided to get into the field of technology and the aged population. The first research project, which was selected is "Internet and the elderly; Designing web navigation". The aim of this project is to study differences in Internet usage (navigation) between young and older Internet users and to identify web design guidelines based on the decline of cognitive, conceptual and mechanical capabilities of the elderly. Further activities will include a symposium on the subject of "New Technologies and the Old Population" and additional research project dealing with advanced technologies for the benefits of the aging society.

THE OPERATION ROOM OF THE FUTURE

PROJECT LEADER:

DR. N. BITTERMAN

Biotechnology and the Life Sciences have recently attained major interest and merit in Israel and around the world. An increasing number of scientists and engineers are partaking in the development of innovative concepts, methods and instrumentation in medical, biotechnological, and high-technology projects, so as to improve life quality, treat diseases, reduce healthcare expenditure, and promote longevity.

The Operating Room of the Future is one of the most rapidly developing fields in medicine today. The most advantageous advances in the future operating room include: minimally invasive procedures, robotics and computer-aided surgery, image-guided surgery, virtual reality, Telemedicine (Telesurgery, Teleradiology, etc.), voice-activated systems, and advanced Bio-materials.

The operating room of the future raises major multidisciplinary issues in technology (men-machine interface), education (teaching and tutoring of the surgical team), health care economy, legal and ethic dilemmas and social development.

The S. Neaman Institute has decided to gather under one roof a number of the best experts from the Techno and other institutions in Israel and abroad, to deliberate on the various aspects of the Operating Room of the Future.

The first stage includes an International Symposium entitled "The Operating Room of the Future" sharing expert speakers from Israel and abroad (postponed to Autumn), and series of three workshops to be followed by the possible establishment of a simulation laboratory of the Operating Room of the Future, serving as a center for research, training (of surgical teams), and beta-site for medical equipment evaluation.

THE "SCHOOL+" PROJECT:

MORE THAN A PLATFORM TO BUILD THE SCHOOL OF TOMORROW

PROJECT LEADERS:

DR. M. EREZ

I. HAYER M.SC.

The "School+" project is an R&D project within the Information Society Technologies programme, approved by the European Commission Research Directorate General, under the Fifth Framework Programme.

The main aim of the "School+" project is to design, develop, demonstrate and evaluate a comprehensive teaching and learning environment by integrating a progressive educational perspective with information technologies, to help schools (teachers, students, parents...) to acquire and develop knowledge and skills required both by future and present citizens of the Information Society.

The "School+" project ventures to re-engineer the school environment, to tackle the issue of computerised information technology in schools from its "roots", and to integrate, adapt, enhance and fine-tune the technology to the schools' changes and needs to educate learning citizens in the Information Society and not vice versa. In the definition of these needs, special attention will be given to equity and inclusion/exclusion issues.

In order to achieve the objectives, as well as relating to the European dimension, the "School+" project's consortium includes partners from academia, industry as well as schools. The participating member countries are Spain, Greece, Israel, the Czech Republic and Finland, bringing into the project expertise and needs spreading from Western to Eastern Europe.

INFRASTRUCTURE POLICIES:

TOWARDS AN INFRASTRUCTURE POLICY CONSENSUS AND A NATIONAL CAPITAL OUTLAY BUDGET 2000-2010

PROJECT LEADER:

PROF. D. CZAMANSKI

Decisions about infrastructure are made in the context of policies concerning growth, job creation, poverty alleviation and quality of life. The key issue is how infrastructure can be made to contribute to other economic policies.

In Israel, in-depth discussions of infrastructure policies are not common. Squeaky-wheel policymaking is the norm. Only some parts of the infrastructure, particularly telecommunications and electricity, have been examined in some depth. Other parts have not received even a rudimentary scrutiny.

Through its outputs, the project seeks to create a catalytic effect on infrastructure decision-making in Israel on the basis of a penetrating, across the board examination of needs, means, institutions and management practices.

The outputs of the project will include position papers, workshops synopses and a white paper on infrastructure policies in Israel. The white paper will include background analyses and proposed capital outlay budget for the first decade of the new millennium.

To create the intended outputs, it is proposed to establish an infrastructure working-group of decision-makers and scholars. The overall mission of the working-group will include:

- An examination of the condition of Israel's infrastructure;
- An across the board examination of the decision-making mechanisms concerning infrastructure needs, development strategies, management, financing and updating processes;
- An in-depth examination of selected number of infrastructures.

The deliberations of the working group will lead to the preparation of an infrastructure white paper to be submitted to the public and government.

As a backdrop for its deliberations and the preparation of a white paper, the working group will examine a variety of infrastructure issues in a context of a two-fold, matrix-type, policy analysis. Some issues will be examined generically, across the various types of infrastructure. Some examinations will focus on a variety of issues in a context of a particular infrastructure.
The working group will initiate and conduct three types of activities: working group generated research leading to issue papers, public discussions with decision makers leading to synopses and preparation of a white paper with national exposure.

First International Pre-Incubator Workshop (USINE)

ADVISORS:

Prof. S. Maital,
Academic Director of TIM

Dr. O. Berry,
Gemini Israel Funds

COORDINATOR:

A. Gordon, Head of the
Liaison Office to EC,
Technion R&D Foundation

On January 21-26 2001 the Samuel Neaman Institute hosted the First International Pre-Incubator Training workshop, organized as part of the EC Fifth Framework Program-Innovation project USINE (University Startup of International Entrepreneurs Program).

The goals of this course were to expose International Pre-incubator trainers to Israeli Incubator and Pre-incubator activity, enable the extraction and development of Tools for entrepreneurship, with the intent of these being transferred to others.

The participants, members of project USINE, and led by EuroConsultant of the University of Bonn, Germany were from leading European University Technology Transfer (TT) centers. The University of Bielefeld - Transferstelle from Germany, Universitade Politechnica De-Valencia - Center for TT, Spain, Ecole Politechnique, France, Centro Europeo De Empresas e Innovacion Navarra S.A., Spain, University of Strathclyde - Glasgow, United Kingdom and the University of Warsaw, Poland

The initiative behind project USINE as a whole was the recognition that innovative technologies and patents developed by researchers, engineers and students in universities industries and research centres, scarcely result in spin-off Companies. The low success rate of spin-off activities is an outcome of the profound gap between the Academic and Business worlds, a gap characterised by differences in culture, ethic, discipline, commitment, terminology, behaviour and the outstanding inherent conflict between Academic freedom and commercial goals. Project USINE aims to bridge this gap, and as part of this effort held it's first training course in Israel.

As part of the training course, European Entrepreneurs met with a wide variety of Israeli Industrialists, Academic Entrepreneurs, as well as representatives of the Business Community, Venture Capitalists and Directors of Technological Incubators. An important part of the course was also allocated to actual visits to companies and industrial parks, such as the one in Tefen, to hear from those in the field about their experiences, difficulties and success.

THE SCIENCE, TECHNOLOGY AND ECONOMY (STE) PROGRAM

PROF. M. TRAJTENBERG ,
HEAD OF STE PROGRAM

PROF. D. PELED,
ACADEMIC COORDINATOR

The Science, Technology and Economy is an SNI core program dealing with SNI central mission of developing national policy alternatives in the fields of science, technology, and economics. Prof. Manuel Trajtenberg founded the program, and coordinates its activities together with Prof. Dan Peled. There are 7-10 additional researchers participating regularly in the program, mostly economists from various universities and research organizations. This is a novel program in several ways. First it cuts across university boundaries trying to bring under one roof the best researchers in the field; second it is an attempt to harness the vast economical and technical knowledge of the team to practical policy issues; third it is meant to educate a cadre of young policy research scholars for Israel, and fourth it will help place the Technion into the center of national policy making.

The activities of this program started in late October 1999, so that we are now in the midst of the program's second year. The program consists of the following interrelated "modules", discussed in details below:

- Research projects conducted by members of the STE Program;
- Workshops on the Economics of R&D;
- Visitors from abroad;
- The development of a data center.
- "Outreach" activities.

1. Research Projects

Four new research projects were already approved for funding this year, following the STE program first public "Call for Proposals". These projects, together with those launched last year, constitute the core of the STE research efforts, and provide the academic platform for most of the other activities. The principle investigators of these projects will join the ongoing STE activities throughout the year, including monthly meetings and workshops.

The new approved projects were:

- Boaz Golany, Faculty of Industrial Engineering and Management, Technion, with David V. Gibson, Univ. of Texas at Austin and IC^2, and Fred Y. Phillips, Oregon Graduate Institute of Science & Technology:
  "Models of Successful Consortia Formation"

- Hedva Ber, Research Department, the Bank of Israel:
  "Venture capital and Economic Growth in Israel"

- Ehud Gelb, Ministry of Agriculture, and Daphne Getz, the Neaman Institute:
  "Technology Spillover in Peripheral-Rural Areas"

- Avi Weiss, Bar-Ilan University:
  "Cooperative and Non-Cooperative R&D with Uncertainty and Spillovers"

- Manuel Trajtenberg, (Tel Aviv University)
  "Silicon Valley and 'Tel Aviv Wadi': A Comparative Study of Spillover Flow"

- Dan Breznitz, (Massachusetts Institute of Technology),
  "Globalization and High-Tech Industrial Development: Ireland, Israel and Taiwan"

These new projects join those started last year:

- Shaul Lach and Robert Sauer (Hebrew University):
  "The Effects of R&D Subsidies: A Structural Approach"

- Asher Blass (Bank of Israel) and Oved Yosha (Tel Aviv University)
  "Financing R&D: A Micro-Study of Israeli Traded Manufacturing Firms, 1990-1998"

- Neil Gandal (Tel Aviv University)
  "The Effect of Software Patents on Innovation and Network Benefits"
  [Interim report submitted]

- Benjamin Bental and Dan Peled (Haifa University)
  "A Structural Estimation of Investment in R&D"

The new approved proposals for research projects will be presented to the STE group in its March 2001 meeting.

2. Public Workshop on "Economics of R&D in Israel"

On January 10, the STE Program held its first public workshop at Dan Panorama Hotel, Tel Aviv. The workshop was well attended by people from both public and private R&D intensive sectors in Israel, some 50 participants, in total.

The morning session was devoted to presentations of on-going STE research projects. The afternoon session was devoted to the linkages between defense R&D in Israel, its technological development, and the performance of its economy. The purpose of that session was to provoke some discussion, and possibly future research work, on the special role that defense oriented R&D may fulfill in Israel. Although the empirical evidence on

such links between defense R&D and economic performance from other countries is mixed, the Israeli case is unique in several ways, which warrant a reexamination of this relationship.

The Defense R&D afternoon session started with a presentation by Professor Frank Lichtenberg, from the Graduate Business School of Columbia University, a leading researcher of defense economics, on "Defense R&D, Civilian R&D, and Economic Growth". Colonel Yaakov Nagel, head of Planning and Budgets from MAFAT, (Israel's Department of Defense R&D Authority), followed by presenting some methods and issues concerning the process of resource allocation in defense R&D in Israel. Concluding the session was a panel discussion, led by Prof. Zehev Tadmor, Chairman of the Board of the Neaman Institute, and former President of the Technion, with the participation of Prof. Lichtenberg, Colonel Nagel, Mr. Benzion Naveh, (former Head of MAFAT), and Prof. Peled.

Some STE researchers are currently drafting, with the cooperation of MAFAT, a concrete proposal for researching the links between defense R&D and growth and development of the Israeli Economy.

3. Monthly Meetings

The periodic meetings of the STE group during the first semester of the 2000/1 academic year were confined to reviewing the incoming proposals, in response to our "Call for Proposal" announcement, and to the first public Workshop, (see above). We plan on resuming the monthly meetings format as of the beginning of the second term.

In the first meeting planned for March 2001, the newly approved research projects will be presented, and plans for directed research will be discussed, (e.g. the economic impact of defense R&D).

4. Visitors from abroad

Professor Frank R. Lichtenberg, Courtney C. Brown Professor of Business at the Columbia University Business School, was visiting us in January 2001. Prof. Lichtenberg is known world wide for his innovative empirical works on defense R&D, productivity growth in the high-tech sector, and the economics of R&D in the medical and pharmaceutical industries. His activities during his visit with the STE group included participation and a keynote presentation in the public STE workshop on defense R&D, (see above), a presentation at the Neaman Institute on "The Costs and Benefits of R&D for Pharmaceutical and Medical Technologies", and consultation with various STE members on existing and potential future research work. Prof. Lichtenberg's visit was very sucessful, and both he and STE members expressed sincere interest in developing future collaborative work.
Another visitor is planned to arrive later in the year.

5. The Development of a Data Center

The need to create a data center that would contain extensive and diverse data on R&D, Innovation, High Education, etc. was identified early by Haim Regev, the former Associate Director of the Central Bureau of Statistics, who took upon himself to do that, with the aid of a steering committee. The Center activities are described in a separate report.

6. Outreach Activities

Members of the STE group are broadening their activities in various policy related directions:

- Prof. Manuel Trajtenberg continue their involvement in the design of R&D policy in Israel through various ad-hoc committees and board of directors of programs operated by the Office of the Chief Scientist of the Ministry of Industry and Trade;
- Prof. Bental and Prof. Peled are involved with an evaluation process of the Technological Incubators Program of the Office of the Chief Scientist of the Ministry of Industry and Trade;
- Prof. Dan Peled participated in an OECD Workshop in Paris in December 2000, on "Intellectual Property Rights from Publicly Funded Research", and in a 2-days meeting of the Technology and Innovation Policy group of the Science and Technology Directorate of the OECD.
- Prof. D. Shefer and Dr. A. Frenkel participate in the evaluation project of the Israeli Academy of Sciences, on "Science and Technology Policy in Israel and Technology Transfer from Israeli Universities", through a project on University-Industry Relations carried out by the Neaman Institute.
- The STE group continues actively to seek suitable candidate graduate students for scholarships, in order to encourage them to develop research work and expertise in areas of interest to the STE Program goals. These efforts take the form of general announcements, as well as approaching specific suitable faculty members in Israeli universities.
- Finally, we plan to resume the dialogue among some members of the STE Program and Technion faculty members actively involved with scientific R&D in various disciplines, in order to learn from each other about channels of technology "spillover" and the economics of R&D, (see last year Annual Report).

THE ZVI GRILICHES RESEARCH DATA CENTER

ACADEMIC COORDINATOR:

H. REGEV

The main scope of the Zvi Griliches Research Data Center is to promote economic research on R&D, Innovation, Human capital, Firm Productivity and related topics, based on Israeli data. The center is a part of the activity of the group of researchers on science technology and economy, within the framework of the Samuel Neaman Institute in cooperation with the Central Bureau of Statistics.

The main activities of the Zvi Griliches Center are:

- Constructing an **Internet site** that will contain all relevant published data in the field.
- Promote the **creation** of detailed, **micro**, statistical **data sets**, which fit research.
- Assist **research based on confidential data** at research rooms at the CBS.

The first activities of the center are:

1. **Publications with Statistical Data.** Up to now 10 publications on Industrial R&D, National R&D expenditure, Innovation and Industrial Statistics were received from the Central Bureau of Statistics and others and were captured in the Internet site. The site provides easy access to every table in each publication and allows retrievals of each table as a single excel file.
2. **Research Data File.** The center is promoting the creation of the following 4 micro research data sets:

- **The Panel of Industrial Firms, 1970-1998** provides a basis for estimating production functions and related models. This file has already been used by Griliches, Regev and others in studies on firm productivity and R&D support. The file will be available for research toward the end of 2001.
- **R&D Support, 1986-1999.** The Chief Scientist provided the CBS with a very detailed file on R&D support at the project and firm levels, which covers the development of this activity over the past 15 years. The new file will also be matched with the R&D and Industrial surveys and will be available for research in October 2001.
- **Linked employer-employee files, 1983, 1995**. The CBS is now considering the creation of employer - employee data files. These files provide a basis for investigating various issues related to labor economics, through simultaneous analysis of supply and demand of the labor market. During 2001 the CBS will construct a preliminary file which will be based on data on employees from the National Security, which will be matched with population censuses and the above mentioned panel of industrial firms.

3. **CBS Research Rooms.** Modern empirical research necessitates data at the level of firms, or even at more specific levels. This kind of data is usually confidential and can only be used by authorized researchers at the CBS offices, in accordance with the stipulations of the Statistical Ordinance. The Zvi Griliches Research Data Center recognizes the importance of this kind of research, and will channel efforts toward promoting the establishment of research rooms throughout the country and providing assistance for researchers who wish to use them.

4. **International Comparisons.** The center will also gather statistical data for OECD and other countries in order to facilitate international comparison.

National Environmental Priorities of Israel- 2001

PRINCIPAL INVESTIGATOR:

Prof. Y. Avnimelech

RESEARCHERS:

Dr. O. Ayalon

Dr. M. Juanico

Prof. Y. Cohen

Dr. H. Zaban

Dr. D. Baum

Adv. O. Karassin

Prof. A. Adin

D. Basel M.Sc.

A joint assessment of the environmental situation in Israel was conducted in 1998-1999 through the initiative of the Neaman Institute and headed by Prof. Y. Avnimelech. During 1998-1999, more than 100 of the country best experts in diverse environmental fields, were involved in discussions leading to the establishment of a list of priorities and a course of action for addressing environmental issues in Israel. Background papers were prepared by experts in each given field and reviewed by additional experts to include their response and comments. Subsequently, workshops were established for discussing the proposals and recommendations that were presented in the professional framework.

Since the environmental arena is dynamic, there is a need to update, judge and adopt new technologies and new solutions. **National Environmental Priorities 2001** will continue to raise public awareness of environmental issues, enhance and expand environmental educational offerings and interdisciplinary collaboration by presenting high-profile symposia, workshops and seminars. Demonstration projects will be initiated, such as the Green Campus project that is currently underway.

Professional activities of follow-up and updating of the issues covered in the first stage of the project have already been launched. In addition, topics not covered in the first stage are being developed, such as the Marine and Coastal Environment, the Agricultural Environment. Several overviews will be presented: the Environmental Education in Israel, The NGOs in Israel, the Industry and the Environment in Israel.

SMART CITY

A PILOT STUDY OF A FRAMEWORK FOR THE DEVELOPMENT OF COMMUNITY NETWORKS

PROJECT LEADERS:

PROF. D. GOPHER

Z. STRAUCHER

PROJECT TEAM:

H. MOGLE

R. NIR

L. FLESHNER

T. KAI

L. MANOR

Under the general umbrella of the Smart City project in the Neaman Institute, a pilot study was conducted at the municipality of Kiryat Tivon. The main objective of this study was to formulate a conceptual framework and methodology for the development of a community network. Such a network is targeted to take advantage of the new developments in information technology, for the purpose of improving the interaction between the citizens and the municipality, service providers, cultural and educational institutes, as well as enhancing communication and social exchange among residents of the community. It is our claim, that a successful community network will make a significant contribution to the quality of life in the community and strengthen its social coherence.

During the last decade, and in particular with the proliferation of the Internet, there have been numerous attempts around the world to develop community networks. Many of these networks had failed and ceased to operate, many have had partial success and limited use, only few can be dimmed successful. It is our contention that a major contributor to the limited success, was the fact that in many cases, external, commercial interests, motivated the development of networks, with little concern about the community needs, priorities and technical preparedness. In other cases, the system was developed to fulfill local political interests, with little systematic knowledge on the necessary dimensions for its establishment and maintenance. We believe that to achieve its goals, the structure, hardware, software, content and organization of the system, should be adapted to fit the special profile of the community, its members and local service providers. A systematic construction of such a profile should be the basis for the development of the network. This is the work that was conducted in Kiryat Tivon, a suburban community of 15,000 residents, in 4,000 households. Kiryat Tivon is known for its active community life. The average education level is relatively high, with a high proportion of academics and professionals. Eighty percent of the households have a personal computer and 70% are connected to the Internet.

Two teams of students conducted 75, socio-economical stratified, phone interviews and 40 face to face interviews with residents. Eighteen service providers were interviewed, including all departments of the municipality, schools, library, cultural centers and health service clinics. In addition, the study team assessed the general communication and computer facilities of the community, and examined expected performance and costs of different technological configuration. The collected information served to develop a community profile from the perspective of developing a network. It served to a recommended three-stage development program, which is accompanied by online assessment of usability and efficiency. It is our plan to join the Kiriat Tivon local team, during the actual development of the network.

OPET ISRAEL (ORGANIZATION FOR THE PROMOTION OF ENERGY TECHNOLOGY)

STEERING COMMITTEE:

DR. Y. SHARAN

Y. ASIA

A. EINAV

PROF. A. BENTUR

M. SHATON

RESEARCHERS:

D. KOHN M. PHIL.

E. SINGER

OPET ISRAEL (OPETI), was established in January 1998 by a Consortium consisting of the Interdisciplinary Center for Technological analysis and Forecasting (ICTAF) at the Tel-Aviv University, the Israeli EU RTD Center (ISERD), the S. Neaman Institute for Advanced Study in Science and Technology (SNI) at the Technion and the Manufacturer's Association of Israel (MAI).

OPETI's mission is to promote efficient use of energy in Israel and to help sustainable economic growth through the use of advanced energy production technologies. OPETI will also help enhance Israeli participation in EU RTD programs on energy and will disseminate information on EU RTD activities and achievements in this field. OPETI takes part in the Israeli DELPHI study to formulate future science and technology policy, and initiates studies and services on technological needs in the energy sector.

The S. Neaman Institute and ICTAF are responsible for the evaluation of technological needs in the energy sector (both in Industry and in academia), the collection and dissemination of documentation and information about energy-related topics and targeted information retrieval and dissemination, aimed at the energy market actors.

Within this framework, the S. Neaman Institute prepared a database on the Israeli Energy Sector, including academy, industry and government.

TECHNOLOGY FORECASTING: DELPHI SURVEY

STEERING COMMITTEE:

DR. D. HASELKORN, CHAIRMAN

DR. O. BERRY

DR. K. FLUG

O. HAVIV

PROF. D. IZRAELI

DR. B.Z. NAVEH

RESEARCHERS:

DR. A. HAUPTMAN

D. KOHN M. PHIL.

I. SHALEV

DR. Y. SHARAN

The Delphi process is a specialized methodology for technology forecasting.

Research and technology policy decisions and entrepreneurial innovation management require a planned, systematic, organized approach:

- that analyses the state of a technology (*technology monitoring*),
- explores its development possibilities (*technology forecast*),
- estimates the direct and indirect impacts of its application on the economy, the environment, the health system, society and other areas (*technology impact assessment*),
- assesses these impacts based on defined aims and values, compares other desirable developments and formulates activity and organization possibilities from these (innovation strategies or technology policy studies).

The Delphi survey is a way of finding ideas, forming opinions and making forecasts, which systematically screen the insights and assessments of selected specialists. The survey results are presented once, or several times, to the experts involved, to allow them to examine their views in the light of the other experts' opinions.

The survey was initiated by the Ministry of Science jointly with the Chief Scientist of the Ministry of Industry and Trade. The survey was executed jointly by the S. Neaman Institute and ICTAF of Tel-Aviv University and it covered 12 technology fields: Materials and Processing, Electronics, Information, Life Sciences, Energy, Environment, Agriculture, Urbanization, Communications, Transportation and Medical Care.

From "Israel 2020" to "Israel 2050"

THE CHALLENGE OF PLANNING THE STATE OF ISRAEL TOWARDS ITS SECOND JUBILEE

PROJECT LEADER:

Prof. Arch. A. Mazor

COORDINATORS:

Dr. A. Frenkel

L. Tangy M.Sc.

Continued activity of the "Israel 2020" Project at the S. Neaman Institute

Following the recognition of the importance of the "Israel 2020" project for formulating a global, long-term concept for Israel, and the knowledge and planning tools accumulated during this project, the S. Neaman Institute has decided to initiate the continuation of the project for the second Jubilee of the State of Israel - namely up to 2050.

Two major moves are contemplated. One is extending the horizons up to 2050. This aspect will adjust and update the rational and methodology of long-term planning and the relevant database. This requires forecasting related to population increase and forecasts of development of different infrastructures. These days the team is assembled to formulate the working plan, the methodology and update the data-base.

The second move is the advancement of projects based on regional cooperation and coordination, integrating a long-term planning approach. Here Israel's national goals will be coordinated with those of its neighbors, formulating principles for the planning stage and a policy appropriate to the target years, in order to locate the means for fulfilling an overall future regional picture. Nowadays negotiations are underway for financing of the project from European sources.

The Ministry of Regional Cooperation asked the S. Neaman Institute to prepare an inclusive cross border master plan as one of the leading projects.

CULTIVATION OF EXCELLENCE IN MATHEMATICAL TEACHING

PROJECT LEADERS:

PROF. A. BERMAN

PROF. S. GIRON

According to recently published international studies the level of mathematics in Israel s high-school system in unsatisfactory. Because of the great importance of mathematics for succeeding in science and technology, and hi-tech industries dependent on them, this phenomenon is of special concern.

Having said this it must be noted that several rather successful programs for cultivating mathematical excellence are being carried out at Israel's universities. To review these programs a one day symposium was held on the 25th of May, 2000 at the Samuel Neaman Institute for Advanced Studies in Science and Technology. Professor Avraham Berman of the Technion, Israel Institute of Technology, and Professor Shay Giron of the University of Haifa organized the symposium.

Professor Daniel Hershkowitz, Dean of Technion's Faculty of Mathematics and Mrs. Shlomit Rachmel, Director of the Department, of the Symposium for Gifted Children in the Ministry of Education welcomed participants.

Professor Bernard Finchuk described the program for preparing gifted pupils towards taking early matriculation examinations, at the Bar-Ilan University. Professor David Brandon described a similar activity at the Technion and the plans to integrated the best students of these programs in regular studies at the Technion. Dr. Benny Arbel, gave a report on the program for cultivating talented youths in mathematics at the Tel Aviv University, while Dr. Miri Amit described the activities of "Kidumatica", a mathematics club in the southern part of the country.

Professor Shay Giron described the Mathematics Olympiads project which includes national competitions and the preparations for the international Olympiad, where Israel has achieved some rather good results.

In addition to these reports Mrs. Nava Livneh gave a lecture on her research project on a 'psychometric evaluation of academic and creative levels of qualifications in mathematics', and Mrs. Tova Liebman presented her conclusions from teaching the Columbia class for gifted children at the Leo Beck high school. Eran Assaf, a pupil at the Ehad Ha'am School in Petah Tikvah, presented examples of gifted children's research activities.

THE GREEN CAMPUS

PRINCIPAL INVESTIGATOR:

PROF. Y. AVNIMELECH

PROJECT COORDINATOR:

DR. O. AYALON

The Technion, as the biggest engineering school and research institute in Israel, has a responsibility to push forward environmental education in the Technion campus, in order to "produce" a new generation of engineers and decision-makers that have a deep understanding of environmental problems.

The Technion can and should generate and demonstrate technological and conceptual solutions for many of our environmental problems, in conjunction with the former education goal.

The S. Neaman Institute took upon itself to prepare and to run a wide spectrum of activities, under a joint umbrella of a Green Campus. The plan was accepted by the Technion President and is now within the framework of the Technion.

The main objective of the Green Campus project is to change the life style in the Technion campus toward a sustainable life-style that will demonstrate environmental awareness.

During the past months we have already encouraged **waste** minimization and recycling (paper, use of reusable envelopes, plastic-bottles collection for recycling industry, collection for recycling of printers and fax machines cartridges).

The students are encouraged to participate in the project (e.g., participate in all committees, run a compost site for food waste) and in **competitions** (logo of the project, designing waste bins, water saving devices etc.).

The future plans include initiating and developing novel methods for water saving, develop and practice smart **transportation** systems within the campus, develop and practice methods for efficient **energy** production and use etc.

In order to disseminate the knowledge the "green page" leaflet is being published every other week and is available on the Technion's web site as well.

MOLECULAR EPIDEMIOLOGY OF COLORECTAL CANCER (MECC)

PROJECT LEADER:

DR. G. RENNERT

MECC is a large case-control epidemiologic study aimed at studying the causes of colorectal cancer in the Israeli population. Specifically the study is evaluating interactions of genes and environmental/behavioral exposure. Specific genes such as the I1307k polymorphism in the APC gene, and phenomena of microsatellite instability (MSI) will be sought with regard to their relation to colorectal cancer risk. 2,200 consecutive new cases of colorectal cancer will be recruited from a defined geographical area in Northern Israel. Another 2,200 controls, matched on a variety of demographic parameters, will be sampled from the general, non-affected, population. The study is expected to take about 5 years. Thus far more than 1,000 participants have already been included. This study is conducted by Dr. Gad Rennert of the CHS National Cancer Control Center at Carmel Medical Center together with Dr. Steve Gruber of the University of Michigan, Ann Arbor. Other members of the Israeli Team are Dr. Ronit Almog, Mr. Marcelo Low, Mrs Hedy Rennert, Mrs. Mila Pinchev and others.

WORKSHOP ON

"FEATURE BASED INNOVATION: A SYSTEMATIC APPROACH FOR MANAGING NEW PRODUCT DEVELOPMENT, FROM IDEA TO MARKET"

PROJECT LEADERS:

PROF. S. MAITAL

DR. H. GRUPP

S.Neaman Institute Researcher Prof. Shlomo Maital, together with his German colleague Dr. Hariolf Grupp, presented a Workshop on "Feature Based Innovation" at SNI on Sunday Oct. 29. The same Workshop was repeated in Tel Aviv, at TIM-Technion Institute of Management, on Monday Oct. 30. The focus of the Workshop was a new framework for new product development and innovation, constructed by Grupp and Maital during their two German-Israel Foundation research projects, conducted jointly under the auspices of SNI and Fraunhofer-ISI, Karlsruhe, Germany, where Grupp serves as Deputy Director. Their research, which took over a decade to complete, is compiled in a forthcoming book, to be published in December by Edward Elgar Ltd. * Contributing to the book were SNI researcher Dr. Amnon Frenkel and Fraunhofer-ISI department head Dr. Knut Koschatzky. SNI Director Prof. Arnon Bentur opened the Haifa Workshop; German Scientific Attache Dr. E. Eichenbach opened the Tel Aviv Workshop.

Among the topics covered in the Workshop:

- How to optimize incremental improvements in existing product features
- How to strategic radical improvements, that create brand-new product features
- How to use price and market data to determine the key drivers of value.

Some 30 participants attended each workshop. Grupp and Maital presented the workshop as a token of gratitude to high-tech industry, and to the many companies that assisted them in their field research. The workshop featured real-world examples including medical lasers, pressure sensors, biodiagnostic kits, gamma cameras, and wafer-cleaning equipment. Among those taking part were product development managers from: Qualcomm, Rafael (Weapons Development Authority), Haifa Chemicals, OmniPro, Chip Express, Teva, GE Ultrasound, MIND, and Nice. In the Workshop, participants engaged in hands-on activities, in which several of them constructed Feature-Based Profiles of their own products and discusssed their R&D and marketing strategies.

* Hariolf Grupp and Shlomo Maital. Managing New Product Development and Innovation: A Microeconomic Toolbox. Edward Elgar Publishing Co.: Cheltenham, UK, Dec. 2001: 339 pages.

THE S. NEAMAN INSTITUTE INFORMATION CENTER

INFORMATIONALISTS:

E. BARZANI

E. GILAD

O. MALBERGER

O. NATHAN-SHATS

The SNI Computerized Information Center was created to fulfill the information needs of the consortia working in the framework of the MAGNET program. It is based on a dedicated system, which was designed according to requirements of the S. Neaman team with cooperation of the consortia.

Information Center Goals:

- Knowledge collaboration among consortium members.
- Managing relevant internal information.
- Information supply from international databases.
- High accessibility via web interfaces.

1. Internal Information Site

Consortium's internal information includes reports of researchers and project managers. The Internet site is designated to store and retrieve all the documents produced in the consortium and allows technical administration of its activities.
The knowledge management system has a web interface. It allows friendly access for information to each user.

2. External Technical and Scientific Information Supply

The site is designated to keep consortium members updated with information published about the subjects the consortium deals with.
This information is retrieved from technical and scientific databases as well as free Internet sites. It includes standards, patents, proceedings, articles and relevant daily news.

3. Information Retrieval

Users may access information by 3 methods:
Using search engine of the knowledge management system.
Surfing via libraries and categories.
Notification by personal profile defined by each user.

Hardware and Servers

The knowledge management system is stored on a server located in NetVision, protected according to information security standards.

Security of Information

The information center site is protected by a Checkpoint Firewall. Consortium members may enter selected categories in this site, according to permission defined by consortium management.

Consortia's Open Internet Site

The open web site of each consortium is designated to publish its activities worldwide. It includes links to consortia companies and MAGNET web site.

Manpower

At present, four informationalists supply information and maintain the Information Center of the consortia published in the following pages.

DEVELOPMENT OF MAGNESIUM TECHNOLOGIES CONSORTIUM

RESEARCHERS:

PROF. E. ALTUS

PROF. M. BAMBERGER

DR. L. GAL-OR

DR. S. TAMIR

Z. KOREN M.SC

PROF. A. ROSEN

PROF. D. SHECHTMAN

PROF. M. WEISS

ACADEMIC COORDINATOR:

DR. A. ROTEM

The Israeli Consortium for Development of Magnesium Technologies was founded in 1997 to establish a generic R&D joint venture supported by the "Magnet Program".

The Dead Sea Magnesium Co. (DSM) will produce during the year 2001 over 30,000 tons of metallic Magnesium and alloys, (production started in December 1996).

The added value of magnesium can be increased significantly by the development of new handling technologies that will make new products possible or their production simpler, faster and cheaper. With the aid of the R&D of Consortium members, the Consortium forecasts that Israel will supply about 12% of all the future magnesium-based products, making DSM one of the biggest suppliers in the world.

The objective of the Consortium is the utilization of the metallic Magnesium Alloys products, through the development of Magnesium Alloy technologies

Four fields of activities of the Consortium R&D program are:

- Development of new Magnesium Alloys, properties study and "Green Technologies".
- Magnesium Casting Technologies.
- Finishing and Corrosion Protection Technologies.
- Forming, Joining and Machining Technologies.

The consortium consists of the following Israeli companies:

DSM; Rotem Ind; Ortal; Matar; Algat; Palbam; Habonim; Electrotherm. Alubin; Zika

Two Academic Institutes are also members of the consortium:

Technion, Israel Institute of Technology represented by the S. Neaman Institute, and the Israel Institute of Metals,

B.G. Negev University, represented by B.G. Negev Technologies.

THE ISRAELI SOFTWARE RADIO CONSORTIUM (ISWR)

RESEARCHERS:

PROF. Y. BE'ERI

PROF. B. Z. BOBROVSKI

PROF. M. FEDER

PROF. I. KALET

PROF. S. LITSYN

PROF. H. MESSER-YARON

PROF. D. RAPHAELI

PROF. S. SHAMAI

ACADEMIC COORDINATOR:

D. KOHN M. PHIL

SWR represents a broad array of communications techniques, which can be implemented in a wide array of products and applications. The use of common SWR hardware and software can reduce time-to-market, development cost, and unit cost of tomorrow's wireless systems. Furthermore, software upgrades can prevent premature obsolescence of these products and systems as new standards are adopted. Software radios can support multiple standards and flexibility in the quality of service.

The Consortium strives to:

- Develop and implement cost-effective generic technologies
- Reduce R&D costs and time-to-market
- Increase worldwide marketing ability
- Promote wide-ranging collaboration between Israeli companies and academic research institutes.
- Present Israeli companies as a leading international force for developing integrated breakthrough technologies and marketing advanced products.

PROJECTS

Base Station Project

Aims

- Development of base station
- Wide band (10-50 MHz)
- Very large number of users (10^2-10^5)
- Multiple sensors
- Multiple mode

Applications

- Spectrum Monitoring (Nice)
- Satellite Communication Hubs (Shiron Satellite Communications)
- Third Generation Cellular (Tadiran Telematics)
- RF Subsystems (MicroKim)

Mobile Radios Project

Aims

Development of end user station for "intermediate" information rate.

- information rate up to 2 MBPS
- Multiple mode
- Multiple purpose
- Low power consumption
- Small physical size

Applications

- Mobile Wireless Network (Tadiran Spectralink)
- Building Blocks for 3G Wireless (Galram)
- Programmable Radio (Tadiran Communications)
- DSP Platform (DSP Group)

Two academic Institutes are members of the consortium: Technion - represented by S. Neaman Institute and Tel-Aviv University represented by Ramot.

INFORMATION SUPERHIGHWAY IN SPACE CONSORTIUM (ISIS)

RESEARCHERS:

PROF. Y. AFEK

PROF. J. AZAR

DR. S. BROS

DR. Y. BIRK

DR. R. COHEN

PROF. E. HEYMMAN

PROF. R. KESTNER

PROF. H. LEVI

PROF. Y. LEVIATAN

DR. A. ORDA

PROF. A. SEGAL

DR. R. SHAVIT

ACADEMIC COORDINATOR:

J. LINHART M.SC.

A "revolution" is changing the role of satellite systems in telecommunications and international services. The satellite communication market could claim close to 10% of the total global telecommunications market by the year 2005, or nearly $100 billion. No longer well removed from the end user, satellite systems will play an increasingly critical role in providing direct access to the telecom services subscriber.
Direct-to-the-consumer satellite services will grow on a global scale, along with fiber-optic cable and wireless communications systems in a hybrid or merged information superhighway. The impact of this newly merged market will be enormous.
More than 2.5B$ (1.5B$ in 1999 alone) had been raised for the new generation of satellite-based networks (Teledesic, Astrolink, SkyBridge, Spaceway, etc.) in conjunction with massive investments carried out by the traditional satellite industries (such as Eutelsat, Astra, Intelsat, etc.), in the broadband multimedia arena.
These satellite constellations will create a "gap" between the existing and future satellite earth-stations and terminals technologies for the following main reasons:

- The new satellites will include On Board Processing, Beam Switching, Intersatellite Links and ATM switching technologies compared to the traditional "bended pipe" configuration of existing satellites.
- The new constellations will create an open, ubiquitous (large number of users and available everywhere) public network for broadband multimedia applications, compared to the existing private networks used mainly for dedicated data transfer and backbone traffic.
- Some of the new networks will include LEO satellites and K, Ka frequency bands compared to the Ku/C and L band in the existing GEO satellites.
  The new systems are targeted to the low-end consumer market compared to the industrial/high-end market of the existing satellites.

In order to close the technological gap that has arisen from the new satellite technologies and features described above, a massive R&D investment is required from the satellite industries in Israel.

The Information Superhighway In Space (ISIS) Consortium was incorporated in 1999 in order to give to the Israeli satellite communication industry a technology "step-function" jump towards the upcoming "revolution" that is changing the role of satellite systems in telecommunications and international services.

The ISIS consortium incorporated under the MAGNET program consists of eight leading satellite communication companies and three academies, cooperating in the development of generic technologies that will be integrated into low cost satellite ground terminals and the appropriate networking systems for the future space based broadband public networks.

Eight Israeli satellite companies, Gilat Satellite Networks, Orbit, Gilat Communications, Harmonic Data Systems, Scopus, Combox, Brightcom Shiron and three academic institutes the Technion, the Tel Aviv University and the Ben Gurion University joined the consortium in 1999.

The S. Neaman Institute represents the Technion and manages the consortium information center.

Overall 42 research projects (31 in the industry and 11 in the academy) are conducted under the framework of 4 maim topics: Networking and Resource Management, Indoor Units, Outdoor Units, System Integration and Test Bed.

During the two years of the consortium activity significant progress was made in all of the projects. Several design reviews took place in the 4 main topics, in which each project achievements were presented and comments and suggestions were discussed.
All the projects technical reports are stored in the consortium information center and are available to all the members. The information center also supplies and stores scientific, technological and business data related to the consortium topics.

QUARTER-MICRON TECHNOLOGY CONSORTIUM

RESEARCHERS:

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ACADEMIC COORDINATOR:

DR. D. GETZ

The 0.25 micron consortium was established towards the end of 1995 to assess critical technology showstoppers and develop solutions for the next anticipated critical manufacturing technology of below .25μ line width. A joint collaboration between industry and academia was established under Magnet with significant achievements over the 5 years of the consortium life.

Main achievements of the consortium are:

- Ability to predict the technology future direction and critical technologies accurately
- Develop leading edge technologies and beta systems and bring them into commercial use and evaluation at key customers around the world
- Acquiring and integration of complimentary state of the art technologies from third party to accelerate the completion of the consortium mission (IMEC, SMS, etc)
- Assemble high level academic researchers and industry members to work cohesively together to meet the challenge
- Ability to attract and participation of all major universities in Israel
- Establish strong working relationship between the key members of each organization involved
- Overcome major obstacles and resolve them in the most effective way
- Complete the Center Lab for Microelectronics at the Tel Aviv university

Members of the Consortium:

Industrial firms: Steag CVD Systems, Jordan Valley Applied Radiation, Ricor, Tower SC and 3T.
Academia: The Technion, The Hebrew University, Ben-Gurion University, Tel-Aviv University and The Center for Technological Education, Holon under the umbrella of the S. Neaman Institute.

LARGE SCALE RURAL TELECOMMUNICATION CONSORTIUM (LSRT)

RESEARCHERS:

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ACADEMIC COORDINATOR:

DR. D. GETZ

Large areas of today's population still have no access to basic telephone services. "The Right to Communication" is supported by the developing countries as well as international organizations such as the United Nations, the World Bank and the ITU. During the coming decade hundreds of millions of lines will have to be installed in rural areas (according to various estimates). The consortium will develop technologies that will serve as a basis for future products and innovative solutions for this market.

Vision:

Achieving advantage for the Israeli industry in the developing LSRT market. Millions of lines spread by means of Israeli technology over vast areas.

Leading companies:

The member companies in the consortium have products and technologies relevant to this market. The technologies to be developed are essential for firms seeing LSRT as part of their strategic market. The technologies developed by the companies and research teams at the universities will serve as a unique technological basis for highly integrated and modular equipment to serve for different topologies and sizes of networks.

The companies include: Telrad Networks, Gilat Satellite Networks, Breezecom.
Academic members: The S. Neaman Institute - Technion; Ramot - Tel-Aviv University, B.G. Negev - Ben-Gurion University, Weizmann Institute.

Goals:

Developing innovative technologies that will serve as basis for future products for the LSRT market. These technologies will offer a basis for an innovative solution offered to communication operators throughout the world, as a preferred global response to LSRT demands. The technologies and solutions will serve as basis for Affordable Rural Telecommunication.

Designing and developing networks including various technologies (transmission, access, allocation and control of network resources) with an ability to expand, planning for low cost infrastructure, and response to unique needs - simple installation, minimal energy consumption, easy maintenance, simple tests without need for skilled manpower.
This requires the development of:

Network architecture - models, concepts of network architecture of LSRT taking into consideration the variety of technologies, wide distribution and unique demands. This will develop architectures, protocols and required services.

Technologies and building blocks - Study and developing main building blocks for access and end equipment, in order to achieve technological basis for affordable and highly integrated modular equipment.

Allocating resources - developing systems and models to use the network resources optimally.

STREAMING RICH MEDIA MESSAGING CONSORTIUM (STRIMM)

RESEARCHERS:

DR. D. RAZ

DR. Y. BIRK

ACADEMIC COORDINATOR:

DR. D. GETZ

STRIMM, which stands for **Streaming Rich Media Messaging**, is a framework used for generating, sending, managing, delivering and playing back rich media messages. Due to the design, different machines and devices, using different operating systems, different media format and different hardware can send and receive rich media messages.

STRIMM provides the standardized technological elements enabling the integration of:

- Creating Audio and Video Messages in most common audio-video standards.
- Scalable Upload and Storage techniques for handling messages on backend servers.
- Connectivity between distributed messaging servers (over WAN).
- Transcoding and media conversion techniques and interfaces for conversion between different multimedia formats and standards.
- Streaming techniques for playback and manipulation of messages.

Consortium members:
Industrial firm: Comverse, Mediagate, GEO, VCON, Optibase, Gilat Communication, Tadiran Scopus.
Academic Institution: B. G. Negev Technologies representing researchers from Ben-Gurion University, The S. Neaman Institute at the Technion representing the researchers from the Technion.

WAFER FAB CLUSTER MANAGEMENT CONSORTIUM (WFCM)

RESEARCHERS:

PROF. Y. BARAM

PROF. A. BRUCKSTEIN

PROF. D. DORI

PROF. B. GOLANI

PROF. M. HEYMANN

DR. R. KIMEL

PROF. D. LEWIN

DR. E. RIVLIN

ACADEMIC COORDINATOR:

DR. D. GETZ

The Manufacturers of integrated circuits invest billions of dollars in process equipment, they are interested in obtaining as rapid a return on their investments as possible. With the decreasing in the critical dimension and the rise in the complexity of the IC, higher yield and shorter cycle time are essential for keeping the competitive advantage.
The ability Wafer Fabs to ensure maximal yield and device performance together with optimal OEE (Overall Equipment Effectiveness), becomes critical for their economic success. Equipment manufacturers are required to provide solutions to support these needs.
Production plans today have a single production system that controls each of the process and measurement tools separately. These are based on simple manual control where the reaction time and operator's involvement are extensive. This causes high production costs and often rejection of many components.
The complexity and cost of production in the future production plants will require solutions with shorter reaction times and higher yields. The members of consortium WFCM (Wafer Fab Cluster Management) propose to develop a novel approach to the control and production management based on control in autonomous production bays. The central production system will control autonomic production bays, which will include automatic process control systems, with minimal operator's involvement.

The Vision
Developing generic technologies to enable implementation of the concept of the control in autonomous production bays. (Autonomous Cluster Controller - ACC)

Consortium goals:

- Development the essential general technologies enabling the future implementation of the concept of autonomous production bays in photolithography and etch.
- Enhancing the use of technology developed within the Consortium in future products of a large number of firms developing and producing in Israel equipment and production solutions and tools for the semi-conductor industry.

Research topics:

- Developing essential methodologies for the implementation of the autonomous production bay ideas
- Research for understanding the critical parameters of process equipment and interrelations
- Research in analyses of measurement data
- Methodologies enabling data integration and transfer within the autonomous production bay
- Algorithms for real time wafer-to-wafer processes in production bays
- Advanced methodologies for error evaluation in measurement equipment, to establish correlation between component performance and yield.
- Generic technologies for cluster controller for various production bays
- Methodologies and software architecture for systems integrating process equipment with measurement as an overall solution for control and management of production bays.
- General communication protocols for equipment control in production bays and communication between cluster controller and the central production management systems.

Members of the Consortium:

Industrial firms: KLA-Tencor, Nova, Optum, Oramir, Jordan Valley, Intel (observer only)
Academic Institutions: The Hebrew University, Jerusalem, Ben-Gurion University, Tel-Aviv University, and The S. Neaman Institute at the Technion.

CONSORTIUM FOR INDUSTRIAL SOFTWARE TOOLS (CONSIST)

RESEARCHER:

DR. Y. RABANI

ACADEMIC COORDINATOR:

DR. D. GETZ

There is ever-growing competitive pressure on manufacturing organizations. Among the factors accelerating the competition is globalization as well as entry of third-world manufacturers into new markets. To maintain competitive advantages, many organizations have moved in the directions of compressing product development schedules, cost cutting, quality improvement, and improving manufacturing processes.

The goal of CONSIST - Consortium for Industrial Software Tools - is to develop generic software infrastructure for most, or all, software applications used in the various phases of the industrial process.

This framework will enable the development of a new generation of web-centric applications and intelligent tools delivering a quantum jump in ease of use and accessibility of production line information.

The infrastructure will be built on the solid technological foundations and proven experience of the CONSIST consortium members in the following domains:

- CAPE - Computer-Aided Production Engineering
- Optimization of processes
- Diagnostics and maintainability analysis
- Knowledge management
- Intuitive hyper-relational information navigation
- Integrating distributed systems
- CAD/CAM - Computer Aided Design/Manufacturing

The vision underlying CONSIST is developing a collection of intelligent software objects as the core of a new generation of applications managing the different aspects and stages of the industrial process. These objects will be managed intelligently at an object layer above a commercial database management system. Additionally, the infrastructure will allow quick and easy connection to other enterprise databases. Using these features will give consortium members a significant technological advantage over competitors, who will be challenged to present a modern infrastructure encompassing integrated functionality spanning CAPE, PDM, expert systems and more.

CONSIST members:
Industry: Tecnomatix Technologies Ltd., CADTECH, ESI, IET - Intelligent Electronics and TopTier
Academia: Tel Aviv University, The S. Neaman Institute (Technion) and Ben-Gurion University

DIGITAL PRINTING CONSORTIUM (DPI 2000+)

RESEARCHERS:

PROF. A. MARMUR

PROF. R SEMIAT

DR. H. ZIGELMAN

PROF. D. HORN

PROF. S. FISHMAN

ACADEMIC COORDINATOR:

DR. D. GETZ

The printing market is valued today at approximately 450 billion US Dollars, and the equipment market for it at an additional 45 billion. 20 years ago Scitex has embarked on a technological revolution related to digital preparation of layouts and printing blocks. Rapid changes in computer technologies have brought about a communication revolution and made the world a "global village", whereas the user environment became more and more individual.

Mass production and long production series characterize the 20th century. Experts foresee the forthcoming century as the century of the client - namely adjusting the product to the demands of the individual customer. The market will have to respond qualitatively and economically to smaller production series and rapid changes. This will bring about the system of "printing on demand" with personalized market segments. There is an accelerated process of change from manual preparation of material for print to advanced uses of digital methods. This process will reach its peak during the early years of the forthcoming millennium.

Digital printing technologies will have to respond to these market changes, to the point where the whole flowchart of the working process, from inception to final product, will become digital. Digital printing technologies include close connections between printing heads and types of ink.

The members of the Consortium believe that the scope of local digital printing technology products will reach 5-8 billion dollars in the years 2001-2003, when the market for ink and other printing materials will increase rapidly and will occupy an increasing percentage of the equipment market.

The consortium, an organization of ten industrial companies: Aprion Digital, CreoScitex, EVS, Indigo, Nur, Scitex, Scitex Vision (Idanit), Shira, Tower and VioNet, and five academic institutions: Bar-Ilan University, Ben-Gurion University, The Hebrew University Jerusalem, Tel-Aviv University, Technion, has defined the following objectives:

- Develop and study new technologies as a basis for developing new products, systems and perishable materials which will put the industrial members in leading positions and control of over 20% of the market.
- Create an academic research infrastructure with industrial vision, to support long-range new ideas and technologies.

Specific R&D efforts focus on the following themes:

- Digital Printing Engines
- Inks for Digital Printing Engines
- Digital Printing Workflow
- CMOS and Color Image Capture
- On-line Color and Printing Quality Control
- Electro-Optical Subsystems and Components

The S. Neaman Institute was chosen to organize the Consortium's computerized information center. The objectives of the information center are to support discussion groups, to build and maintain the central information repository and to organize seminars on printing technologies.

SEMINARS AND WORKSHOPS

1. Software Defined Radio: Migration Strategies for Wireless Systems, J. Mitola III, June15-16, 18, 2000.
2. Feature Based Innovation: A Systematic Approach for Managing New Product Development, from Idea to Market, H. Grupp and S. Maital, October 30, 2000.
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* *The list of previous publications is available separately.*

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The Royal Government of Netherlands, The Data Studies and Consultations (DATA) - Bethlehem, The Economic Cooperation Foundation (ECF) - Tel Aviv, The Environmental Protection and Research Institute (EPRI) - Gaza, Workshop: Coordinating Israeli-Palestinian "2020" and "2015", Long Term Planning", Ma'aleh Hamisha, February 6-9, 2000.

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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 main emphasis in the professional activity of the Neaman Institute is in the interface between science and technology, economy and society. Therefore the natural location for the Institute is at the Technion, which is the leading technological university in Israel, covering all the areas of science and engineering. This multi-disciplinary research activity is more important today than ever before, since science and technology are the driving forces for growth and economic prosperity, and they have a significant influence on the quality of life and a variety of social aspects.

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, organizes 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 current Director is Professor Arnon Bentur. The Institute Board of directors is chaired by Prof. Zehev Tadmor and includes ex-officio Technion's Provost. 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.

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