



Samuel Neaman Institute
FOR ADVANCED STUDIES IN SCIENCE AND TECHNOLOGY

ANNUAL REPORT 1999-2000



POLICY FOR PROGRESS



Technion - Israel Institute of Technology

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AT THE HELM

The S. Neaman
Institute Building



Mr. Samuel Neaman
The Founder



תלמוד תורה
התורה היא אבן היסוד
לכל חברה וכל עם
היא מקור החיים והשלום
והצדקה והאמת
והשלום והשלום
היא אבן היסוד
לכל חברה וכל עם

The closing year of the century was a major turning point for the Samuel Neaman Institute with a newly appointed director, chairman of the board, board of directors and advisory board, and a brand new thematic program, and a multi-focal outreach to other universities and institutions in Israel and abroad. We all feel that this year we are creating a solid foundation for our institute. A foundation strongly rooted in our significant accomplishments in our twenty year long history, and one that will jump-leap us toward new heights enabling us to play an increasingly central national role in providing scientific well-research alternatives to the policy issues facing Israel in the broad fields of science, technology, industry, economy, universities and education, natural resources and physical infrastructure.

Professor Arnon Bentur, subsequent to an exceptional service and stellar performance on Technion management as Vice President for Research accepted the appointment as Director of the Institute for a period of three years. As soon as he returned from his brief sabbatical in Boston he plunged into his new job with enthusiasm and skill and began creating the new program.

At the request of our Founder and Chairman of the Board since the inception of the Institute Mr. Samuel Neaman, I have agreed to assume the role of Chairman of the Board replacing the irreplaceable Sam. I have done so with Sam's tacit agreement that his active involvement in the daily affairs of the institute will not diminish as a result but rather increase. This is indeed the case and Sam, in his new formal role as Founder, continues his decades-long personal daily involvement in the affairs of the institute. By doing so he is practicing his own life-long philosophy professing that the friends and supporters of Israel and Technion should not only give their financial support and their heart, but should also become personally involved and invest their knowledge and life-long experience. Sam's wise and helpful advise has been and continuous to immensely valuable to the Institute and will hopefully continue for many years to come.

This year with the launching of the new Technion Governance and management we have a new Board of Directors composition with the elected Provost (and former Director of the Institute) Prof. Daniel Weihs and Prof Nadav Liron former Vice President of Academic Affairs, acting as Technion representatives.

Finally, with the completion of term of most members of the Advisory Council a new Advisory Council was appointed consisting of a truly illustrious list of names from across the country and the Technion. We consider their advice and active support as being crucial in meeting our ambitious goals. The full Advisory Council has assembled once and is scheduled for its second meeting. The Senate representatives, however, meet regularly with the SNI Director for impromptu review of our programs and consultations.



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, defines the Institute's areas of activity from which the vision and the goals of the Institute are apparent:

"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 S. 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 academic, engineering and science institution in the country, including all areas of science and engineering. This activity is more important today than ever before, as in this era 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 S. 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 other universities and other 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 and experts 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, except 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 established this year includes continuation as well as change with respect to the past. A major initiative was taken to implement a wider program in various relevant topics of the national policy, with a special emphasis on R&D policy and technological innovation. The program was initiated by the S. Neaman Institute with an aim of establishing an 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 will hopefully 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 three main areas directly related to science and technology. The following is a short overview of these areas.

1. National Science, Technology and Economy Policies

Policy studies in this area will be 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.

2. Infrastructure, environment and national planning policies

This area is of the utmost importance for a modern country. It's advancement 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.

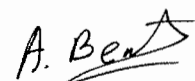
3. University education and human capital

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 (technology transfer between universities and industry).

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 Programme. The S. Neaman Institute manages the academic partners of eight active consortia, and for support it has established and operates five 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, publications and databases. The impact within the Technion will take 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

LIST OF PROJECTS

New Beginnings

8. The Samuel Neaman Distinguished Visitors' Seminar Series
9. The Science, Technology & Economy Program
12. R&D Data Center
13. Innovation and Technology Transfer
15. The Smart City: Technological Developments and Social Impact
16. From "Israel 2020" to "Israel 2050": The challenge of planning the State of Israel towards its second jubilee
17. Sustainable development of the Israeli water system and the fate of agriculture
18. Green Campus

Ongoing Projects

19. Technometric benchmarking
20. Follow-up of the immigrant population from the Chernobyl area
22. Molecular epidemiology of colorectal cancer
23. Determination of national environmental priorities
24. Towards the mitigation of green-house gas emission - policy paper
25. Standards on emission of Air Pollution: seminar.
26. OPET Israel (Organization for the Promotion of Energy Technology)
27. Technology Forecasting - Delphi Survey
28. Green architecture - Towards Sustainable Development.

29. Workshops

Consortia:

30. The S. Neaman Institute Information Center
32. Development of Magnesium Technologies Consortium
33. Software Radio (SWR) Consortium
35. Information Superhighway In Space (ISIS) Consortium
37. Industrial Software Tools (CONSIST) Consortium
39. Wafer Fab Cluster Management (WFCM) Consortium
41. Quarter-Micron Technology (0.25 μm) Consortium
42. Digital Printing (DPI 2000+) Consortium
44. Multimedia On-Line Services Technology (MOST) Consortium



THE SAMUEL NEAMAN DISTINGUISHED VISITORS' SEMINAR SERIES

Last year S. Neaman Institute has launched a special distinguished visiting seminar series. In this seminar series internationally renowned visitors of S. Neaman Institute are presenting seminars on a broad range of intellectually exciting topics relevant to the mission of the S. Neaman Institute. The seminars are presented to an invited audience only including Technion management, deans and heads of units at the Technion, the S. Neaman Institute Board of Directors and Advisory Board and special invitees. In the future these lectures will be recorded and published by within an appropriate S. Neaman Institute publication series.

Last year the following seminars were given:

1. Professor Lewis Branscomb, Kennedy School of Government, Harvard University
Lecture: **Technology Policy – The role of independent institutions**,
February 16, 1999.
2. Professor L.E.Scriven, Regents' Professor, Department of Chemical Engineering
and Materials Science, University of Minnesota, Minneapolis
Lecture: **The Emerging New Role of Multidisciplinary Research on the
University Scene**, October 10, 1999.
3. Professor Adam Jaffe, Brandeis University
Lecture: **Technology, Geography and Economic Growth - Is the world
getting smaller?** December 14, 1999.
4. Professor Michael Radnor, Kellogg Business School and Chairman, MATI
Consortium
Lecture: **Emerging prerequisites for planning and managing technology**.
March 19, 2000.
5. Professor Mark Schankerman, London School of Economics and Senior Advisor to
the European Bank for Reconstruction and Development.
Lecture: **Patent Systems and R&D Incentives**, April 13, 2000.

THE SCIENCE, TECHNOLOGY AND ECONOMY (STE) PROGRAM

ACADEMIC COORDINATOR:

PROF. M. TRAJTENBERG

This is an SNI core program dealing with SNI central mission of developing national policy alternatives in the fields of science' technology and economy. Prof. Manuel Trajtenberg heads the program, which includes 7 researchers. 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, with the opening of the present academic year. The program consists of the following interrelated "modules":

Research projects conducted by members of the group.

Monthly seminars.

Visitors from abroad.

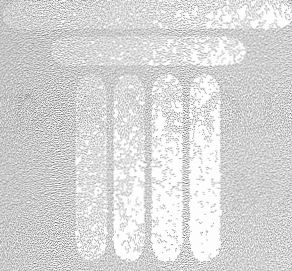
The development of a data center.

"Outreach" activities.

Research Projects

There are at present 4 research projects under way, conducted by researchers from 3 major universities (Hebrew University, Tel-Aviv and Haifa), and from the Research Department of the Bank of Israel. These projects constitute the core of the STE group, and provide the academic platform for most of the other activities:

- 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"

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

The proposals for the projects were presented to the STE group and discussed extensively. Preliminary results are scheduled to be presented at the June monthly meeting.

Monthly Meetings

A group of Technion Professors (Shlomo Maital, Daniel Shefer, Daniel Czamansky, Miriam Erez) meets once a month at the S. Neaman Institute, and the meetings usually consist of the following activities: a 2-hour academic seminar; an organizational meeting; meeting of the data steering committee. Thus, these meetings usually last half a day. The academic seminars so far have been:

- Presentation and discussion of research proposals from members of the group (2 meetings).
- Seminar by Prof. Mark Schankerman (London School of Economics): "Stylised facts of patent litigation."
- Seminar by Arie Bregman (Bank of Israel), and Simcha Bar Eliezer (Central Bureaus of Statistics): "Spillovers in Israeli Industry".

Visitors from abroad

Within the framework of the program two visitors were invited: Prof. Adam Jaffe from Brandeis University and the National Bureau of Economic Research (December 1999), and Prof. Mark Schankerman from London School of Economics, UK (January 2000). The visits of both Jaffe and Schankerman were very successful, both in terms of their delivering interesting talks, and in the fact that they had fruitful interactions with members of the group as well as with outside faculty.

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 on Haim Regev, the former Associate Director of the Central Bureau of Statistics, took upon himself to do that, with the aid of a steering committee. The Center activities are described in a separate report.

Outreach Activities

Three kinds of outreach activities were undertaken: the first consists of giving talks to groups outside the STE group, that are interested in those topics; the second is to interact with outside professionals, in ways that may be beneficial for both; the third is policy oriented interactions.

As to the first, the main activity has been so far to give lectures to a forum of Deans and heads of Research Centers at the Technion. Adam Jaffe gave the first such lecture in December 1999, Mark Schankerman delivered the second one in April. The second one in April and there will be at least one more later in the spring.

Within the realm of the second type of outreach, a forum was established consisting of 6 Technion Professors (Gidon Uretzky, Oded Shmueli, Ehud Keinan, Moshe Eizenberg, Rafael Rom and Uri Sivan) in a variety of disciplines (Engineering, Science and Medicine), and 4 members of the STE group. The goal is to develop a dialogue that will be beneficial to both: for the STE group the idea is to learn from them about the “real stuff” of R&D (particularly about the “R”) and spillovers. For the outside faculty the benefit would be to learn about the Economics of Science and Technology, in ways that may help them think about the economic impact of their own research, and provide them with tools to develop comprehensive Research programs. The first meeting in January 2000 was quite successful, but it became clear that in order for such a dialogue to succeed, (i) both sides have to benefit in a clear way (it cannot be one-sided), (ii) there is a need to make sure there is a “common language”; (iii) a proper communication mechanism must be formulated. Reflecting those prerequisites, it was decided that there will be two “modes” of meetings. At first the economists will present short talks on basic economic concepts and modes of thinking about the issues of common interest (e.g. growth, productivity, R&D spillovers, financial aspects of these, etc.), followed by discussion. For the second “mode” the economists will submit to the scientists and engineers “lead questions” reflecting the economists interests, followed by short talks responsive to those questions, reflecting experience of the scientists and engineers.

The third type of outreach consists of providing direct inputs into the policy making process in Israel. Two members of the group, Morris Teubal and Manuel Trajtenberg, are currently involved in discussions with a team lead by the Minister of Industry and Trade, Ran Cohen, on the design of a coherent R&D policy for the near future, including a revision of the 1985 R&D Law. In addition, Trajtenberg is involved in similar efforts with the Office of the Prime Minister.



THE RESEARCH DATA CENTER

ACADEMIC COORDINATOR:

H. REGEV

The main scope of the 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 the economy, within the framework of the Samuel Neeman Institute. In its first stage the data center will cover four main areas:

- 1. Publication of Statistical Data.** The center is building an internet site that will include all the relevant published data in the field. The basic unit is a publication, or a part of a publication, which includes tables, the meta-data (methods and definitions) and a short description of main findings. Every table is a separate file and the user can download it to his computer as an excel file and use it in his research. Up to now 8 publications were received from the Central Bureau of Statistics (CBS) and were captured in the site.
- 2. Industry Level Data Files.** The center will also include files with detailed non-confidential data at an industry level. The first file is based on the CBS industrial statistics for the years 1990-1994. The file includes also the R&D data and can be used to estimate different models, such as production functions. The file was already used by two researches from the Bank of Israel and the CBS in a study of spillovers.
- 3. CBS Research Rooms.** The modern empirical research needs data at a firm, or even more detailed, level. This kind of data is usually confidential and can be used for research only by authorized researchers, in the CBS offices and following special rules that are imposed by the Statistical Law. The Research Data Center recognizes the importance of this kind of research and will try to promote it and assist researchers by:
 - Stimulating the creation of new research files at the CBS;
 - Encouraging the opening of research rooms in the main campuses or at least in the CBS regional offices;
 - Promoting and helping research which is based on individual data statistical data for the OECD and other countries that will facilitate international comparison.

Haim Regev, former associate director of the CBS, is in charge of establishing the Center, in cooperation with a steering committee of the STE Program.

I NNOVATION AND TECHNOLOGY TRANSFER

RESEARCHERS:

PROF. A. BENTUR

DR. A. FRENKEL

DR. D. GETZ

PROF. D. SHEFER

PROF. A. SEGNER

Innovation resulting from scientific research and technological developments has become a key element in the growth of modern economies. Therefore, the prosperity and well being of a modern country depends on its ability to develop know-how through R&D and mobilize it into a commercial product or process. The mechanism by which this mobilization occurs is a complex one and can not be modeled simply by the linear approach which assumes that once know-how is developed through research it will spontaneously diffuse into the industry. The process is quite complex and involves a variety of interactions between academia, research institutes, industry and government. Thus, scientific know-how is only one element, though important one, in the process of innovation, and in order to effectively utilize it and develop it into a commercially viable entity there is a need for an effective system of technology transfer which will involve all the above mentioned organizations and institutions. In order to develop effective policies of technology transfer, to optimize the potential of scientific know-how, there is a need to understand the processes and interactions involved.

S. Neaman Institute took upon itself to study this area and develop models for technology transfer at a variety of levels: between academia and industry and within industries, in particular with respect to small and medium enterprises (SME). A comprehensive research program is also being established now by the Science Technology and Economy (STE) group and the S. Neaman Institute, which will address three main issues: R&D spillovers, commercialization of university technology transfer and R&D financing of the technology transfer. In the studies on university technology transfer special attention will be given to the balance and interaction between commercialization and traditional roles of the university of advancing the frontiers of knowledge through basic research and teaching.



The projects underway and submitted proposals are as follows:

- University Technology Transfer (supported by the Israeli Ministry of Science).
- Israeli Financing Innovation Schemes for Europe (supported by the European Union 5th framework R&D Program).
- University-Industry Relations in Israel.
- Innovation Enhancement in Industry through New Procedures of Technology Transfer from Universities.
- Technology Transfer Tools for SME's.
- Benchmarking the Extended Enterprise and Innovation Success in Small Firms.

THE SMART CITY: TECHNOLOGICAL DEVELOPMENTS AND SOCIAL IMPACT

Recent developments in information technologies – particularly with regard to the Internet – are beginning to have a significant impact on a wide range of human needs. This project focuses on developments in information technologies and their impact on urban populations. Providing a wide range of services to an urban population represents a particularly important challenge facing those elements – whether commercial or governmental – whose business it is to make such services available. The development of the Internet and other forms of information technology has made it possible to offer a wide range of services through the use of such tools. The use of information technologies has the potential to greatly increase the efficiency and quality of services made available by local providers.

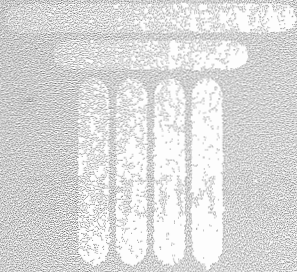
The “Smart City” can be defined as a city or town in which an information infrastructure has been created and in which a sizeable number of activities engaged in by the residents are carried out online or through the use of other information technology tools. This project will focus on five aspects of life in the Smart City: 1) Electronic Commerce, 2) Tele-work, 3) Tele-medicine, 4) Electronic Municipal Government, 5) Electronic Education.

Few studies exist with regard to the social impact – that is, the effect on the end-user, the municipal resident – of the use of such technologies. There is also a dearth of studies that focus on the composite effect on the urban population of the provision of services in these five areas.

The Samuel Neaman Institute has assembled a team of researchers from the Technion and beyond to focus on each of these aspects as well as the combined effect of the use of information technologies on the urban population in each of these areas. The Institute is also pursuing cooperative relationships with a number of Israeli cities that are planning to, or are in the process of, providing online services to their residents.

The goal of this project is twofold: to produce a high-quality study of an issue which has so far been explored primarily by interested parties – such as businesses – in order to reach objective conclusions with regard to the extent to which such technologies are changing people’s lives and, secondly, to produce a series of policy recommendations for Israeli central and local governments with regard to the utility – in terms of the public’s interest – in providing particular types of services through the use of information technologies.

The Steering Committee for establishing the project and the specific research avenue include experts from SNI, the Research Center for Work Safety and Human Engineering, the Faculty of Architecture, Haifa University and the Open University.



PROJECT LEADER:

PROF. A. MAZOR

COORDINATORS:

DR. A. FRENKEL

L. TANJI, M.Sc.

FROM "ISRAEL 2020" TO "ISRAEL 2050"

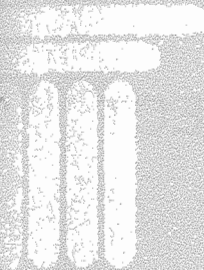
THE CHALLENGE OF PLANNING THE STATE OF ISRAEL TOWARDS ITS SECOND JUBILEE

Continued activity of the "Israel 2020" Project at the S. Neeman 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. Neeman 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 database.

The second move is a project 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.



SUSTAINABLE DEVELOPMENT OF THE ISRAELI WATER SYSTEM AND THE FATE OF AGRICULTURE

PROJECT LEADER:

PROF. D. ZASLAVSKY

The original motive for the workshop came from a report prepared by Prof. Dan Zaslavsky from Israel, The Technion, Israel Institute of Technology, formerly the Water Commissioner for the State of Israel.

During early 1996, Raphael Eitan - former Minister of Agriculture and the Minister of Environment, asked Prof. Zaslavsky to prepare a presentation on the water system, its state and future developments. Several drafts were prepared and were distributed over the years with responses from many experts. He was worried about the fate of agriculture in Israel.

A very grave picture was drawn with threatening developments in terms of water quantities and qualities. The issue and the report were brought eventually to administrative consideration.

Unfortunately, concrete steps were not taken.

The final report, completed in May 1999, was issued by the S. Neaman Institute and distributed to some 150 water experts, to all Knesset members and other interested parties. Two follow-up actions were taken:

1. Presentation before the Knesset Comptrolling Committee with the participation of the State Comptroller.
2. Organization of a workshop at the S. Neaman Institute. Over 90 top professionals participated in the workshop.

As a result of this effort the Water Commissioner, on his way out at the end of this turn, adopted the main conclusions of the report.

Finally, the budget division of the Ministry of Finance, after reconstruction of past objectives seems to agree to the first 100 million cubic meters sea water desalination.

The main conclusions of the workshop are summarized below:

- By and large, there is no material difference of opinions between the experts, with the exception of one subject which is the water allocation for farming and the use of price as its main tool.
- There are minor differences about certain quantities. It seems that the return to wide scope and long term planning will eliminate even these differences.
- The common opinion was that there is a continuous deterioration in:
 - R & D investment;
 - planning efforts;
 - clear definition of responsibilities;
 - professional level of discussions.



GREEN CAMPUS PROJECT

PROJECT COORDINATOR:

PROF. Y. AVNIMELECH

The Technion, as the biggest engineering school and research institute in Israel, has a responsibility to advance the environmental case.

Israel faces critical environmental issues: Drinking water quality has to be protected; breathing clean air cannot be taken for granted; planning and preservation of nature and open space are critical issues in a dense, growing and developing country, etc.

Engineering can worsen the situation if development, industrialization and planning ignore the environment. On the other hand, only good science and engineering can help and enable the mutual coexistence of sustainable development and environment. There is a need to strongly emphasize the critical environmental issues in the education of our future scientists and engineers, R&D activity in the Technion and to change the life style accordingly.

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. Planned activities include developing, testing and demonstrating water saving devices essential to Israel's struggle with the decreased water supply (project run in cooperation with the Water Commissioner), sophisticated recycling etc.



T ECHNOMETRIC BENCHMARKING

RESEARCHERS:

DR. A. FRENKEL

DR. H. GRUPP

PROF. S. MAITAL

During 1999, a decade of research on “technometric benchmarking” – interfirm and intertemporal comparison of technological quality based on quantifying product features – was brought to conclusion. The research was funded by the German-Israel Foundation and was sponsored jointly by the S. Neaman Institute and Fraunhofer-ISI.

A book titled *Managing New Product Development & Innovation* was completed¹ and is under review by a leading publisher. The objective of the book is to supply an integrated operational set of tools for managing innovation, from the inception of the idea through product design, production and marketing.

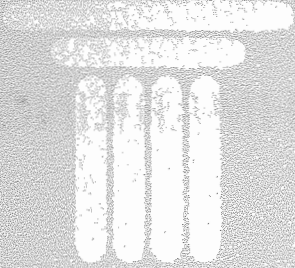
The book’s 15 chapters are comprised of nine previously-published or forthcoming papers and six chapters prepared during 1999. Among the newly-written chapters are:

- “Innovation Investment as Doors to the Future: A Real Options Approach”;
- “Estimating the Value of Brand Names: A Data Envelopment Approach”;
- “Sensor Technology: A Dynamic Assessment”.
- “The Relation Between Perceived Innovation and Profitability: An Empirical Study of Israel’s Largest Firms”

Grupp presented the paper on “Estimating the Value of Brand Names” at the I.A.M.O.T. Conference in Florida, Feb. 20-24, 2000.

A Workshop is being planned, at which scholars and R&D project managers will meet to learn and discuss the set of tools developed in this project.

¹ *H. Grupp and S. Maital. Managing New Product Development: A Microeconomic Toolbox. S. Neaman Institute for Advanced Studies in Science & Technology, Technion, Haifa, ISRAEL: 2000. 336 pages*



FOLLOW-UP OF THE IMMIGRANT POPULATION FROM THE CHERNOBYL AREA

RESEARCHERS:

N. BAR YOSEF,

D. REISFELD, MPH,

H. RENNERT, M.P.H.

G. RENNERT, M.D., PH.D.

S. SHAPIRO, M.D.

The aim of this activity is to evaluate the magnitude of health effects possibly attributable to radiation exposure following the accident at the Chernobyl nuclear reactor.

Our studies involve immigrants to Israel from areas in the former USSR, where increased Cesium 137 levels were measured following the 1986 accident in the Chernobyl nuclear reactor.

Three different activities are taking place:

1. A study of a group of immigrants from the exposed area who volunteered to provide data to the study center (ICHES). The number of participants accrued is about 12,000. All participants provided self-reported information on their exposure and on their health status before and after the accident. In 1998 a follow-up activity was taken, and 1,800 of the original participants have complied and provided new data. The physicians of these participants also provided confirming information.

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

A very high rate of self-reported medical complaints is evidenced among the study group. These mainly include various thyroid problems but also benign and malignant tumors. These self-reports are currently being validated by the primary care physicians.

2. A study of children from the Chernobyl area (USAID). Children are known to be more sensitive to the effects of radiation than adults. Eligible are people who were in-utero or up to the age of 5 years at time of the accident, and who resided in the exposed areas. These children and a control group of unexposed children of parallel size are offered a complete physical examination with emphasis on physical and sexual development, blood tests, and psychological questionnaires to be filled-up by



both child and mother. Thus far 637 exposed children and 701 children from the control group have been tested.

3. A study of the clean-up teams (liquidators). This group has received the highest exposure to radiation. More than 800 of them have immigrated to Israel and 734 of them have already been examined. All of the liquidators are being evaluated for prevalence of chronic diseases. Based on our experience, the Ministry of Health has assigned our unit to be the follow-up clinic after this population in accordance with the decision of the Ministerial Committee for Immigrant Absorption.



MOLECULAR EPIDEMIOLOGY OF COLORECTAL CANCER

RESEARCHERS:

M. LOW, M.P.H.

M. PINCHEV, M.D.

H. RENNERT, M.P.H.

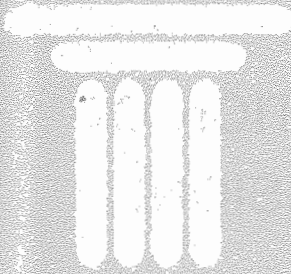
G. RENNERT, M.D., PH.D.

This is a population based case-control study that examines the contribution of genetic sequence variation and environmental factors, as well as the interaction between them, to the development of colorectal cancer (CRC).

It is an international collaborative study with the University of Michigan that was started in 1999 and will be carried out over a five year period. The study population will include 2,500 newly diagnosed patients with colorectal cancer and 2,500 matched controls from the general population. The cases are recruited from five general hospitals in the north of Israel (Rambam, Bnei-Zion, Carmel, Haemeq and Naharia) that cooperate in this research.

All participants are interviewed and a blood sample for the molecular analysis is drawn from each of them. The study questioner covers information concerning lifestyle, family history of cancer, medical conditions and dietary habits. The molecular tests will include the GSTM1 and NAT2 polymorphism and the APC I1307K mutation which is a susceptibility outlet for colorectal cancer, recently identified among individuals of Ashkenazi Jewish descent.

Thus far 728 cases and 250 controls were recruited.



DETERMINATION OF NATIONAL ENVIRONMENTAL PRIORITIES

PRINCIPAL INVESTIGATOR:

PROF. Y. AVNIMELECH

RESEARCHERS:

O. AYALON, M.Sc.

M. BEN-MEIR

PROF. Y. COHEN

DR. B. FLICKSTEIN

DR. A. MARKADO

PROF. D. MAHALEL

D. MORGENSTERN

DR. M. RAVIV

DR. R. SCHERF

PROF. G. SHELEF

The preservation of national environment encompasses a very large number of areas, but the national resources (manpower and budget) that can be devoted to this objective are, per force, limited. Israel must, therefore, determine the environmental issues that are more urgent or important than others, and prioritize the dedication of resources accordingly.

The Israel Economic Forum for the Environment, a voluntary consortium of industries, businesses and the "green" organizations, has joined S. Neaman Institute in a collaborative effort to investigate the relative importance and urgency of the environmental issues and to formulate a set of national priorities in dealing with these issues.

More than 10 scientists and engineers, each a noted expert in his field, were charged with developing a set of priorities in the areas of water, air, solid waste, hazardous waste, transportation, urban planning, nature and open space, marine environment, and agricultural systems. Each of the above areas was reviewed by about 10 more experts, so as to develop an accepted and well balanced environmental policy.

The final report was issued in March 1999. A concise version of this report was sent to the various political parties, recommending the inclusion of the findings in their programs toward the forthcoming elections. A national conference, the biggest yet in the field of the environment was convened in November 1999. Government, industry and public delegates discussed the contents of the document. Ms. Dalia Itzik, the Minister of the Environment attended and addressed the meeting.

TOWARDS THE MITIGATION OF GREEN HOUSE GAS EMISSION: POLICY PAPER

PROJECT LEADER:

PROF. Y. AVNIMELECH

RESEARCHERS:

ENERGY:

PROF. G. GRADER

PROF. E. KEHAT

PROF. A. SHAVIT

PROF. D. ZASLAVSKI

TRANSPORTATION:

DR. Y. SHIFTAN

DR. L. TRATAKOVSKY

PROF. Y. ZVIRIN

INDUSTRY:

PROF. C. AHARONI

PROF. G. GROSMANN

PROF. E. KEHAT

BUILDINGS CLIMATE:

PROF. R. BECKER

PROF. E. SHAVIV

AGRICULTURE & OPEN SPACE:

PROF. G. MANOR

SOLID WASTE AND WASTE

WATER:

O. AYALON, M.Sc.

ENVIRONMENTAL ECONOMY:

PROF. M. SHECHTER

DR. N. BECKER

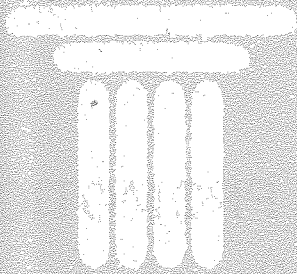
ENVIRONMENTAL CHEMISTRY:

PROF. Y. OREF

The Kyoto convention on the Preservation of the Environment is a binding undertaking by all the developed (industrial) countries to reduce their emission of greenhouse gases to prescribed levels. The Ministry of the Environment intends to submit a National Policy Paper on the reduction of greenhouse gases emission in Israel between now and the year 2050. The Ministry has commissioned S. Neaman Institute to catalogue the sources and propose ways and means to reduce these emissions.

A team of Technion and Haifa University experts was retained to conduct the survey and to propose a national policy.

A draft of the policy paper was submitted to the Ministry of the Environment and it is hoped it will serve as a basis for national policy.



S TANDARDS ON EMISSION OF AIR POLLUTANTS: SEMINARS

ORGANIZING COMMITTEE:

PROF. Y. AVNIMELECH

ING. D. KOHN M. PHIL.

ADV. T. LEVINSON

The Samuel Neaman Institute together with the environmental committee of the Israeli Bar has established a tradition of organizing and holding one-day long seminars in contemporary issues involving Law and Environment. These seminars are intended to provide a forum for the free exchange of information and opinions that will be of value to professionals in government, industry, "green" NGOs and to independent advisors.

The first seminar was held on March 4, 1998 and dealt with **Emissions Standards to Air and Water**. This was soon followed on December 10, 1998 when we discussed **Emissions Survey of Effluent and Air Pollutants**.

On January 1, 2000 we held a seminar on voluntary-contractual mechanisms for the advancement of environmental goals entered into by authorities and industry. The two years that passed since the signing of two such mechanisms – the Treaty in the national level and the Kyoto Protocol in the international arena – laid the background for these seminars that were a source for both lessons learned and precursors of trials to overcome.



OPET ISRAEL (ORGANIZATION FOR THE PROMOTION OF ENERGY TECHNOLOGY)

STEERING COMMITTEE:

Y. ASIA

PROF. A. BENTUR

A. EINAV

M. SHATON

DR. Y. SHARAN

RESEARCHERS:

D. KOHN, M. PHIL

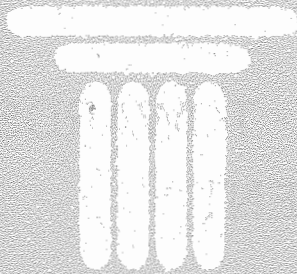
E. SINGER, B.SC

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 academy), 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 data-base on the Israeli Energy Sector, including academy, industry and government.



TECHNOLOGY FORECASTING: DELPHI SURVEY

STEERING COMMITTEE:

DR. D. HASELKORN, CHAIRMAN

DR. O. BERRY

O. HAVIV

PROF. D. IZRAELI

DR. K. FLUG

DR. B.Z. NAVEH

RESEARCHERS:

D. KOHN, M. PHIL

I. SHALEV, B.SC

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 is executed jointly by the S. Neaman Institute and ICTAF of Tel-Aviv University and it covers 12 technology fields:

Materials and Processing, Electronics, Information, Life Sciences, Energy, Environment, Agriculture, Urbanization, Communications, Transportation and Medical Care.



GREEN ARCHITECTURE - TOWARDS SUSTAINABLE DEVELOPMENT

PROJECT LEADER:

PROF. E. SHAVIV

Sustainable development means planning aiming at the preservation of natural resources. Such development does not relate to individual houses but to the whole residential environment, the settlement or the town, and directly affects quality of life.

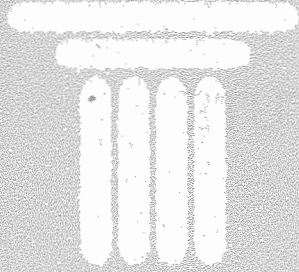
Development which ignores the conservation of natural resources influences the hot-house effect caused by the emission of hot-house gases. According to current data, the partial contribution of climate and lighting of buildings to the emission of hot-house gases in Israel amounts to a third of the total emissions from other sectors. Over the next two decades the areas for building houses and offices will double. As a result emission in the building sector in Israel will increase up to 50%.

Therefore energy saving in buildings has a significant potential to help reduce emission of hothouse gases in Israel.

In green architecture the building is not only a shelter, but becomes a system operating towards the achievement of thermal comfort at a minimum energy waste. Such architecture is environmental, using minimal natural resources and is completely harmless.

Various technologies enable building in a manner which enables considerable energy saving for heating, cooling and lighting buildings. This saving helps conserve the environment and is economical for the building users.

The center for research and development at the Faculty of Architecture and Town-Planning at Technion organized a seminar and an international exhibition on the subject of **Green Architecture - towards sustainable development**. The goal was to make planners in Israel aware of the advanced technologies for conservation of energy in buildings. The exhibition and seminar presented theories, solutions and planning tools for energy saving while achieving maximal comfortable thermal conditions in the building, the street, the square of the town. These are the most state-of-the art solutions in Israel and the world. The S. Neaman Institute was one of the sponsors for these activities.



WORKSHOPS

1. CDMA – An Introduction to Third Generation Cellular Systems, June 3, 1999.
2. Selected Items in Computer Communications, October 17, 1999.
3. Software Radio Hardware Problems, November 2, 1999.
4. Sustainable Development of Israeli Water System, December 15, 1999.
5. Standards of Emission of Air Pollutants, January 1, 2000.
6. MMIC Workshop, March 13-15, 2000.
7. Green Architecture, May 3, 2000.



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.

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 allow technical administration of its activities. The knowledge management system has a web interface. It allows friendly access for information to each user.

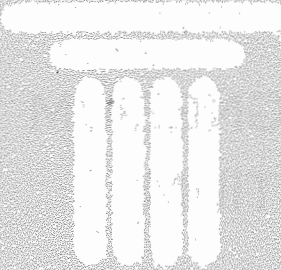
External Technical and Scientific Information Supply

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.

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

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 2000 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; Haborim; Electrotherm.

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.



SOFTWARE RADIO (SWR) CONSORTIUM

RESEARCHERS:

PROF. I. BAR-DAVID

PROF. Y. BE'ERI

PROF. B.Z. BOBROVSKI

PROF. M. FEDER

PROF. N. MERHAV

PROF. H. MESER-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

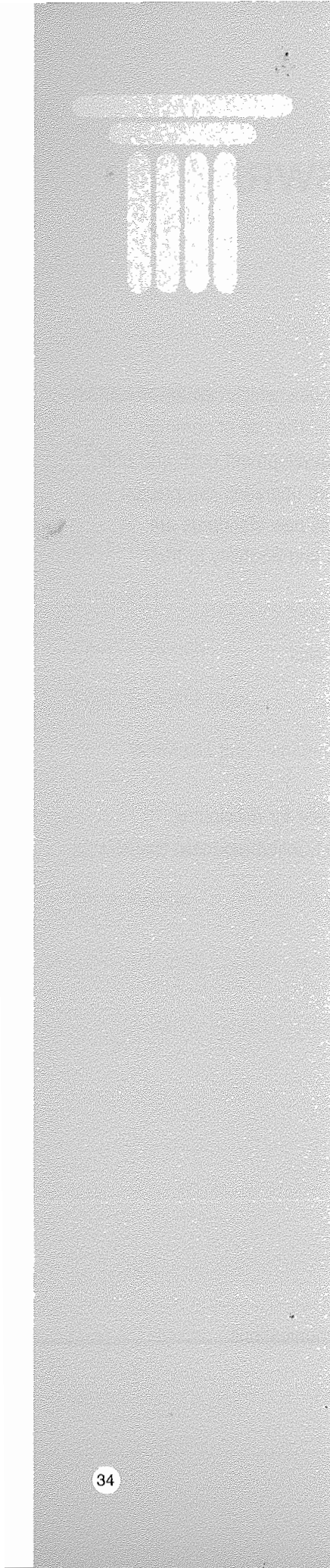
Base Station Project

Aims

- Development of base station
- Wide band (10-50MHz)
- Very large number of users (102-105)
- 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

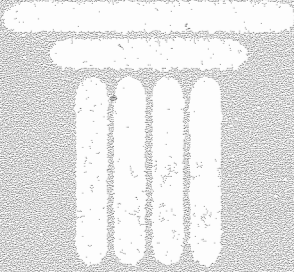
Development of end user station for “intermediate” information rate.

- 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 Communication)
- 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 (ISIS) CONSORTIUM

ACADEMIC 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

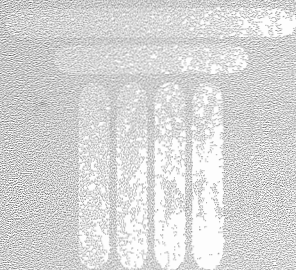
A "revolution" is changing the role of satellite systems in telecommunications and international services. The satellite communication market could claim close to 10% of the total global telecommunications market by the year 2005, or nearly \$100 billion. No longer well removed from the end user, satellite 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 main topics: Networking and Resource Management, Indoor Units, Outdoor Units, System Integration and Test Bed.



INDUSTRIAL SOFTWARE TOOLS (CONSIST) CONSORTIUM

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.

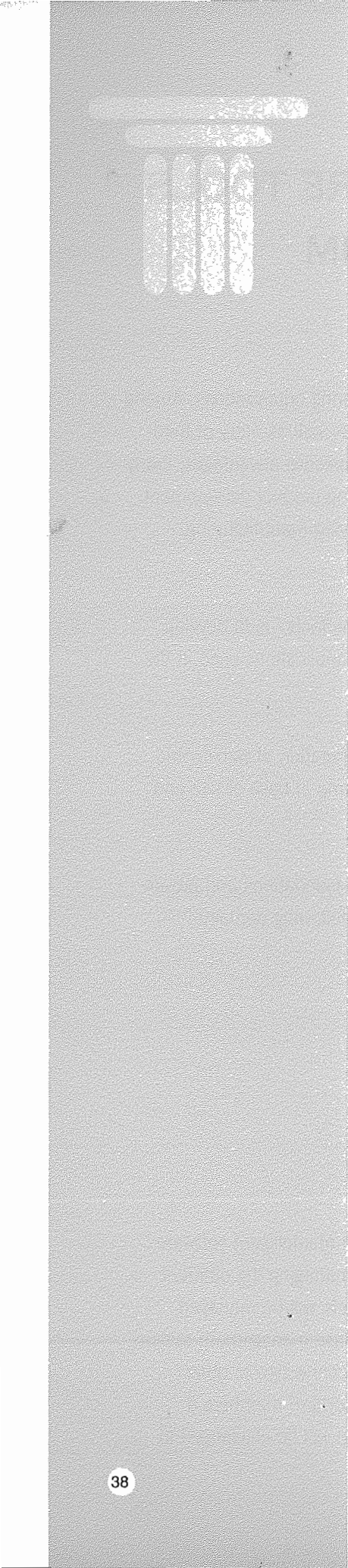
The goal of CONSIST - Consortium for Industrial Software Tools - is to develop generic software infrastructure for most, or all, software applications used in the various phases of the industrial process.

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

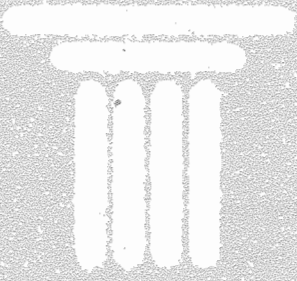


present a modern infrastructure encompassing integrated functionality spanning CAPE, PDM, expert systems and more.

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



WAFER FAB CLUSTER MANAGEMENT (WFCM) CONSORTIUM

RESEARCHERS:

PROF. Y. BARAM

DR. D. BRACHA

PROF. A. BRUCKSTEIN

PROF. B. GOLANI

DR. Y. HAMLINIZKI

PROF. M. HEYMANN

DR. R. KIMEL

DR. M. LINDENBAUM

DR. M. MESIN

DR. E. RIVLIN

DR. A. SMILOVIC

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 decrease 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, InSyst, 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.



QUARTER-MICRON TECHNOLOGY (0.25 μM) CONSORTIUM

ACADEMIC RESEARCHERS:

DR. S. BERGER

DR. R. EDREI

PROF. E. FINKMAN

PROF. A. FRUCHTMAN

PROF. D. GERSHONI

PROF. Y. HAAS

PROF. A. HOFFMAN

PROF. Y. NEMIROVSKI

PROF. J. SALZMAN

PROF. Y. SHACHAM

PROF. J. SHAPPIR

DR. I. SHECHTER

DR. D. SPECTOR

PROF. Y. YACOBY

PROF. A. ZIEGLER

ACADEMIC COORDINATOR:

DR. D. GETZ

The technologies of QUARTER MICRON are a milestone in the production of integrated circuits, paving the way to the production of circuits in Ultra-Scale-Integration (ULSI) technology at quarter micron and smaller scale. The Integrated Circuit industry development is limited by performance of the equipment for processing and for inspection.

The consortium for 0.25 μm technology was established to answer the need for R&D pre-competitive, generic technologies for integrating industry and academia in order to build an infrastructure that will support both existing and future IC processing and inspection equipment manufacturers in Israel. Another objective of the consortium is the successful commercialization of future products resulting from the development programs of the consortium.

The industrial members of the consortium are AGI, Jordan Valley Applied Radiation, Ricor, Tower, and 3T. The academic members consist of the Technion, the Hebrew University, Tel-Aviv University and The Center for Technological Education, Holon, under the umbrella of the S. Neaman Institute. All these parties joined together in the effort to develop the desired generic technologies.

1998 was the third year of the consortium activity. During this year the joint central laboratory of the Consortium was established at the Tel-Aviv University and new research projects were started in the academia. The central lab will serve all the researchers in the consortium and support the members' research and development activities. Both MAGNET and the industrial members fund the central lab.

Joint projects of the industries and the academia were originated and the close industry-academia R&D ties resulted in technological achievements. The Consortium's information center, managed by the S. Neaman Institute, has been fully computerized to enable the sharing of consortium-generated information and know-how, as well as the supplying of technological and business information services by the S. Neaman team to the consortium members via a private network.

The consortium held a workshop and an annual conference at the S. Neaman Institute, devoted to the presentation of results of the research done within the framework of the consortium. A web site presenting the consortium mission and activities can be found at the following address: <http://www.025micron.org.il>

DIGITAL PRINTING (DPI 2000+) CONSORTIUM

TECHNION RESEARCHERS:

PROF. A. MARMUR

PROF. R SEMIAT

ACADEMIC COORDINATOR:

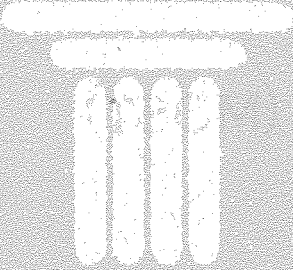
DR. D. GETZ

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 six industrial companies: Scitex, Idanit, Indigo, Tower, Nur, and Shira, 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.

MULTIMEDIA ON-LINE (MOST) TECHNOLOGY SERVICES

TECHNION RESEARCHERS:

PROF. A. AVERBUCH

PROF. A. BAR-NOI

DR. I. BEN SHAUL

DR. Y. BIRK

PROF. I. CIDON

DR. R. COHEN

PROF. M. HEYMANN

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PROF. S. NAOR

PROF. D. PELEG

PROF. S. PELEG

DR. E. RIVLIN

PROF. A. SEGAL

DR. I. SHIMSHONI

PROF. A. SIDI

DR. A. TAL

PROF. S. ULLMAN

ACADEMIC COORDINATOR:

DR. D. GETZ

The MOST consortium is an organization of more than 20 Israeli hi-tech companies and about 20 academic research teams who cooperate to advance the state-of-the-art in Multimedia On-line Services Technology in Israel. With a total budget exceeding \$100 million and more than 350 developers on board, the MOST consortium is determined to deliver new levels of integration and breakthrough cost/performance ratios to the world of multimedia on-line services technology market.

Mission

“The MOST Consortium is developing technologies that will change the Internet from its current state of a huge text and graphics information repository into a real-time, collaborative multimedia tool”

Real-time: The Internet today is mainly a tool for storing information for later retrieval. MOST develops technologies for the next generation Internet, that will support high quality live video, video and data conferencing and other types of real-time interactions in an affordable manner. Real-time also applies to information delivery, where push techniques combined with intelligent filtering, shorten the time between the creation of an information item and its being delivered to the interested user.

Internet-based collaboration: Tools and applications developed by MOST will support new types of interactivity among members of on-line communities. Live online technologies that automatically identify who is available on-line, direct voice and video chat among members and video-rich presentations and live broadcasts, are among the targets of the MOST Consortium R&D.

Multimedia-ready infrastructure: MOST infrastructure technologies bring broadband, and continuous connectivity to homes and small businesses based on technologies such as ADSL, VSAT and Wireless Access Networks. From highly developed countries demanding Fast Internet to rural areas of developing countries, MOST can provide broadband connectivity at a truly competitive price.



Research Projects Conducted by MOST Members

MOST approaches the challenge of multimedia delivery over the WEB in a unique way, which combines infrastructure and software development under the same framework. Advanced implementations of communications and multimedia technologies, optimized for the future Internet, are being integrated to provide effortless system solutions that emphasize cost-effectiveness and ease of deployment.

Specific R&D efforts focus on the following themes:

- Real-time streaming of audio and video content over broadband networks
- Advanced authoring and coding of 2D, video and 3D graphical information for Fast Internet environment
- Integration with virtual-community servers and efficient handling of security and navigation at Fast-Internet rates.

The MOST Consortium members represent a unique mix of innovative young startups, recent success stories of the Internet boom and some of the most experienced and powerful Israeli high-tech companies. The broad range of technological background of the members allows new prospective technologies to be developed with regards to market potential, associated problems and possible effective solutions. The consortium expanded from an initial structure of 6 high-tech companies to become one of the largest alliances in Israel's high-tech industry.

The MOST Lab and Demo Site

As part of its activities, the MOST consortium has established a state-of-the-art Internet Communications Center, that serves as a test lab and demo facility for the Consortium's and other Internet technologies. The Center hosts a range of application servers that connect several test communication infrastructures, via leased lines of fast IP or ATM backbone.

At the Lab, multimedia authoring workstations create demo content and control a range of applications, such as virtual community centers, multi-user games, auto-published multimedia databases, etc..

LIST OF RECENT PUBLICATIONS*

Publications in English

Shefer D., Maital S., INNOVATION: Technology Assessment, Forecasting, Strategy and Regional Policy, May 1997.

Proceedings of Space Communications Technology for Capacity Building, Israel, 21-25 September, 1997.

Kohn D., Shalev I., The Impact of Technion Graduates on Israel's Economy, May 1998.

Shefer D., Koschatzky K., Frenkel A., Guenter W., Spatial Diffusion of Industrial Innovation and Regional Development, December 1998.

Grupp H., Maital S., Managing New Product Development and Innovation A Microeconomics Toolbox, January 2000.

Publications in Hebrew

Schechter, M., Carmel, G., Avnimelech, Y., Ayalon, O. Economic Incentives in Solid Waste Production Policy, January 1997.

Y. Mamane, Monitoring and Air Pollution Control of Volatile Organic Compounds (VOCs), February, 1997.

Zvirin, Y., Tartakovsky, L., Gutman, M. Hybrid and Electric Propulsion of Buses, April, 1997.

Raveh, A., Shapira, Y., Balila, D., Economic Aspects of Aerospace Activity in Israel, April, 1997.

* *The list of previous publications is available separately*



Barlev, S., Mahalel, D., Perry, D. Examination of the Relation between Average and Variance in Travel Times in Urban Roads. June, 1997.

Kohn, D., Shalev, I., The Shortage of Electronic Engineers and Computer-Science Graduates, July, 1997.

Law Enforcement in the 21st Century, Parts A and B, August, 1997.

Carmon, N., Project Renewal in Israel, 1979-1994, September, 1997.

Kohn, D., Shalev, I. The impact of Technion Graduates on Israel's Economy, May, 1998.

Eshel, R., The Impact of Science on the Security of Israel, August, 1998.

Eshel, R., The Impact of Science on the Civil Industry of Israel, August, 1998.

Goldschmid, Y., Remote Sensing of Air Pollutants in Industrial Areas, December, 1998.

Burkat, A., Incineration and Energy Recovering from Waste, January, 1999.

Zaslavsky, D., Sustainable Development of the Israeli Water System and the Fate of Agriculture, December, 1999.

Avnimelech, Y., et al. Determination of National Environmental Priorities, June, 1999.

Kohn, D., Shalev, I. et al. Technology Forecasting for the 21st Century, October, 1999.

Kohn, D., Singer E. Who is Who in the Israeli Energy Sector, March, 2000.



Papers Published in Scientific Literature

Shefer D., Frenkel A., "Local Milieu and Innovativeness: Some Empirical Results", The Annuals of Regional Sciences, No. 1, pp. 185-200, 1998.

Grupp H. and Maital S., "Interpreting the Source of Market Value in a Capital Goods Market: R&D Management in Industrial Sensors", R&D Management, 1998.

Ben Arieh A., Grupp H. and Maital S., "Optimal Incremental Innovation: A Mathematical Programming Approach for Integrating R&D and Marketing", Research Evaluation, 1998.

Chapters in Books

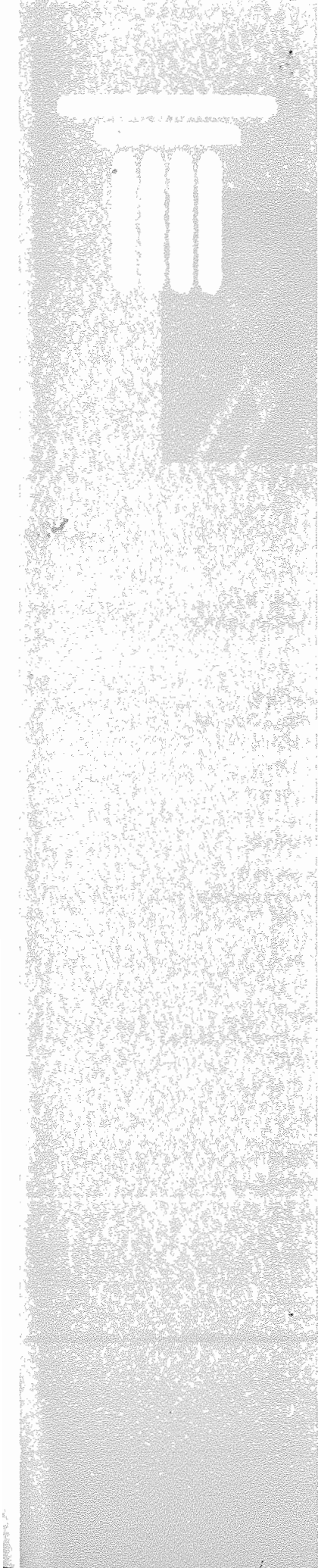
Frenkel A., Shefer D., "Technological Innovation and Diffusion Models: A Review." , Chapter in a book: CS. Bertuglia, S. Lombardo, P. Nijkamp (eds.), Innovation Behavior in Space and Time, Springer Series in Advances in Spatial Science, Berlin, Verlag Springer, Chapter 3, pp. 41-63, 1997.

Shefer, D. and Frenkel, A. "Agglomeration and Industrial Innovation in Space: An Empirical Analysis". In: P. Rietveld and D. Shefer (eds.) Regional Development in an Age of Structural Economic Change, Aldershot, UK: Ashgate Ltd. (Chapter 4), 1999.

Papers Presented at Scientific Conferences

The 3rd Israeli – British & Irish Joint Regional Science Workshop Public Investment and Regional Economic Development, Hebrew University of Jerusalem, Mt Scopus, 14-16 February 2000, "Does Location Matter for Hi-tech Industry? Evidence from Israeli and Irish Companies".

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 "2050", Long Term Planning", Ma'aleh Hamisha, February 6-9, 2000.



The 39th European Regional Science Association ,23-27 August 1999, Dublin, Ireland, "Different Paths to Success? The Growth of the Electronics Sector in Ireland and Israel".

The 1999 Meeting of the IGU Commission on the Organization of Industrial Space: Promoting Growth; New Industries, Policies and Forms of governance. Haifa and Beer Sheva 19-26, June 1999. "Fast-Growing Industries, Location and Innovation: A comparison Between Israel and German Industrial Firms.

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

As an independent not-for-profit research organization, the Institute does not advocate any specific policy or embrace any particular social philosophy. As befits a democratic society, the choices among policy alternatives are the prerogative and responsibility of the elected representatives of the citizenry. The Samuel Neaman Institute endeavors to contribute to a climate of informed choice.

The Institute undertakes sponsored research, organises 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's 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.

Funding

The Institute's activities are partly financed by the income from the Samuel Neaman Research Fund, located at the American Society for the Technion. This ensures freedom and independence. At the same time, contract research is undertaken for government, public and private organizations, provided it is in accordance with the Institutes' goals and objectives.

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