



Samuel Neaman Institute  
FOR ADVANCED STUDIES IN SCIENCE AND TECHNOLOGY

# ANNUAL REPORT 2002/03



POLICY FOR PROGRESS



Technion - Israel Institute of Technology

Technion - Israel Institute of Technology  
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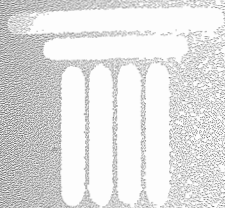
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AT THE HELM



SAMUEL (SAM) NEAMAN  
FOUNDER  
1913-2002





# SAM NEAMAN - IN MEMORIAM

Mr. Samuel (Sam) Neaman, the Institute's founder and visionary, died at the age of 89 on November 13<sup>th</sup>. He was laid to final rest next to his beloved wife, Cecilia, at the old cemetery in Haifa, Israel. Until the last day of his life, Sam followed Institute's affairs almost on a daily basis and was a rich source of ideas, suggestions, help and support.

Mr. Neaman was a much-admired businessman and philanthropist. Among his many business ventures, he was the Chairman of the Board and CEO of McCrory Corporation in New York and Laconsolidada Ironworks in Mexico; as well as the Past President of the American Society for Technion and the American-Israel National Chamber of Commerce. His vision and generosity created a renowned policy research think-tank at the Technion in Haifa, Israel: The Samuel Neaman Institute for Advanced Study in Science and Technology.

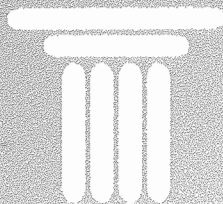
Sam was born in 1913, in the small village of Rosh Pina in the northern tip of the Galilee, to a mother from one of the pioneering founding families of the village and a father who made Aliyah at the turn of the 20<sup>th</sup> century. His father was a teacher and Sam's Hebrew was excellent, as was his Arabic, French, Spanish, and of course, English.

Sam's life-story, as it emerges from his autobiographical book "Israel Inside and Out", published last year by the Israel Ministry of Defense Publishing House, stretches over much of the 20th century, and reads like a novel intertwining most of the major events of the century from W.W.II to the formative years of Israel's independence and the struggles following it. Crisscrossing British Palestine, Syria, Iraq, Egypt, France, England, Italy, and Greece during W.W.II, Sam was an active participant in most of the major events.

From Rosh Pina, the family moved to Tyre and Damascus where his father established Hebrew schools. When the British pushed the Turks out of the region and established the British Mandate, the family returned to British Palestine. At the young age of 13, Sam informed his father that he had decided to become a farmer and went to study at the famous Agricultural School in Mikveh Israel.

When the Arab Uprising started in 1929, he joined the Hagana at the age of 16. Sam worked as a farmer in Yavniel, Atarot, Herzlia, Binyamina and Bitania, places that are part and parcel of the backbone of the Zionist experience and Israel's national history. Then, instructed by the Hagana, he joined the horse-mounted British Palestine Police. There, he quickly earned the respect of his British superiors and of his Arab colleagues who fondly gave him the nickname Sammy.

Meanwhile his family moved temporarily to Paris to enable his younger brother Yifrah (who later became a world renowned concert violinist and master teacher) to study music with the best teachers of the time. In Paris, his budding business acumen started to show. Without any prior experience and capital he succeeded to establish a viable business manufacturing sweaters.



When W.W.II broke out, Sam immediately returned to Palestine, volunteered to the British Army. He quickly reached the rank of sergeant major, fighting all over the war theater and getting medals for courage and leadership. He was sent to officers' school, and his exceptional performance quickly earned him the rank of major, which was the highest rank reached by any volunteer from Eretz Yisrael.

After the war, he returned to London where his wife Cecilia had spent the war. She escaped from France in 1940 and worked throughout the war for the Free French Forces of General de Gaulle.

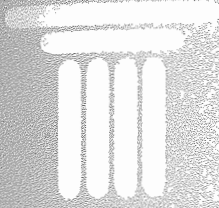
As a high-ranking war hero, he was called upon by Moshe Sharet (the pre-state Secretary of State) to help convince the Jewish community to support the emerging State of Israel. He did well, and was then sent to do the same in the United States, where he became a sought-after leading fundraiser. He was then asked to head up the Bonds in Europe and South America. He joined Ampal, and began the first major pioneering business investment program in Israel. Among its projects was the building of first Sheraton Hotel in Tel Aviv, which he personally supervised.

Sam then went to Mexico and as CEO quickly turned the fledgling Consolidada Ironworks into a profitable company. The success so impressed the Minister of Industry of Mexico that he asked Sam to head up all Mexican iron and steel works. Sam refused the offer and came to the United States where took over the McCrory Corp. chain of 1,200 stores, which was on the verge of bankruptcy. Sam turned the chain into a great success and served as its President and CEO for 12 years. This success story was described in detail in T.J. Peters and R.H. Waterman's book "In Search of Excellence - Lessons from America's Best-Run Companies". At the request of the Israeli Minister of Finance Rabinowitz, Sam returned to Israel to create a new special office for developing business ties and relations with Europe. But, governmental bureaucracy and shortsightedness intervened and Israel lost an important opportunity to reap Sam's great business talents. Sam returned to the United States and devoted his time to philanthropic work and the creation and development of the Samuel Neaman Institute at the Technion.

Sam was one of a kind - a man of great character. He was blessed with a rare intellect, exceptional physical and mental courage, original thinking, decision-making capabilities, extraordinary memory, a rare gift of expression, total intellectual honesty and unlimited faith in the Zionist ideal, but also with compassion and understanding of our Arab neighbors with whom he lived for so long.

Nothing said to Sam ever went past him without going through the refinement of his sharp mind. Every problem presented to him was analyzed and looked at it from every angle. Then, with amazing speed, he came up with a solution - an original viewpoint, new and right on target.

On the surface, Sam was pragmatic and tough, someone who saw things as they are - without any window dressing. He didn't allow himself for even one second to indulge in self-



delusion. He read people like an open book with respect to their weaknesses and strengths. But underneath this tough and pragmatic exterior beat the heart of an idealist who believed that man is good from his youth and with education and the right leadership, will chose good and not bad. Time after time in his life's journey, whether as an agricultural worker, policeman, military commander or director of a giant corporation, he demonstrated this through personal example.

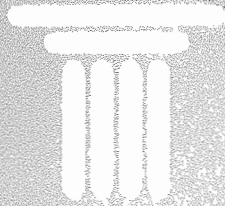
In his own words, as quoted from his book, his character was forged in Mikveh Israel and the British Army:

*"In Mikveh I learned to take life as it is. Everything has its role and function: from the rain that wets the soil making it ready for plowing, to the cows giving milk, and to the people who work the land. This early lesson in sheer pragmatic, down-to-earth reality was a lesson for life. It taught me not to be surprised, neither to wonder nor to be romantic about things, life and people, but be pragmatic, matter-of-fact about it. Everything and everybody has its role and function. When Hitler marched into Czechoslovakia, I was in France, I knew that there is only one way to go - and that is to fight. This too was a fact of life. No second thoughts, no hesitation, and no questions. It had to be done. This was my next role. I volunteered to the British Army. British Army life, where I spent six years, taught me how to know and recognize people for what they are. It taught me, as an officer, the burden of loneliness of a commander and leader. On the outside, I was an officer carrying out his duty; on the inside, I was shut tight. This life taught me that being respected and appreciated for professionalism is far more important than being loved. It taught me that one could take a useless group of disorganized people, and convert them into a powerful cohesive fighting force. It taught me discipline, and that one has to plan ahead. It taught me never to give up, that one could take beating after beating and come back victorious. It taught me that standing up and being counted at the right moment, and making the right decision, can make all the difference in life".*

Sam was laid to eternal rest in his beloved land of Israel next to his wife Cecilia, and according to his request, resting in one hand is Cecilia's wedding band and, in the other, his insignia from the Hagana and the battle decorations he was awarded by the British Army during World War II.

Sam was my mentor and friend for almost a quarter century. I will always miss his friendship and sound wise advice. May he rest in peace.

**Professor Zehev Tadmor**  
**Chairman of the Board**



# DIRECTOR'S REPORT

## PREFACE

We are grieving the loss of Samuel (Sam) Neaman, the founder of the Institute, who passed away this year. His vision of the Institute has guided me all along and has been an inspiration to me and my colleagues in our endeavors to develop the range and scope of activities of the Institute, as outlined in the present report. As the Director of the Institute, in my fourth and last year, I am indebted to Sam Neaman for providing me with the opportunity and tools to be engaged in such a unique and rewarding mission.

## VISION

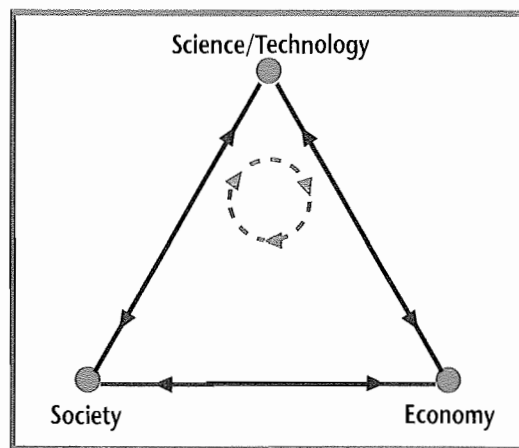
The Samuel Neeman Institute was founded in 1978 by Samuel Neaman who contributed the resources for this purpose. The document establishing the Institute, authorized by the Technion Senate, clearly defines the Institute's areas of activity, from which the vision and goals of the Institute are apparent. 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".

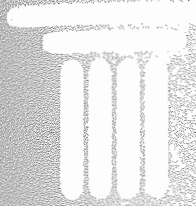
## OBJECTIVES AND SCOPE OF ACTIVITY

The main emphasis in the professional activity of the S. Neaman Institute is in the interface between science and technology - economy - society, as shown schematically in the figure below.



Therefore the natural location for the Institute is at the Technion, which is the leading technological university in Israel, covering all areas of science and engineering. This





multidisciplinary 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 on a variety of social aspects. This is the unique nature of the S. Neaman Institute as a policy research institute.

An additional important aspect of this interface is its 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 developments 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.

#### **STRUCTURE AND MODE OF OPERATION**

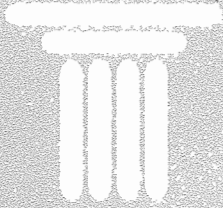
The S. Neaman Institute is located on the Technion campus and enjoys the infrastructure of this institution. Nevertheless the Institute is legally and administratively an independent not-for-profit organization. This enables it to be effective in fulfilling its goals, providing it with the flexibility to establish research and expert teams including also representatives from other universities and other organizations, government, business and industry, required for such interdisciplinary policy research. The S. Neaman Institute, therefore, derives 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**

The S. Neaman Institute is completing a multi-annual initiative for developing a comprehensive program with direct input on national R&D policies. Special emphasis is given to science policies and technological innovation and their impact on advanced industry, human resources and national infrastructure. The program was developed with an aim of establishing the base for an on-going activity that will include in-depth studies and application steps in order to influence decision makers.

#### **CORE RESEARCH ACTIVITIES**

The core activities of the S. Neaman Institute have recently been modified and streamlined into three major focus areas, as outlined below. A new theme, more horizontal in nature, is currently being developed, to address issues of national security that interface with the economy and society. This new effort is the result of the awareness in the various studies that many of the civilian issues, spanning science and technology, economy and society cannot be properly addressed to develop policy alternatives without taking into account the impact of national security aspects.



### ***Science, Technology and Economy***

Policy studies in this area are based on investigation 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. The program is now focusing on four main aspects: the role of human capital in the process of innovation and technological change, the economics of high-tech, R&D policies and R&D spillovers. Associated with this program are research activities that directly address various industrial operations and innovation systems. These are more applied in nature and are grouped in this annual report in a special section titled Industry, Innovation and Technology Transfer.

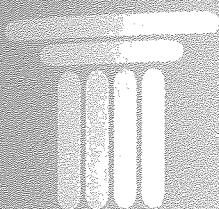
Position papers based on these studies were developed and presented in national forums, such as the Knesset Committee for Science and Technology, the Minister's Committee on Science and Technology and the Forum of Chief Scientists.

### ***Universities, Education and Human Resources***

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 integration of the universities' research abilities within the national technological innovation system. An international working group studying the future of research universities was recently established. It also addresses the role of colleges in the higher education system in Israel. Several studies on university technology transfer and university-industry relations, sponsored by the Israeli Academy of Science and the Israeli Ministry of Science, have been completed, and will serve as a basis for "brain storming" at the national level. In addition, the Neaman Institute launched several projects with the intention of directly affecting campus life, such as the Technion Green Campus Project, the Technion Forum for Science and Technology Policies and the Technion Entrepreneurship Laboratory.

### ***National Planning, Environment and Infrastructure***

This area is of the utmost importance for a modern country. Its well-being cannot be achieved only by technological development and economic growth; these should be complemented by quality of life, environment and advanced national infrastructure such as transportation and communication. In this area of activity 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, among others, "National Environmental Priorities for Israel" and national planning "Israel 2020 to Israel 2050". The "Israel 2050" project has been developed this year into several focused subprojects, one of which, supported by the Israeli Ministry of Regional Cooperation, looked into regional planning. We are in the midst of the development of other projects related to infrastructure, most notably energy and water. Several reports on water policy in general and in the agricultural sector in particular have been completed. A comprehensive report on the state of energy in Israel is being developed and will serve as a basis for establishing a forum for energy policies. In each of these areas, the intention is to hold an annual conference presenting the "state-of-the-art"



in Israel. Such a mode of operation has been established in the area of national environmental policies.

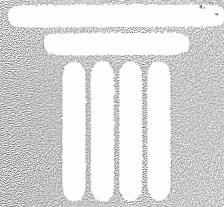
#### **APPLICATION AND SUPPORT ACTIVITIES**

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 Neaman Institute has been involved in the development of the program's concept and has played an instrumental role in making it work by taking upon itself responsibilities in coordinating the academic research partners of the consortia. Now, when the program has matured and the expertise of coordinating the academic partners has also developed within the Technology Transfer Offices of the Israeli universities, the Neaman Institute has decided to gradually depart from this activity, in order to be able to effectively direct its resources and energy to its core activities in R&D policy studies.

The Neaman Institute will however remain active in the MAGNET program through involvement in running the data centers of the consortia. Currently we are operating 11 such centers. This is within the main strategy of developing information and database centers as part of the infrastructure required for policy studies and their implementation. These data centers will complement the Griliches Research Data Center established for R&D policy studies, as well as other data centers that are currently being developed in the areas of environment and regional planning. The Neaman Institute is establishing cooperation with the Israeli National Bureau of Statistics within the framework of its 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 on the Technion. The external impact is to be achieved by various mechanisms such as seminars and workshops, an academic guest program, policy papers presented to decision makers, publications and databases. The impact within the Technion will take place via initiation of policy studies involving Technion faculty and through workshops, seminars and visits by experts from abroad. These activities are aimed at exposing 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.

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



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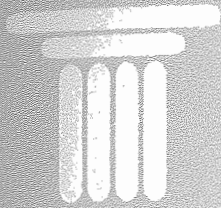
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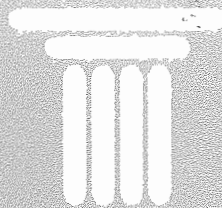
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# THE SCIENCE, TECHNOLOGY AND ECONOMY (STE) PROGRAM

## HEAD OF PROGRAM:

PROF. M. TRAJTENBERG

## ACADEMIC COORDINATOR:

PROF. D. PELED

## STEERING COMMITTEE:

PROF. A. BENTUR

PROF. S. LACH

PROF. S. MAITAL

PROF. D. PELED

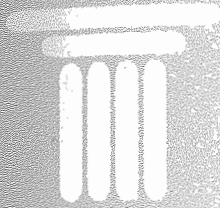
PROF. M. TRAJTENBERG

The Science, Technology and Economy Program is a core program whose central mission is developing national policy alternatives in science, technology and economics. Prof. Manuel Trajtenberg chairs and coordinates its activities together with Prof. Dan Peled. There are about 15 additional researchers who regularly participate 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 economic 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 Neuman Institute and the Technion at the center of national policy making. The activities of this program started in late October 2000, making this the program's fourth year.

## I. New Research Projects

Following our call for proposals issued last year, we received a large number of high quality applications, a fact that reflects the reputation and reach achieved by the STE Program. The academic committee of the STE Program finally selected 10 projects, which bring in an excellent group of economists and business school faculty from various Universities, and cover a range of topics of interest to the program. In particular, two of the projects focus on human capital and innovation, and another two on the venture capital sector in Israel, which are the program's central themes. The following is a detailed list of projects:

1. Dr. Daniele Passerman, Department of Economics, The Hebrew University  
*New Immigrants, Innovation, Productivity and Skill Complementarities in Israeli Manufacturing Firms*
2. Prof. Zvi Eckstein, School of Economics, Tel Aviv University, and Dr. Sarit Cohen-Goldner, Department of Economics, Bar Ilan University  
*Immigrants in the High Tech Sector -The Role of Imported and Local Human Capital*
3. Prof. Shlomo Maital, Technion  
*Dynamics of Technology and Innovation: Business Process Modeling in Theory and Practice, with Applications to Israeli and German R&D Intensive Firms*
4. Dr. Efrat Tolkovsky, Technion  
*Venture Capital in Israel: A New Industry or a Unique Culture*

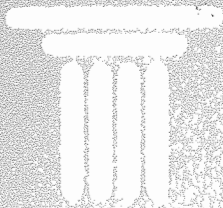


5. Prof. Morris Teubal, Department of Economics, Hebrew University  
*Venture Capital's Contribution to Economic Growth and Innovation*
6. Prof. Chaim Fershtman, School of Economics, Tel Aviv University, and Sarit Markovitz, Recannati School of Management, Tel Aviv University  
*Patents and R&D Race: A Dynamic Perspective*
7. Prof. Miriam Erez, Dr. Eitan Nave, and Ela Miron, Technion  
*Innovation, Quality and Efficiency in R&D: A Multi-level Analysis of the Effects of Individuals, Teams, Leadership and Organizational Factor*
8. Prof. Don Siegel, Department of Economics, Rensselaer Polytechnic Institute, Dr. Robert Sauer, Department of Economics, Hebrew University  
*Assessing the Relative Performance of University Technology Transfer in the U.S., U.K., and Israel: A Distance Function Approach*
9. Prof. David Genesove, Department of Economics, Hebrew University  
*The Effect of Patent Confiscation on Innovation: The Trading with the Enemy Act*
10. Danny Breznitz, Department of Political Science, MIT  
*The Davids Go Global - The Politics of High-Technology Industrial Development in Peripheral States*

Several of the projects supported by the STE program were completed in the course of this past year. The results were presented during the group's periodic meetings, and published in the STE Working Papers series (see below).

## **II. Scholarships**

Since its inception, at the STE Program, we have understood that one of the limitations facing policy-oriented research in this field is the scarcity of economists and researchers in related disciplines specializing in science and technology. It was thus decided to support graduate students in order to encourage them to write dissertations in this area. Since 2000-2001, we have supported seven students writing MA and Ph.D. dissertations at various universities, and this year, we awarded scholarships to the following six students, all of them pursuing doctoral degrees:



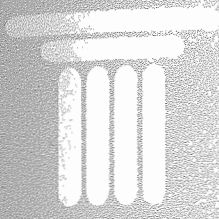
1. Guy Navon, Ph.D. student, Department of Economics, Hebrew University  
*The Impact of Universities on Salaries: An Empirical Study of the Industrial Sector*
2. Yochai Rafaelli, Tel Aviv University, Business School,  
*Organizational Innovativeness and its Influence on Core Competencies: How Inventors are Organized within Firms and are there General Success Factors?*
3. Husni Zuabi, Ph.D. student, Hebrew University, Economics Department,  
*High Tech Sectors vs. Traditional Sectors and Economic Growth*
4. Muchammed Said Hachmad, Ph.D. student, Department of Economics, Hebrew University  
*University Technology Transfer: The Case of Emerging Technology and the Industry Structure*
5. Gil Avnimelech, Ph.D. student, Department of Economics, Hebrew University  
*Added Value of the Israeli Venture Capital Companies: A Resource-Based View of VC Human Capital*
6. Irena Milshtein, Ph.D. candidate, Tel Aviv University, Business School  
*The Optimal Level of R&D in Software Markets*

### III. Working Papers

One of the intended goals of the STE Program is to influence the national agenda and policy making in science and technology. Thus, dissemination of the research output resulting from the supported projects is key to the program's success. The main vehicle to that end is the Working Papers Series, comprising the end results of STE projects, as well as other papers of related interest, written by researchers connected to the program. In the course of this past year, we have had a plentiful crop of working papers, reflecting the completion of past projects. Moreover, we made a concerted effort to disseminate them among potentially interested parties, and have received an overwhelmingly positive response. This is the list of working papers published lately:

1. Yosha Oved, and Blass Asher, *Financing R&D in Mature Companies: An Empirical Analysis*, STE WP 10, April 2002.
2. Breznitz, Danny, *Conceiving New Industrial Systems: The Different Emergence Paths of the High-Technology Industry in Israel and Ireland*. STE WP 11, May 2002.





3. Gandal, Neil, *A First Look at Internet Business Methods Patents*. STE WP 12, May 2002.
4. Breznitz, Danny, *The Military as a Public Space – The Role of the IDF in the Israeli Software Innovation System*. STE WP 13, May 2002.
5. Bar-Eliezer, Simcha, and Bregman, Arie, *The Impact of R&D Spillovers on Growth and Productivity in Israeli Manufacturing Industries – 1990-94*. STE WP 14, September 2002.
6. Shaked, A. *Universal Banking and Investment in R&D Intensive Firms – an Empirical Investigation*. STE WP 15, September 2002.
7. Bental, B. and Peled, D. *Quantitative Growth Effects of Subsidies in a Search Theoretic R&D Model*. STE WP 16, October 2002.
8. Galai, Dan and Wiener, Zvi, *A Micro-Economic Approach to Government Support of R&D Investments in the Private Sector*. STE WP 17, November 2002.

#### **IV. Monthly Meetings**

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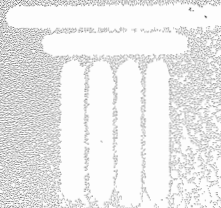
The STE Program continued holding the traditional monthly meetings in which group members present and discuss ongoing projects. One of the significant advantages of this forum is that it allows providing feedback at earlier stages of the projects in an unpretentious, sympathetic academic environment, thus truly influencing and helping the researchers reach their stated goals. Such environment is seldom encountered in traditional academic forums. Each meeting lasts over three hours, and typically includes two to three presentations, and discussions of additional topics of interest to the group.

In the course of the fall semester of this academic year (2002-03), three meetings were held, consisting of presentations of ongoing research projects (including those by scholarship recipients), as well as academic talks. During the spring semester, there will be four meetings, including a special session at the annual meeting of the Israeli Economic Association. The latter is important in order to showcase the activities and research output of the STE Program to the wider community of economists.

#### **V. Outreach Activities**

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We are planning a field visit for participants in the STE Program to the Intel's fab in Kiryat Gat. The intention is both to have a first-hand look at one of the most advanced high tech

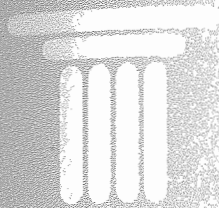


facilities in Israel, and also to discuss with officers of the fab issues pertaining to future government policy, such as the building of a new plant there and the request for further government support.

In July 2002, Prof. Manuel Trajtenberg participated in a panel on "Defense R&D Policy in the Anti-terrorist Era" held at the Summer Institute of the National Bureau of Economic Research, in Cambridge, MA. Following this appearance, he was invited to present a paper on the topic at the conference on "Innovation Policy and the Economy" which will be held in Washington, DC, in April 2003. In November 2002, Professor Trajtenberg lectured on "Government Support for R&D: Continuity and Change" at the International Telecom Israel 2002 Conference. In the context of this event, he also met with the Australian Minister of Science, and briefed him on R&D policy in Israel.

#### **VI. The Zvi Griliches Data Research Center**

Haim Regev, the former Associate Director of the Central Bureau of Statistics, and Prof. Shaul Lach of the Department of Economics at the Hebrew University, have completed the development of the data provided by the Office of the Chief Scientist of the Ministry of Trade and Industry, which includes highly detailed information on every single R&D project supported by the OCS since the mid-1980s. These data are now available to researchers for future studies (at a special research room at the CBS), in conjunction with other data from the OCS that can be matched to it. This represents a crowning achievement to create a long-term data creation effort supported by the STE Program. A comprehensive report of the center is presented in Part VII of this report.



# UNIVERSITY

## INDUSTRY TECHNOLOGY TRANSFER

### RESEARCHERS:

PROF. D. SHEFER

DR. A. FRENKEL

Closer integration of the universities in the national innovation system is in their interest since it enhances teaching and research at the universities, and demonstrates the universities' contribution to the economic welfare of the state, thus justifying continued 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 advancing the frontiers of knowledge. 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 was to develop policies and tools that will facilitate the transfer of new technologies from universities to industry. Thus, the universities will become more relevant to the country's social and economic life. The research examined barriers to technology transfer, formulated new mechanisms, and developed tools for control and follow-up. The latter can 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, society at large and, in particular, the quality of teaching and research at the universities.

The report summarizing the project was recently published. It includes, among other things, quantitative analysis of achievements of technology transfer offices in Israeli universities in comparison to the US, as well as survey of attitudes of faculty members and industry.

**The project was sponsored by the Israeli Academy of Sciences and the Ministry of Science, Culture and Sport.**



# EVALUATION OF THE ISRAELI TECHNOLOGICAL INCUBATORS PROGRAM

## RESEARCHERS:

PROF. D. SHEFER

DR. A. FRENKEL

This study was carried out under the Fifth Framework Program of the European Union. Its main objective was to examine the efficiency and adequacy of the Israeli Technological Incubators Program as a vehicle for fostering the growth of the high-tech industry, and as a model for European countries in general and Italy in particular, to emulate. To achieve this objective, an in-depth field survey was carried out with 21 managers of technological incubators and 109 initiators of new projects.

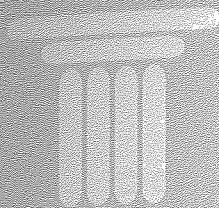
The Israeli Technological Incubator Program began in the early nineties in the wake of the influx of hundreds of thousands of new immigrants from the former Soviet Union. The aim of the program was to enable entrepreneurs with new promising ideas, but no financial means and managerial skills, to "fulfill their dreams". Between the years 1990-1993, 28 such incubators were established throughout the country. Today, 24 are still in operation.

The research thoroughly examined the extent of the program's success. This was measured by the number of the projects that successfully graduated from the incubator, and their ability to attract financial support either while in the incubator or upon leaving it.

The research focused special attention to the spatial distribution of the incubators, their degree of specialization, and the type of sponsorship they received. Attention was given to the program's potential contribution to regional economic development. The incubator managers' and project initiators' level of satisfaction regarding the incubator's operation was also investigated.

Today, more than 10 years since the program's initiation, it can be concluded that the Israeli Technological Incubator Program is indeed a "success story". The program fulfilled a significant portion of its objectives. It provided a large number of scientists, both new immigrants and Israelis, with the opportunity to establish new high-tech start-ups upon their graduation from the incubator. The program's main advantage is its ability to promote and support viable high-tech ideas that could not otherwise attract financial support on the free markets.

This project was sponsored by the European Union Fifth Program.



# TOTAL FACTOR PRODUCTIVITY AS A PERFORMANCE BENCHMARK FOR FIRMS: THEORY AND EVIDENCE

## RESEARCHERS:

PROF. H. GRUPP

PROF. S. MAITAL

We propose using Solow's macroeconomic approach and the concept of Total Factor Productivity (TFP) as a microeconomic tool for analyzing individual firms. TFP, long used in analyzing macroeconomic growth among countries, is a useful strategic performance benchmark for individual firms. TFP calculations permit managers and investors to partition labor productivity growth between two sharply different underlying causes: capital-deepening (higher capital per worker), and exogenous technological change. The TFP benchmark can be computed from readily available information in financial statements.

The report's structure is as follows. Section 2 presents a simple version of Solow's model, suitable for use in individual firms and provides a numerical example. Section 3 gives detailed total factor productivity calculations for the 20 largest firms in the world. Section 4 provides three case studies of total factor productivity growth, for Intel, YPF (Argentina's largest energy company) and Merck. The final section summarizes and concludes.

# I NNOVATION PARTNERSHIPS WITH USERS

## RESEARCHERS:

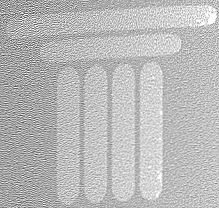
DR. D. GETZ

PROF. B. KAHANE

Innovation is unlikely to be successful if it is based on the supposition that the innovative process is essentially simple, linear and sequential. It is not. The innovative process is complex, intricate and irregular. Basically, it can be considered as a learning and information process. Successful innovation is the product of a total information package to which R&D makes only a partial contribution. There are additional contributions from other participants in the process, including the users of the new technology, whose input is just as vital as the information derived from R&D.

Thus, initial and continuous user implication in the innovative process is a key factor, which points to the potential of partnerships involving not only components of R&D producers (academic and industry) but users as well. Nevertheless, successful incorporation of users in the innovation process is a difficult task since their identity, legitimate representatives and modes of interaction are not necessarily obvious. To help address this issue, a study of two very different cases was established, looking into different forms of strategic partnerships for innovation, which not only incorporate innovation users, but also are initiated and shaped by them. These contrasted situations (one in Israel, the other in France; one outside of any government support, the other inside such a scheme) show how users find their way to shape new types of alliances in order to achieve innovation. They stress the interactive nature of the innovation process and the interest of moving government intervention beyond academic/industry relationship, in order to incorporate innovation users.

*The paper summarizing the project was presented at the EFMD conference in Sophia Antipolis and won first prize.*



# THE FUTURE OF THE CHEMICAL INDUSTRIES IN ISRAEL

## RESEARCHERS:

PROF. Z. TADMOR - INITIATOR

DR. GILEAD FORTUNA -  
CHAIRMAN

PROF. EPHRAIM KEHAT

DR. TUVIA ZISNER

ARNON GOLDFARB

REUVEN VACHS

PROF. YORAM AVNIMELECH

The purpose of this study is to review the current chemical industry in Israel, to examine the alternative options for its development and to recommend a national policy.

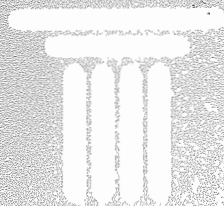
The study started in the beginning of 2002 and was targeted to evaluate and consider the following:

1. The trends in the global chemical industry, studying the changes and strategies of the international companies and looking at a few national policies in detail; evaluation of the implications of government policies on the national chemical industries and the global consequences.
2. The "inventories" of the chemical industry in Israel covering current businesses and plans for the future, and understanding of the different industrial sections positioning vs. the global competition.
3. Environmental considerations and their implications, including preferred locations for new industries. Evaluating the changing policies in Israel and the world concerning environmental effects and the best available technologies.
4. Maturing new technologies, which are relevant to the industry and could affect its growth directions.

A plan of action was defined and executed. The following tasks were accomplished in 2002:

1. Bibliographic material was assembled, describing the chemical industry in Israel and the world. This survey was based on the information obtained from the Neaman Institute data centers, the Association of the Israeli Industry and the Central Bureau of Statistics.
2. Meetings were held with most of the general managers of the major chemical industries and of related industrial branches.
3. Discussion of modes of assessment of the national interest and the commercial impact of the Israeli chemical industry. A measuring method was agreed upon. The contribution of different segments to the national interests was evaluated accordingly.
4. National policies of some small and medium size foreign countries were studied with the purpose of learning from them on issues relevant to Israel.

A summary of the initial findings has been assembled in a report and its conclusions and options for recommendations are being discussed. The contribution of the chemical industry

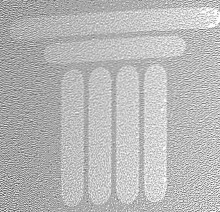


to the Israeli economy has remained stable and very significant. However, a few issues are of concern and it is crucial that they be addressed:

1. Environmental constraints.
2. The deteriorating public perception of the basic chemical industry.
3. Emerging new technologies that must be adapted as new growth engines.
4. Effective mobilization of academic know how in these technologies and its continued integration into industrial strength.
5. Maintaining the attractiveness of the chemical education for the next generation.

*Based on this report, a workshop will be scheduled. The outcome of the report and meetings is expected to be developed into a national policy plan, to be worked out with industry and government.*





# RETHINKING THE RESEARCH UNIVERSITY OF THE 21<sup>ST</sup> CENTURY AND THE ISRAEL HIGHER EDUCATION SYSTEM

## PROJECT LEADER:

PROF. Z. TADMOR

## PROJECT TEAM:

PROF. ARNON BENTUR

PROF. H. GUTFREUND

PROF. A. KEYNAN

PROF. E. LEIBOWITZ

PROF. H. ROSOVSKY

PROF. S. ROTHBLATT

PROF. M. TRAW

PROF. M. YAARI

An international working group<sup>®</sup> was assigned to critically examine the mission, structure and organization of the future research university and the system of higher education in Israel. This effort resulted in the formulation of a number of position papers.


On the issue of defining a research university which is responsive to 21<sup>st</sup> century needs and constraints, two draft papers were prepared, entitled the "The Main Role of the Research University in the 21<sup>st</sup> Century Democratic State" by Elia Leibowitz, and "The Triad Research University – A Post 20<sup>th</sup> Century Model" by Zehev Tadmor. The former assigns a new, central and paramount role to the classical research university in the modern democratic society, which is equal in significance to the main branches of a democratic state; whereas, the latter foresees a very different type of research university, which attempts to both retain the core mission of the research university yet responds to constraints, changes and challenges ahead.

The specific issues of organizational restructuring faced by the Israeli research universities as a result of governmental initiatives were discussed and, as a starting point, work began on documenting past experiences in organizational reform at the Hebrew University and the Technion.

The many issues facing the Israeli higher education system as a whole were addressed in detail by Sheldon Rothblatt, Martin Trow and Henry Rosovsky in their responses to the document outlining the main issues and dilemmas. These will be debated and discussed in future meetings in preparation for a comprehensive draft document, which will also include funding considerations for the system.

In addition, in order to gain a better insight on the role and mission of the colleges in the higher education system, a second working group comprising three presidents of colleges<sup>®</sup> submitted their findings in a paper entitled: "Revisiting Higher Education – The Colleges" (Hebrew).

<sup>®</sup> **Members of the Working Group:** Professor Arnon Bentur Director of Neaman Institute and former Vice President for Research at the Technion, Professor Hanoach Gutfreund former President of Hebrew University and Professor of Physics, Professor Alex Keynan Professor of Biology the Hebrew University and Senior Advisor to the President of the Israel Academy Sciences and Humanities, Professor Elia Leibowitz, Professor of Physics at the Tel Aviv University, 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 Zehev Tadmor Professor of Chemical Engineering,



*former President of Technion and Chairman of the Board of the Neaman Institute, 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 and Professor Menachem Yaari of the Hebrew University and former President of the Open University.*

© **Members of this group are** Prof. Nava Ben Zvi from the Hebrew University and President of Hadassa College in Jerusalem, Prof. Elazar Kochva (Chair) of Tel Aviv University and former President of Tel Aviv College, and Prof. Zeev Tzahor of Ben Gurion University and President of Sapir College in the Negev



# COLLEGES IN ISRAEL

## PROJECT TEAM:

PROF. NAVA BEN ZVI,  
HADASSAH COLLEGE,  
JERUSALEM

PROF. ELAZAR KOCHVA (CHAIR),  
TEL AVIV UNIVERSITY

PROF. ZEEV TZAHOR,  
SAPIR ACADEMIC COLLEGE

Within the framework of the project "Rethinking the Israeli Higher Education System", a special task on the role of colleges was identified, and a subcommittee was established to deal with it.

The terms of reference for the Subcommittee were stated as follows:

*"... the Subcommittee is expected to comment on the desirable structure of the higher education system in Israel from the point of view of the colleges, analyze the current system of colleges, track their historical evolution, identify their mission as perceived by their leadership and their strategies to achieve their goals, and make recommendations regarding their character, structure, role and mission for the future. The subcommittee should also consider the implications of its decisions on the secondary school education programs, the various preparatory courses and the admissions requirements."*

The subcommittee recommends that higher education in Israel should be expanded and should be based on three institution types: Research Universities, Academic Colleges [the equivalent of the American four-year colleges], and community colleges [to be established]. The Research Universities should emphasize graduate studies [M.A. and M.Sc. with thesis and Ph.D.] and restructure their undergraduate curriculum towards Honors Programs leading directly to Ph.D. studies.

The academic colleges should mainly cater to a variety of undergraduate studies, both general academic and professional, and include a small number of selected Masters degree programs.

The community colleges should offer a two-year curriculum with the possibility of continuing studies at the universities and academic colleges and transfer of credits for a series of basic courses. Admission to the community colleges should be liberal in order to provide a second chance for a wide population of potential students. The admission policy to the academic colleges and to the universities should remain selective and the requirements should include a fully recognized high school diploma ["bagrut"], external examinations in certain basic subjects ["mitsraf"] and a psychometric test. This policy will not only ensure a high academic level at the first two institutions of higher education, but will also encourage the development of high standards of teaching in the secondary school system.

The subcommittee recommends that during the expansion of the higher education system, measures should be taken in order to raise the academic standards in all institutions.

# WOMEN IN COMPUTER SCIENCE

## RESEARCHERS:

DR. O. HAZZAN

DR. D. LEVI

T. LAPIDOT

L. EIDELMAN

Women are part of the human resources and are a great potential to be harnessed towards the development of the knowledge society. The present project is intended to provide an in-depth analysis into the methods to promote women participants in the high-tech sectors, starting with actions that need to be taken at the school level.

The Israeli high-school curriculum in computer science addresses advanced topics in computer science. However, it seems that it attracts more high-school male students than female students. Formal and informal data indicate that the percentages of the high-school female students who study computer science at the level A computer science matriculation exam is relatively low. For example, in the years 1998, 1999 and 2000, the percentages of female students who took the level A computer science matriculation exam was 26%, 27% and 29% respectively.

On October 2001, within the framework of the Samuel Neaman Institute, a study was launched to examine the causes that may account for the data presented. In order to increase the impact of the study, the research was carried out in collaboration with "Machshava" – The Israeli National Center for High School Computer Science Teachers.

During the first year of the research the following actions were taken: (a) A questionnaire was distributed among computer science teachers; (b) Four workshops for teachers were organized to address the issues and the research team presented the subject in conferences in Israel and abroad; (c) The research team met leading women in computer science and collected (together with computer science teachers) data from various resources; (d) On November 2002, a one-day conference was organized, in which the research topic was discussed from various perspectives, including its relationships to the topic of enhancing human resources in Israel.

Generally speaking, the analysis of the data yields three categories of factors that may account for the observation that high school female students are discouraged from learning computer science: cognitive factors, social factors and affective factors. Currently, based on the data analysis, we are designing and developing a set of activities for encouraging high school female students to consider taking computer science at the highest possible level.



# A NATIONAL SURVEY OF ISRAELI MEDICAL GRADUATES

**PROJECT LEADER:**

DR. N. BITTERMAN

The S. Neaman Institute, with the support of the Chief Scientist of the Ministry of Health and the deans of the four medical schools in Israel, initiated a national survey of Israeli medical graduates. This project is part of the ongoing activities of the Neaman Institute dealing with human resources.

A detailed questionnaire was distributed to graduates of the four medical schools in Israel who completed their studies between the years 1981-2001.

The primary objectives of this national survey are:

1. To characterize the graduates' academic background and training (in addition to the M.D. degree), and define at which stage of their career they were acquired.
2. To follow the career choices and the current occupation of Israeli medical graduates, identify their involvement in research, high-tech, innovations, biomedical projects, industry, etc.
3. To evaluate the attitude of the graduates towards the present medical education programs, and their compatibility to the needs of the current and future requirements of the medical profession in Israel. The graduates were asked to rank their preferences for alternative medical education programs.

The results of the survey are currently under extensive statistical evaluation. Primary results reveal that considerable percentages of the graduates acquired, in addition to their M.D. degree, another academic degree. A remarkable number of graduates are involved in hi-tech activities, such as technological innovations, patents or enterprise projects. Interesting information and detailed input has been retrieved from the graduates concerning their position towards the options of different medical education programs for M.D. studies. The full report will be completed by early spring and will be presented to policy makers responsible for national medical and educational activities. Hopefully it will serve as a basis for re-evaluation and further discussions of future medical education programs in Israel. The recommendations will be assessed in light of the changing requirements of the medical occupation, bio-medical research, and the medical biotechnological industry in Israel.

# THE "SCHOOL+" PROJECT: MORE THAN A PLATFORM TO BUILD THE SCHOOL OF TOMORROW

## PROJECT LEADERS:

PROF. M. EREZ

I. HAYER, M.SC.

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

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 and 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 computerized information technology in schools from its "roots", and to integrate, adapt, enhance and fine-tune the technology to the schools' changes and the needs of schools to educate learning citizens in the Information Society and not vice versa. In defining these needs, special attention will be given to equity and inclusion/exclusion issues.

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

Within the first year of R&D in the project, a clearer view has been achieved, regarding consortium schools current problems and their needs to become schools of tomorrow. An educational approach was established, upon which the participating schools designed collaborative activities. This has led to a clearer view regarding the problems, needs of schools in relation to organizational matters, and all those issues related to with the difficulty with respect to innovating and integrating ICT at curriculum and school levels.

The S. Neaman institute team participated in all the activities, and was a leading partner in two main ones. As a result, two reports were submitted to the EU: *Collaborative Learning Activities Report* (D03.1), and *Dissemination and Use Plan* (D11.1). The team also prepared the chapter on *Country Forums' Analysis*, within the *Educational Approach Development Report* (D04.1).



# AGING AND TECHNOLOGY: INTERNET FOR THE ELDERLY

## RESEARCHERS:

DR. N. BITTERMAN

I. SHALEV

Computer technology and the Internet (Information Technology –IT) have become an inseparable part of our daily lives. They are an essential element in the work environment, the home, education, commerce and healthcare. In recent years, senior citizens are using the Internet and web-based systems extensively. The Internet can improve dramatically the social and economic quality of life of older adults as individuals and of our society as a whole.

However, the benefits emerging from new technologies, including computers and Internet, depend upon the adapting new technologies to the needs, possibilities and to the willingness of the elderly population to use innovative technology.

The primary research project conducted in the S. Neaman Institute explored the differences in Internet usage and navigation patterns of young and old Internet users, and studied web design guidelines (links configurations). The study supported the notion that seniors are capable of using the Internet as well as young people, but at a slower pace. However, with proper interface adapted to the special limitations of the elderly people (expressed in perceptual, cognitive and motor limitations), elderly people will be able to benefit fully from the innovative technology.

Based on the importance of e-health and interactive healthcare services for the elderly population we are focusing our further research projects in the field of adapting e-health systems for the elderly population. Interactive computer healthcare services (e-health, e-care, Telemedicine) is a fast developing field that will probably dominate the medical services in the coming "knowledge society". Providing interactive health services will decrease healthcare expenses, improve the chain of treatment, enhance the quality and efficiency of healthcare, and increase the fairness and equality of the distribution of medical services mainly for the elderly population and citizens of remote areas. Therefore, special concern must be given to adapting e- health service for the use of the elderly population.

# NATIONAL PLANNING: FROM "ISRAEL 2020" TO "ISRAEL 2050"

## **PROJECT LEADER:**

PROF. ARCH. A. MAZOR

## **COORDINATOR:**

L. TANGY M.SC.

## **PROJECT PROFESSIONAL MEMBERS:**

PROF. ARCH. ADAM MAZOR

PROF. RACHELLE ALTERMAN

PROF. RAPHAEL BAR-EL

DR. JONA BARGUR

ARCH. ELI FIRST

DR. AMNON FRENKEL

ARCH. MEIRA GLUSKINOS

PROF. AMIRAM GONEN

ENG. GIDEON HASHIMSHONY

DR. RASSEM KHAMAISSI

PROF. ARIE SHACHAR

DR. DAFNA SCHWARTZ

MS LISA TANGY, MSc.

MR. RAN DRESSLER, MSc.

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.

Three major associated projects are currently in progress:

### **1. "Israel 2020" and "Palestine 2015" – Coordinating the Palestinian and Israeli Long-Term Plans**

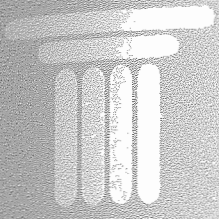
The overall aim of this project is to create a basis for long-term planning cooperation between Israeli and Palestinian teams, using existing long term planning by both Israelis and Palestinians, as its point of departure. The Israeli plan is "Israel 2020" - a master plan for the 21<sup>st</sup> century. The Palestinian plan is "Palestine 2015", which was carried out by the Palestinian Ministry of Planning and Cooperation (MOPIC) between 1994-1998. As part of the project's preliminary phase, dedicated to the optimal coordination of the Israeli and Palestinian long-term plans, an inaugurating workshop was conducted (February, 2000) with the overall goal of bringing together Israeli and Palestinian planners in order to initiate a professional dialogue.

The workshop's main output was a jointly agreed-upon set of preliminary understandings on Israeli-Palestinian cooperation in long-term planning. These understandings were summarized and defined by a list of 11 integrated planning issues into a written report. The Royal Government of the Netherlands sponsored the preliminary phase. At this stage, the World Bank is interested in setting up financial resources for the continuation of the project. Mopic and the Israeli Ministry of Regional Cooperation sent a letter to the World Bank stressing the significance of the project and calling upon the World Bank to fund it.

### **2. Master Plan for Cross-Border Cooperation between Israel and its Neighbors**

Following the conflict resolving approach, in the framework of its peace-building efforts, the Israeli Ministry of Regional Cooperation asked the S. Neaman Institute, in the framework of "Israel 2050" Project, to prepare an inclusive cross border master plan for Israel and its neighbors. The work began in August 2002. 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.

### **3. Equal Opportunities for All in Israel**

The overall aim of this project is to close existing gaps between Jewish and Arab communities in Israel and improve the quality of life for all. The significance of this step became self-evident in the wake of the October 2000 violent Arab demonstrations that ended with a dozen Arab Israelis dead. Within the long-range planning, 2030 is the target year for reaching mutual goals and objectives. Accordingly, a strategic comprehensive plan will be formulated. The initial phase includes agreement on terminology and definitions of issues. The project, which is contracted by the Economic Cooperation Foundation (ECF) and the Arab Center for Alternative Planning (ACAP), and funded by the Kahanov and Goldman Funds, will be jointly directed by Prof. Adam Mazor, head of "Israel 2050" project and Dr. Hanna Swaid, head of ACAP, with the participation of Jewish and Arab professional experts in a variety of relevant fields. "Israel 2020" findings and database serve as a platform for the plan that began in June 2002.

# ENVIRONMENTAL PRIORITIES OF ISRAEL- 2003

## **PRINCIPAL INVESTIGATORS:**

PROF. Y. AVNIMELECH

DR. O. AYALON

## **RESEARCHERS:**

PROF. ARNON SOFER

MR. YIZHAK GOREN

DR. NOAM GRESSEL

ADV. ORR KARRASIN

The second report of National Environmental Priorities was published in 2001. The first part of the report included follow-up, examination, critique and update of several aspects of subjects derived from the first report. The subjects were: open spaces and urban environment, transportation, water and wastewater, air quality, hazardous substances and solid wastes.

Regrettably, we noted that in numerous areas no progress was made and the requisite actions were not carried out. Lack of progress in the area of the environment usually means regression and sometimes – irreversible retreat.

The second part of the report included expanded discussions on two topics: the role of agriculture in the environment and marine environment and coasts.

The last part of the report included overviews, prepared by leading professionals, on the following subjects: a review on tap water treatment, environmental education and public participation, environmental funds and the role of industry in the environment. We have also reported on the Green Campus of the Technion, a demonstration project of increasing environmental awareness and activism.

The third issue of the project, National Environmental Priorities of Israel- 2003, has already been launched. In addition to the assessment of the implementation of the 2001 report recommendations, it will include an expanded discussion on alternatives of energy production, a summary of green construction, and a general overview of the effects of the environment on human health. In addition, on the one hand, it will include a chapter on public transportation- the commitment of the public transportation sector to use clean fuels, proper management of garages, and on the other hand- infrastructure and incentives to promote public transportation.



# ENVIRONMENTAL TECHNOLOGIES AND BUSINESS OPPORTUNITIES

## PROJECT ORGANIZATIONS

ISRAEL EXPORT INSTITUTE -  
ENVIRONMENTAL TECHNOLOGY

MINISTRY OF ENVIRONMENT

MINISTRY OF TRADE & INDUSTRY

MANUFACTURERS ASSOCIATION  
OF ISRAEL

ASSIF TECHNOLOGIES LTD.

## RESEARCHERS:

Y. GOREN

DR. O. AYALON

For decades, Israel has led the world in the development of new methods of water conservation. More recently, its scientists also have developed pioneering methods for environmental monitoring, protection and remediation, recycling and waste treatment as well as technologies for alternative energy. Israeli firms in this field are increasingly active in the emerging markets of developing countries. Israel is especially strong in providing such services, and many Israeli firms and consultants work with organizations such as the World Bank, WHO and FAO, to provide them with environmental expertise. Several Israeli companies in the defense industry have taken the lead in developing environmental technologies, such as equipment that detects hazardous substances or reclaims metals and waste, as part of their process of civilian conversion.

In Israel, close cooperation between university R&D and industry assures rapid commercial application of solutions to environmental problems. Yet investments in environmental R&D are rather low in comparison with other developed countries (0.1% in Israel, 3.2% in Canada, 4.2% in Denmark, % of total research expenditure). Exports in 1994 surpassed \$100 million, increased to \$250 million in 1997 and are expected to increase to over \$500 million by 2002. Yet, the global market for environmental technologies is increasing dramatically (Germany, for example, has invested in environmental technologies in 1999 \$1.15B) and a proper policy could significantly increase the share of these technologies in Israeli export.

Business opportunities of environmental technologies can be funneled into two types of markets and Israel should be involved in both: low-tech of rather inexpensive and labor intensive technologies exported to developing countries; and high-tech and sophisticated technologies to be used and exported to developed countries.

Controlling, reducing and monitoring air pollution, improving energy efficiency, developing "clean" energy systems, and controlling, reducing and monitoring water and land pollution are only a few of the areas in which urgent measures should be taken.

The present investigation will screen the environmental technologies, potential markets, trade mechanisms and international protocols affecting the development of environmental technologies.

The outcome of the study will include recommendations for policy and investments required in this field.

# SUSTAINABLE AGRICULTURE UNDER THE CONSTRAINTS OF WATER LIMITATIONS

## **PRINCIPAL INVESTIGATORS:**

PROF. Y. AVNIMELECH

DR. HAIM ZABAN

## **RESEARCHERS:**

DR. O. AYALON

MRS. NOA FELER

The activity of the modern society is associated with nuisance and damage of the environment (i.e., noise, water contamination, air pollution etc.). Modern development is characterized, among other things, by massive urbanization and a rise in standards of living (and wastes produced accordingly). The agricultural sector, being in an economic crisis for the past years, is characterized by massive land use and intensification of the agriculture, both leading to immense use of resources (water, fertilizers, pesticides, etc.) as well as land erosion and desertification. Nevertheless, there is a need to preserve the agricultural sector not only as a supplier of food, but also as a supplier of environmental benefits (i.e. supplier of oxygen and a carbon dioxide sequestration mechanism, increased infiltration and water drainage to ground water).

In densely populated countries like Israel, the agricultural sector serves also as a guardian of open spaces and as a site for nature and landscape, as well as an attraction for eco-tourism. Agriculture has a very important role in environmental services. Thus, the shortage of this sector might be accompanied by reduction in the quality of life and environment in Israel.

In a recent study of the S. Neaman Institute, the agricultural sector was analyzed, taking into consideration the limited availability of water supplies and the expected dramatic price increase. The study concluded that there is a real need for reduction in the quantity of water supplied to agriculture in order to supply sufficient amount of water to the public sector and the industry. The main way to reduce demand for water is by the economic means of price control. The research demonstrated that better planning of crops (i.e. crops where the income for water is higher than the price of water) is needed.

The present study is intended to evaluate the external benefits and costs of agriculture. These externalities include the environmental services (i.e., preserving open spaces) of agriculture as well as environmental damages (i.e., excessive use of fertilizers).

The outcome of the research will include recommendations for a new policy and perhaps even a system that will compensate farmers not through water prices, but rather through the environmental services provided by agriculture.

Due to the fact that different conditions prevail in different parts of the country (water and land availability, proximity to metropolitan areas, etc.), the research will focus on regional recommendations for farmers (i.e., type of crops) and economic incentives or subsidies needed.



# THE WATER RESOURCES CRISIS

**BOOK AUTHOR:**

PROF. DAN ZASLAVSKY

A comprehensive book on the water resources crisis was recently completed by Prof. Dan Zaslavsky. It presents the complete background of the water resources management in the past years, with the purpose of pointing out the mistakes and oversights. The book was published as a joint effort of the Neaman Institute and the Grand Water Research Institute.

The water crisis is not a new or unexpected phenomenon. For several years now, the water resources have been undergoing an acute crisis, and this intensifies from one year to the next. This crisis is neither god-given nor the result of an ecological disaster. It is a result of human misbehavior. The continuous decrease in the Lake Tiberias water level, the country's chief water resource, and of the groundwater aquifers throughout the country to far below the recharge rate; plus the continuous deterioration of the drinking water quality, the pollution of water sources and the increased evidence of saltwater intrusion in the groundwater – all these are a direct result of the lack of correct and timely decision making. In fact, it is the result of a complete mismanagement of the water system over the last 30 years.

The Israeli water problem is characterized by four sub-groups of problems:

### **Group 1 – Quantity**

In Israel, there is severe water shortage and a deficit in the water balance. This is the result of the water demand that causes an over-pumping exceeding the recharge of the water sources and results in the fast drainage of the natural water basins. Low water levels in Lake Tiberias and the aquifers are causing saltwater intrusion into water sources and also cause the reliability of water delivery to be almost non-existent.

### **Group 2 – Quality**

The quality of the drinking and irrigation water within the Israeli water resources is in a continuous decline. Saltwater intrusion into the water resources, the irrigation using treated liquid-waste water, the pollution of underground water with masses of toxic wastes, petroleum-oil leakage, washout from municipal water piles and, at times, even toxic waste water from the industry, are causing serious damage to water quality.

### **Group 3 – The neighboring countries**

Israel has to share its poor water resources with Jordan (following the peace agreement) and the Palestinian Authority. There is a high probability that future conflicts and agreements will further reduce the Israeli share of these resources, rightly or not.

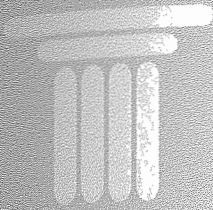
#### **Group 4 – Management**

For years, the Israeli water resources have been managed unprofessionally, due to dispersed authority and lack of well-defined responsibilities at the decision management level, as well as shortsighted behavior guided by personal interests and pseudo-interests.

These four groups of problems are the source of all others.

The problems were known. There are available solutions. Furthermore, these solutions would have cost a mere fraction of the economic damage caused by not doing anything or by doing the wrong thing.

The water resources mismanagement can be used as a metaphor for many other problems in the public administration.



## ORGANIZATION FOR THE PROMOTION OF ENERGY TECHNOLOGY

### **STEERING COMMITTEE:**

DR. Y. SHARAN

Y. ASIA

A. EINAV

PROF. A. BENTUR

M. SHATON

### **RESEARCHER:**

D. KOHN, M. PHIL.

DR. O. AYALON

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 took 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 academia, industry and government.

# E

## ENERGY POLICIES IN ISRAEL: TOWARDS SUSTAINABILITY, EFFICIENT USE AND EQUITABLE BURDEN

### INVESTIGATORS:

PROF. D. CZAMANSKI

A. EINAV

The goal of this project is to develop a set of energy policies for the next 25 years for the State of Israel. An additional goal is to promote a policy platform for regional cooperation in the context of various geopolitical scenarios. The policies will address production and consumption issues. In particular, issues of efficiency and equity will be coupled with concern for the conservation of energy and utilization of various alternate energy sources. Special focus will be placed on the interactions between energy and environment.

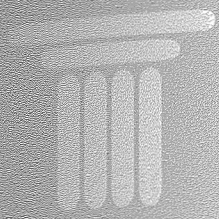
The policies to be studied will include technical and non-technical considerations and the means to policy ends. Experts will be gathered to:

- develop position papers on various issues,
- present alternate approaches for consideration of decision makers,
- develop plans for demonstration projects of new technologies, in particular in the fields of renewable energy and energy conservation.

Groups of experts will be grouped around a variety of themes to conduct background research and to develop policy papers that will serve as a basis for workshops for experts and decision makers. The purpose of the workshops will be to examine the issues and to develop policy alternatives. Each of the activities will be led by a coordinator and supported by an appropriate database center of the Neaman Institute. The contributions and papers developed by each of the teams will be compiled to serve as a basis for developing the overall policy concepts.

The first stage of the project is now being completed. It includes the preparation of a guiding report by Amnon Einav, on the current state of energy in Israel and the resulting policy issues that need to be addressed. The issues addressed in the report include amongst others: the dynamics of the energy sector in Israel; the fuel sector; coal and natural gas; production of electricity and its regulation; sustainable energy development, alternative energies and future technologies; local energy sources, R&D needs.





# 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 amassed in farms that may include tens of large turbines. Most of the wind-farms are located on land. During the last 10 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 dense population), objections of neighbors 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 expensive (foundation problems, severe corrosion, the transfer of electricity to land, etc.), offshore wind farms are becoming feasible.

Israel has good wind energy resources. One wind farm already operates on the Golan Heights, while others are planned. Yet, because Israel is one of the most densely populated 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 has been performed. Based on these two studies, the economics of building offshore wind farms in Israel was investigated.

# MOLECULAR EPIDEMIOLOGY OF COLORECTAL CANCER (MECC)

**PROJECT LEADER:**

DR. G. RENNERT

MECC is a large population-based case-control epidemiological study aimed at studying the causes of colorectal cancer in the Israeli population. Specifically the study is evaluating interactions of genes and environmental/behavioral exposures (such as dietary habits, reproduction, hormone use, smoking, occupational exposures, physical activity, medication use and more). Specific genes such as the 11307k 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 are being recruited from a defined geographical area in Northern Israel. Another 2,200 controls, matched on a variety of demographic parameters, are being sampled from the general, non-affected, population.

The study is expected to take about 5 years. Thus far, about 2,000 new cases of colorectal cancer and 1,800 controls have already been included. A variety of results have been published thus far with data emerging from this project, the last of which appeared in the prestigious journal *Science* last month. 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, Dr. Mila Pinchev, Dr. Yoram Chaïter and others.



# FORUM FOR ACADEMIC RESEARCH OF NATIONAL SECURITY

## **CHAIR:**

MAJ. GEN. (RES.) UZI DAYAN

## **STEERING COMMITTEE:**

PROF. ARNON BENTUR

MAJ. GEN. (RES.) UZI DAYAN

PROF. NEHEMIA FRIEDLAND

DAN MERIDOR

PROF. DAN PELED

PROF. ZEHEV TADMOR

PROF. MANUEL TRAJTENBERG

## **HEAD, DEFENSE-ECONOMY GROUP:**

PROF. DAN PELED

## **HEAD, DEFENSE-SOCIETY GROUP:**

PROF. NEHEMIA FRIEDLAND

A Forum for academic research of national security issues is currently being established within the framework of the Neaman Institute. The forum is intended to develop programs to encourage research in the area of national security and provide a framework for mutual interactions and exchange of ideas between academic researchers and the leaders of the defense establishment in Israel. The program and the processes to accompany it are intended to enhance the effectiveness of the decision making process in this area.

National security issues affect all facets of life in Israel. The defense sector is central in the country's economy and society and its impact on the civilian sector is paramount. This includes, among others, the economy and growth, industry and technological development, science and professional human resources. The spillovers from defense to the civilian sector and vice-versa are quite significant, and decisions and actions taken in the defense sector therefore have a tremendous influence on the economic and social well being of the country. This complexity requires in-depth analysis and research to be able to assess the impact of policies developed. Such research should be professional, independent and based on the best, updated scientific methodologies.

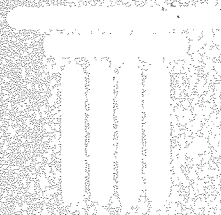
There is an extensive research activity taking place within the defense establishment itself. However, it does not meet the requirement for outside independent academic research which is essential for policy making. On the other hand, research of national security issues which is carried out in universities and various academic research institutes does not fully cover all the required issues, as, for example, is the case in defense-economy interrelations, and does not always effectively interface and liaise with potential consumers in the defense establishment.

The Forum's vision and objectives are to establish the infrastructure required for academic research in areas which are lacking, as well as integrating the researchers in academia to interact with policy makers to affect the decision making process.

The mechanisms of action will include setting up research groups in needed areas, formulating research issues to be addressed by the teams and maintaining regular framework for meetings and conferences to provide the stage for interactions among the researchers themselves, and between them and decision makers.

At this stage two areas have been identified where research groups are being established: defense-economy and defense-society.

Major General (Res.) Uzi Dayan, former Chairman of the National Security Council, has initiated the program and leads the establishment of its activities in his capacity as the chairman of the Forum.



# 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 Science Technology and Economy (STE) group, 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:

- Promoting the **creation** of detailed, **micro statistical data sets**, which fits research
- Assist **research based on confidential data** in research rooms at the CBS.
- Constructing an **Internet site** containing all relevant published data in the field.

### Creation of Data sets and Use for Research

During the last two years, a number of research data sets were set up and are now available for research on human capital and R&D and its support. During 2003, all the files that were included in the center's initial stage will be available for research (see details below).

In addition, an agreement has been reached between the Central Bureau of Statistics and the Samuel Neaman Institute to promote the use of those data sets for research by placing in the internet site detailed information on the research files and their use in the research rooms, and by attempting to fulfill the specific needs of researchers.

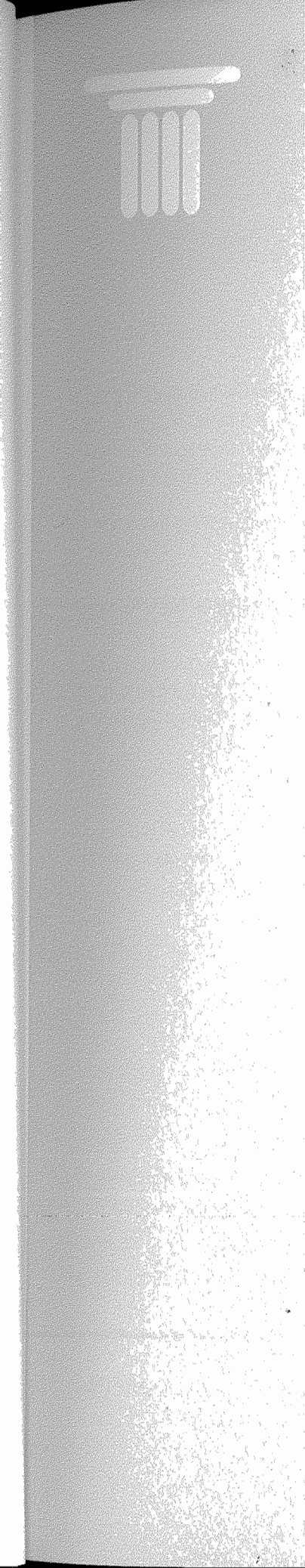
### The Internet Site

The Internet site covers the following areas:

- 1. Publications with Statistical Data.** To date, 12 publications on Industrial R&D, National R&D expenditure, innovation and industrial statistics were received from the Central Bureau of Statistics and others and they were placed on the Internet site. The site provides access to every table in each publication and allows retrievals of each table as a single excel file. During the year 2003, the site will be opened to the public.
- 2. Industry Level Research Data Files.** The site provides files with detailed non-confidential data at the level of industries as well as at other levels. The first file on the manufacturing sector, at the 3 digit industry level, is already available in the center.

### Research Files (the First Stage)

- **R&D Support File 1987-1999.** The Chief Scientist provided the CBS with a very detailed file on R&D support at the project and firm levels, which covers development of this



activity over the past 15 years. The new file will also be matched with the R&D and Industrial surveys (**available for research**).

- **R&D Survey Panel 1990-1999.** This includes detailed annual data on industrial R&D expenditures and support from the annual R&D surveys. The panel enables study of the structure and changes of Israeli R&D firms (**available for research**).
- **The Panel of Industrial Firms, 1970-1999.** This provides a basis for estimating production functions and related models (**to be available for research at the end of 2003**).
- **Linked Employer-Employee Files, 1983-1995.** The CBS is now among the few statistical bureaus that constructs employer-employee files. These files provide a basis for investigating various issues related to labor economics, through simultaneous analysis of supply and demand in the labor market. **A pilot file for the year 1995 is now available for research.**

#### **International Comparison**

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

# MAGNET CONSORTIA INFORMATION CENTERS

## INFORMATION SPECIALISTS:

E. BARZANI

O. BERL

E. GILAD

O. MALBERGER

O. NATHAN-SHATS

K. TONCIULESCU

The SNI Computerized Information Center was established to fulfill the information needs of the consortia working in the framework of the MAGNET program. It is based on a dedicated system, designed according to requirements of the S. Neaman team in cooperation with the consortia. Eleven such centers are active within the framework of the Neaman Institute:

1. ISWR – A broad array of communications techniques, which can be implemented in a wide array of products and applications.
2. DPI – Infrastructures and technologies for digital printing.
3. LSRT – The LSRT Consortium works on the development of technologies that will enable large-scale deployment of communications networks in rural areas.
4. STRIMM – Enabling rich media messaging over Next Generation Networks (NGN).
5. WFCM – The development of architectures, algorithms and communication infrastructures for process control that will facilitate the integration of process and control equipment (wafer FAB clusters) with an automated management control system.
6. ISIS – The Information Superhighway In Space Consortium.
7. MOEMS – The Micro-Systems Consortium.
8. IZMEL – The development of generic technologies for image guided surgical therapy.
9. TEVEL – The development of biotechnological infrastructures for improved plant growth.
10. MAGNESIUM – Development of Magnesium Technologies Consortium.
11. Nanomaterials.

### Information Center Goals:

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

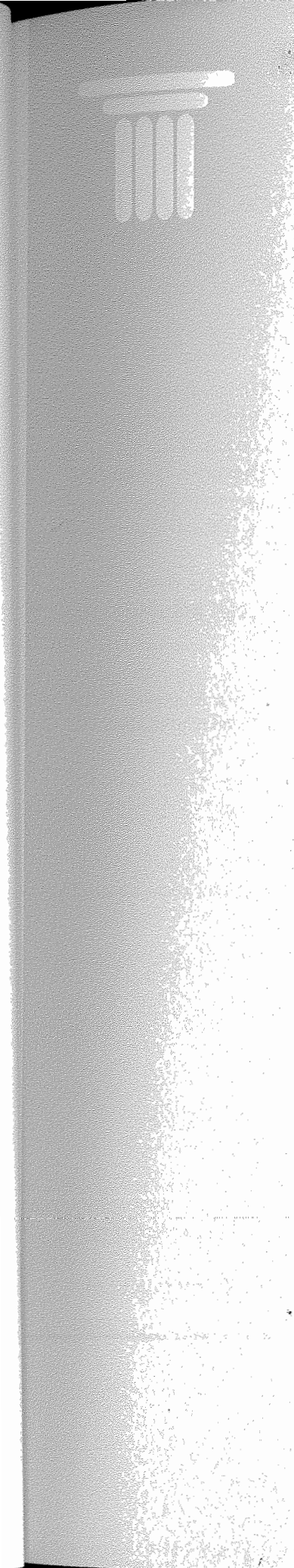
#### **1. Internal Information Site**

Consortium's internal information includes reports of researchers and project managers. The Internet site is designed to store and retrieve all the documents produced in the consortium, as well as to enable technical administration of its activities.

The knowledge management system has a web interface. It enables user-friendly access to information.

#### **2. External Technical and Scientific Information Supply**

The site is designed to keep consortium members updated with information published about the subjects with which it deals.



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 three methods:

- Using a 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, and is 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, only with specific permission of the consortium management.

#### **Consortia's Open Internet Site**

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

#### **Human Resources**

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



# MAGNESIUM USERS ASSOCIATION

**COORDINATOR:**

ISRAEL REICH

The Israeli Magnesium Users Association (MUA) will commence operation at the beginning of 2003. It is a follow-up to the Consortium for Development of Magnesium Technologies, which recently finalized its five years of operation within the framework of the MAGNET program of the Chief Scientist of the Israeli Ministry of Industry and Commerce. The members of the consortium, having had productive research collaboration, decided to continue their association and thus established the MUA.

The main magnesium operation in Israel is The Dead Sea Magnesium Co. (DSM), which produced during 2000-2002 over 30,000 tons of metallic magnesium and alloys a year (production started in December 1996).

The added value of magnesium can be increased significantly by the development of new handling technologies to make new products feasible, or their production simpler, faster and cheaper. With the aid of the R&D carried out by the consortium members, and now, with the efficient cooperation of the MUA members, the forecast is that Israel will succeed in supplying about 10% of the world's future magnesium-based products.

The objective of the MUA is the utilization of the metallic magnesium alloy products, through further development and strengthening of collaboration, as well as dissemination of current 'know how' of the following magnesium alloy technologies:

- New magnesium alloys, "Green Technologies".
- Magnesium casting technologies.
- Forming, especially extrusion technologies.
- Finishing and corrosion protection technologies.

***The MUA includes the following Israeli companies:***

DSM; Rotem Ind; Ortal; Alubin; Matar; Algat; Palbam; Electrotherm; IAI; IMI; Elbit,

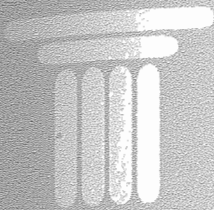
***Two academic Institutes are also members of the MUA:***

Technion, Israel Institute of Technology, represented by the S. Neaman Institute and the Israel Institute of Metals, and Ben Gurion University, represented by B.G. Negev Technologies.

The MUA will carry out its tasks as defined in its annual program by means of three centers:

- The Neaman Institute at the Technion, which will develop a data base and coordinate the technical activities.
- The Israel Institute of Metal (the northern center)
- Magnesium Research Institute (the southern center)





# MAGNET CONSORTIA

## I. Active Consortia at S. Neaman Institute:

1. DPI – Digital Printing Consortium
2. STRIMM – Streaming Rich Media Messaging
3. ISIS – Information Superhighway In Space
4. Consist – Consortium for Industrial Software Tools
5. WFCM – Wafer Fab Cluster Management
6. ISWR – The Israeli Software Radio Consortium
7. Magnesium - Development of Magnesium Technologies Consortium

## II. Consortia recently transferred to the Technion R&D Foudation:

1. LSRT – Large Scale Rural Telephony
2. MOEMS – Micro-Opto-Electro-Mechanical-Systems
3. EDCoT – Emerging Dielectrics and Conductors Technologies
4. OptiPac – Optical Packaging

# DIGITAL PRINTING CONSORTIUM (DPI 2000+)

## RESEARCHERS:

PROF. S. FISHMAN

PROF. D. HORN

PROF. A. MARMUR

PROF. R. SEMIAT

## ACADEMIC COORDINATOR:

DR. D. GETZ

Today, the printing market is valued at approximately 450 billion US Dollars, and the equipment market for it at an additional 45 billion. Twenty years ago, Scitex 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", where the user environment has become more and more individual.

Mass production and long production series characterized 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.

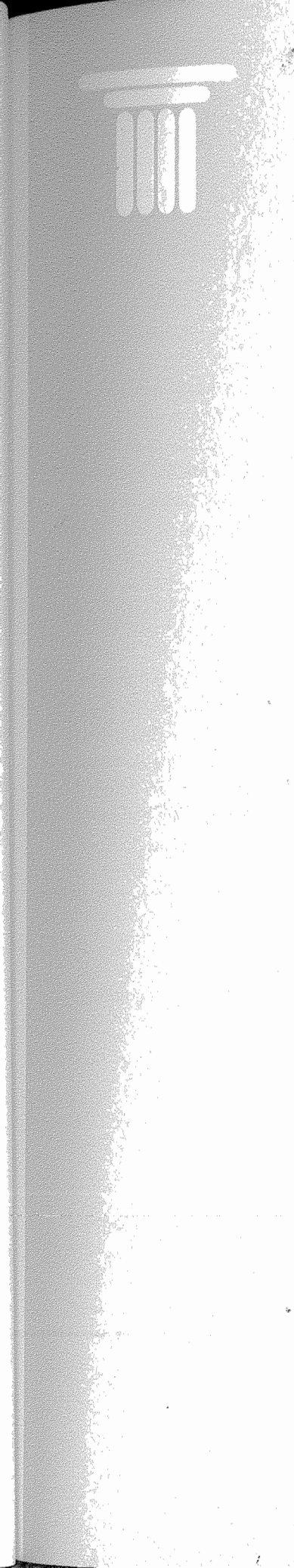
The members of the Consortium believe that the scope of local digital printing technology products will reach 5-8 billion dollars in the years 2001-2003, when the market for ink and other printing materials will increase rapidly and will occupy an increasing percentage of the equipment market.

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

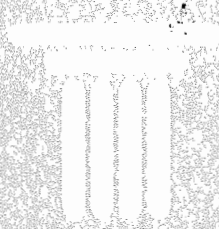
- Develop and study new technologies as a basis for developing new products, systems and perishable materials which will put industrial members in leading positions and control of over 20% of the market.
- Create an academic research infrastructure with industrial vision, to support long-range new ideas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



# STRIMM-STREAMING RICH MEDIA MESSAGING CONSORTIUM

## RESEARCHER:

DR. D. RAZ

## ACADEMIC COORDINATOR:

DR. D. GETZ

The STRIMM Consortium was established in 2000 to enable rich media messaging over Next Generation Networks (NGN). STRIMM intends to establish the architecture, protocols and framework for the delivery of rich media messaging, such as Video-mail, rich media SMS and MMS, over the Internet and next generation cellular systems. The Consortium's fruits will create the infrastructure and tools to provide end users, be it PC or cellular device users, a rich and improved user experience.

## The Challenge

Users send and receive messages of multiple media types (video, audio, text, animation hyperlink) via various devices -PCs, cellular phones, PDA, Set Top Boxes ,TV and Internet terminals - with the dominant applications being e-mail, cellular voicemails and SMS messages. In spite of this demand, today's environment cannot accommodate rich media messaging: the architectures and frameworks cannot support the transmission requirements, the various messaging devices and technologies are not compatible, there are many different video and audio encoding schemes and compression methods, and the prevalence of many different standards makes it almost impossible to transparently communicate between different devices. For rich media messaging to capture a dominant position, new technologies and products will need to provide efficient architectures that enable transmission, as well as common standards and protocols.

## STRIMM Structure

STRIMM 's members are divided into four working groups, each with a clear and common agenda:

WP1: Infrastructure -Architecture for rich media messaging

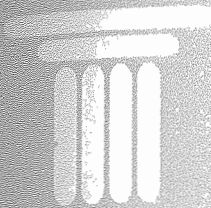
WP3: Upstream/Downstream, interface and protocols

WP5: Transcoding and related technologies

WP7: Interoperability and Integration

Together, these four groups develop the following technologies: Architecture that fits mass market, and which is both scalable and reliable. Servers that interoperate with existing systems, extending and enhancing e-mail standards. Protocols and mechanisms that optimize and improve network ability to handle rich media messages. Rich media transcoding that adapts to bandwidth and terminal capabilities.

Quality of Service incorporation.



**Consortium members:**

**Industrial firms:** Comverse, Emblaze Systems, Mediagate, Optibase, VCON, Scopus Network Technologies, Mobixell Networks, InfoWrap Systems

**Academic Institutions:** S. Neaman Insitute - Technion, BGU - Ben Gurion University, RAMOT - Tel Aviv University

# INFORMATION SUPERHIGHWAY IN SPACE CONSORTIUM (ISIS)

## ACADEMIC

### RESEARCHERS:

PROF. J. AZAR

DR. S. BROS

DR. Y. BIRK

PROF. R. COHEN

PROF. H. LEVI

PROF. MAZAR

PROF. Y. LEVIATAN

PROF. 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. By the year 2005, the satellite communication market could claim close to 10% of the total global telecommunications market, 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.

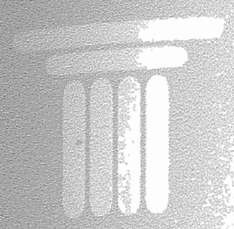
More than 2.5B\$ (1.5B\$ in 1999 alone) had been raised for the new generation of satellite-based networks (Teledesic, Astrolink, SkyBridge, Spaceway, etc.) in conjunction with massive investments carried out by the traditional satellite industries (such as Eutelsat, Astra, Intelsat, etc.), in the broadband 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 as 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 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 five 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.

Five Israeli satellite companies, Gilat Satellite Networks, Orbit, MicroKim, Scopus, Shiron, and three academic institutes, the Technion, Tel Aviv University and Ben Gurion University, joined the consortium in 1999.

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

Overall 21 research projects (14 in industry and 7 in academia) are conducted in the framework of three main topics: networking and resource management, indoor units and outdoor units.

During the four years of consortium activity significant progress was made in all of the projects. Productive cooperation was established between the academic teams and the industry partners. Bi-monthly group meetings took place in the main topics, in which each project's achievements were presented and comments and suggestions were discussed. The research goals of all the projects were mutually influenced by industry requirements and the academic vision.

All the projects technical reports are stored in the consortium information center and are available to members. The information center also supplies and stores scientific, technological and business data related to consortium topics.

# CONSORTIUM FOR INDUSTRIAL SOFTWARE TOOLS (CONSIST)

## **TECHNION RESEARCHERS:**

PROF. G. ELBER

DR. A. FISHER

PROF. B. GOLANY

PROF. A. SHTUB

## **ACADEMIC COORDINATOR:**

MR. YITZHAK ADORIAN

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 direction 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 consortium is continuing its second phase activities centered on the work with IAI (Israel Aircraft Industries), a strategic partner acting as the voice of the customer. The





objective of the 2<sup>nd</sup> phase is to face the challenge of a real manufacturing environment and bridge the critical gaps in order to make the generic platform developed in the first phase productive.

During the first year of this second phase, the implementation of CONSIST's platform caused a significant reduction in production lines cost.

**CONSIST members:**

**Industry:** Tecnomatix Technologies Ltd., CADTECH, ESI, SAP Portals, ClickSoftware, IAI (Israel Aircraft Industries).

**Academia:** Tel Aviv University, The S. Neaman Institute (Technion) and Ben Gurion University.

**Academia:** Tel Aviv University, The S. Neaman Institute (Technion) and Ben-Gurion University.

# WAFER FAB CLUSTER MANAGEMENT CONSORTIUM (WFCM)

## RESEARCHERS:

PROF. A. BRUCKSTEIN

PROF. R. KIMEL

PROF. D. LEWIN

PROF. E. RIVLIN

PROF. I. YAVNE

DR. YOED TSUR

## ACADEMIC COORDINATOR:

MR. YITZHAK ADORIAN

## WFCM Mission Statement

WFCM seeks to develop architectures, algorithms and communication infrastructures for process control that will facilitate the integration of process and control equipment (wafer FAB clusters) with an automated management control system. The vision is to implement production processes in future FABs for the manufacture of semiconductors autonomously and automatically thereby optimizing the chip production process and to maximize equipment usage and material yield.

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.

Today, production plans have a single production system that controls each of the processes 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 consortium's vision is the development of enabling architectures, tools, algorithms and infrastructure for process control. This will enable an integration of process and metrology equipment with control applications to meet the requirements of the "Autonomous Cluster" in future semiconductor fabrication facilities.

The first three years of consortium activity were characterized by a need to understand the underlying technologies, the specification of the technological definitions and then commencing with the basic development work that afforded an understanding of the semiconductor tool equipment sector. In recent years the consortium's activities have crystallized. The following projects and research give expression to this focused activity.

## The consortium's activities are concentrated in four principal directions, namely:

1. Process control.
2. Infrastructure – Adaptation and implementation of communication protocols, information transfer and standards.
3. Industrial engineering – scheduling workflow and developing tools for production management.

4. Data fusion between the various metrology tools and the process control equipment.

WFCM is the first consortium in MAGNET to include a non-Israeli company in its activities. As AMAT-USA only joined the consortium in its third year, the initial period is also experimental during which the parties will get to evaluate the working arrangement.

***Members of the Consortium:***

***Industrial firms: KLA-Tencor, Nova, Optum, Applied Materials (Israel),***

***Applied Materials – USA , Jordan Valley, Intel (observer only)***

***Academic Institutions: Tel Aviv University, and The S. Neaman Institute at the Technion.***

# 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. Y. PINHASI

PROF. D. RAPHAELI

PROF. S. SHAMAI

DR. A. YAHALOM

## 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 ( $10^2$ - $10^5$ )
- Multiple sensors
- Multiple mode

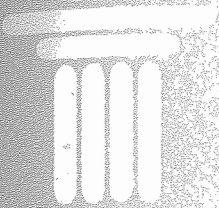
#### Applications

- 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.

# DEVELOPMENT OF MAGNESIUM TECHNOLOGIES CONSORTIUM

## RESEARCHERS:

PROF. D. SHECHTMAN

PROF. M. BAMBERGER

PROF. A. ROSEN

PROF. E. ALTUS

PROF. M. WEISS

DR. A. ROTEM

DR. L. GAL-OR

Z. KOREN, M.SC

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".

This year, the consortium successfully completed its tasks on the 31 of August 2002.

During 2002, the Dead Sea Magnesium Co. (DSM) produced 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 and of its 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 was the utilization of the metallic magnesium alloy products, through the development of magnesium alloy technologies.

### *Consortium R&D program were in four fields:*

- 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 included the following Israeli companies:*

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

### *Two Academic Institutes were also members of the consortium:*

Technion - Israel Institute of Technology, represented by the S. Neaman Institute. and the Israel Institute of Metals, Ben Gurion University, represented by B.G. Negev Technologies.

# LARGE SCALE RURAL TELECOMMUNICATION CONSORTIUM (LSRT)

## RESEARCHERS:

PROF. R. BEN-YEHUDA

PROF. Y. NAOR

PROF. A. SCHUSTER

The LSRT consortium works on the development of technologies that will enable the large-scale deployment of communications networks in rural areas.

Major parts of the world's population still have no access to telephones. 50% of the world's population has never made a phone call. According to an ITU (International Telecommunications Union) survey, 40% of the world's population is situated more than two hours from the closest telephone. While in most of the western world there are tens of phones for every 100 people (80 phones for every 100 Israelis, for example), the numbers for Third World countries are much lower, as low as a few phones for every thousand people in many areas!

Preparing a "conventional" infrastructure of telephone lines is not feasible in most of these areas. There are more than a few difficulties in bringing large-scale communications to rural areas, of a technical (infrastructure preparation) as well as a financial nature (cost of deployment and the need to subsidize the communications services offered because of the villagers' lack of funds).

During the coming decade hundreds of millions of lines will have to be installed in rural areas (according to various estimates). "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.

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. They have made it their goal to research and plan the technological infrastructures that will enable them to better compete with the industrial "giants" in future tenders of the LSRT market, while also enabling them to develop products and realize their full marketing potential. 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 different topologies and sizes of networks. The mutual work is also the basis for future business cooperation and provides an important marketing springboard for international markets.

*Recently transferred to the  
Technion R&D Foundation*

**The companies include:** Telrad Networks, Gilat Satellite Networks, Alvarion, TTI Telecom.  
**Academic members:** The S. Neaman Institute – Technion; Ramot – Tel Aviv University, B.G. Negev – Ben Gurion University, Weizmann Institute, Institute for Industrial Mathematics.

**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 responding to unique needs – simple installation, minimal energy consumption, easy maintenance and 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** – Studying and developing main building blocks for access and end equipment, in order to achieve a technological basis for affordable and highly integrated modular equipment.

**Allocating resources** – developing systems and models for optimal use of network resources optimally.



# MOEMS CONSORTIUM

## THE ISRAELI CONSORTIUM FOR THE DEVELOPMENT MICRO OPTICAL ELECTRO MECHANICAL SYSTEMS

### RESEARCHERS:

IZHAK BUCHER

DAVID ELATA

GIDI GRADER

GERSHON GROSSMAN

EREZ HASMAN

Yael NEMIROVSKY

JOSEPH SALZMAN

DOV SHERMAN

*Recently transferred to the  
Technion R&D Foundation*

### About the consortium

The Israeli consortium for the development Micro Optical Electro Mechanical Systems was founded in 2001 to establish a generic R&D joint venture supported by the "Magnet Program".

The consortium consists of several Israeli companies:

Elbit, ELOP, Opgal, RAFAEL, SCD, ShellCase, TeraOP, TAMAM

Three Academic Institutes are also members of the consortium:

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

**Technion, Israel Institute of Technology**. Represented by the Technion Foundation

**Tel-Aviv University**, represented by Ramot.

### The objective of the Consortium are:

Study and Develop new technologies as a basis for developing new Micro Electro Mechanical Systems and developing manufacturing process and methods for manufacturing those micro systems which will put the industrial members in leading positions in the market of MOEMS products.

Create, direct and support academic research infrastructure with industrial vision, to support long-range new ideas and technologies.

### The Consortium mission

- Identify future market trends and customer needs.
- Define technologies and breakthroughs in advanced stages, by which new products will be developed.
- Analyze critical technological gaps.
- Foster development of generic solutions, tools and infrastructure.
- Develop and implement cost-effective generic technologies.
- Establish infrastructure, labs and manufacturing process facilities that strengthen Israeli industry's technology.
- Establish long-term cooperation between Israeli Industry and academic institutions to pioneer cutting-edge technological achievements.
- Achieve successful and short time-to-market products.
- Position Israeli companies as an international force that leads new solutions for the MEMS technology.

**Specific R&D efforts focus on the following themes:**

- Micro Gyro Technology.
- Scanning Micro Mirror Technology.
- Un-Coated IR detector.
- MOEMS Packaging.
- The 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

# EMERGING DIELECTRICS AND CONDUCTORS TECHNOLOGY (EDCOT) CONSORTIUM

## RESEARCHERS:

DR. S. BERGER

DR. R. EDREI

PROF. M. EIZENBERG

PROF. A. HOFFMAN

DR. W. KAPLAN

PROF. M. S. SILVERSTEIN

The semiconductor industry rapidly is reaching the stage of development where currently used materials and fabrication processes will limit devices performances.

The requirements for miniaturization and increasing component operation speed cannot be achieved by current technology.

New materials and fabrication methods must be introduced into the industry in order to further reduce component size and increase speed performance.

The EDCoT consortium focuses on developing technologies for utilizing such materials in semiconductor component fabrication.

The activities include: development of material processing methods, testing procedures, test equipment, component performance evaluation, etc.

## Research subjects:

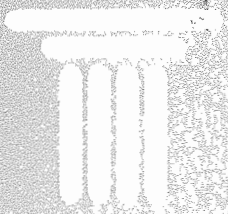
- Conformal diffusion barriers for Cu metallization.
- Morphological, structural and physical-chemical properties of high K dielectric films.
- Development of criteria for high quality interfaces between ultra thin high-k dielectric films and Si substrates.
- Adhesion of metals to dielectrics.
- Low-K dielectric metrology.

## Consortium members

Industry: Tower Semiconductors, Jordan Valley, K.L.A Tencor, Sella Semiconductors Laboratories and C.I Systems.

Academia: The Technion, Israeli Institute of Technology - represented by the S. Neaman Institute, Tel Aviv University - represented by Ramot and Ben Gurion University represented by B.G Negev Technologies.

*Recently transferred to the Technion R&D Foundation*



# TECHNION OUTREACH ACTIVITIES

## COORDINATOR:

DR. O. AYALON

## TECHNION OUTREACH ACTIVITIES

The Neaman Institute has taken upon itself to develop several focused activities for the benefit of the Technion, in addition to its traditional mode of operation aimed at integrating Technion faculty in the research projects of the Neaman Institute. Currently, there are three activities, one ongoing and two in the development stage.

### 1. Green Campus Project

The Technion, as Israel's most veteran as well as chief technological institute, bears responsibility for educating engineers and scientists and for being in the forefront of research and development resolving environmental issues. 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.

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

The main objective of the Green Campus project is to change the lifestyle on the Technion campus toward a sustainable lifestyle demonstrating environmental awareness.

The Green Campus activities and projects embrace a broad range of issues including water conservation, waste minimization, energy conservation, resource conservation and pollution prevention.

(visit our web site for full description of our activities <http://tx.technion.ac.il/~greenweb>).

It appears that the Green Campus project is making its mark and has led to a change in thinking and behavior across the campus. Technion employees, students and faculty are becoming involved, offering suggestions and comments.

The President of the Technion has recently established the Green Campus council that will guide the activities of the Green Campus and improve the implementation of the project's outcomes within the different faculties. A dozen faculty members have agreed to participate in this council and new ideas and directions will be implemented.

We will continue to increase faculty members and students awareness of environmental issues and encourage businesses and government groups to view the Technion as a model and beta site for demonstrating environmental technologies.

#### Green Campus Advisory Council:

Prof. Arnon Bentur, Director, S. Neaman Institute, Chairman.

Prof. Yoram Avnimelech, S. Neaman Institute.

Prof. Rachel Becker, Faculty of Civil and Environmental Engineering. →

#### **SPONSORSHIP:**

PROF. M. EIZENBERG,  
VICE PRESIDENT  
FOR RESEARCH

#### **COORDINATOR:**

PROF. A. BENTUR,  
DIRECTOR,  
S. NEAMAN INSTITUTE.

#### **COORDINATORS:**

PROF. M. EREZ,  
PROF. A. FEIGENBAUM,  
DR. Z. SHPERLING

Prof. Isaac Guedi Capeluto, Architecture and Town Planning.  
Prof. Noah Galil, Faculty of Civil and Environmental Engineering.  
Prof. Michal Green, Faculty of Civil and Environmental Engineering.  
Prof. Alexander Laufer, Faculty of Civil and Environmental Engineering.  
Prof. Izhack Oref, Faculty of Chemical Engineering.  
Prof. Edna Shaviv, Architecture and Town Planning.  
Prof. Michael Stiassnie, Faculty of Civil and Environmental Engineering.  
Dr. Yoed Tsur, Faculty of Chemical Engineering.  
Prof. Shmuel Yannai, Faculty of Food Engineering and Biotechnology.  
Prof. Dan Zilberstein, Faculty of Biology.

## **2. Technion Forum for Science and Technology Policies**

The Technion Forum for Science and Technology Policies was established within the framework of the Neaman Institute under the sponsorship of the Technion Vice President for Research. It is intended to bring together senior faculty members from all the Technion departments to work together to provide a brainstorming forum to develop and assess national science and technology policies. An additional task is to provide a group of experts who could represent the Technion in meetings in national forums, where issues of science and technology are discussed, such as the Knesset Committees.

The Neaman Institute will serve as a home base for this forum, and its infrastructure, including databases and research activities, will support the forum.

The current membership of the forum is as follows: Prof. Uri Cogan, Prof. Elisha Cohen, Prof. Gadi Eizenstein, Prof. Paul Feigin, Prof. Arie Feuer, Prof. Moshe Gur, Prof. Uri Kirsch, Prof. Abraham Lempel, Prof. Nadav Liron, Prof. Abraham Marmur, Prof. Shlomo Moran, Prof. Nitsa Movshovitz-Hadar, Prof. Hillel Pratt, Prof. Uri Shamir, Prof. Daniel Shefer, Prof. Arnon Siegmann, Prof. Michael Silbermann, Prof. Shammai Speiser, Prof. Zehev Tadmor, Prof. Daniel Weihs, Prof. Dan Zilberstein, Prof. Jacob Ziv, Prof. Yoram Zvirin.

## **3. Entrepreneurship Laboratory**

The Neaman Institute, the Faculty of Industrial Engineering and Management and the Technion Research and Development Foundation are jointly developing a new concept to provide a "friendly" mechanism to support faculty members in their effort to commercialize their inventions. The concept is tightly linked with a new MBA program of the Faculty of Industrial Engineering and Management dealing with management of technology. The students, within the framework of this program and under the supervision of a team of expert guides, will develop a business and marketing plan for Technion inventors in close cooperation with the relevant faculty member. The outcome will serve both the students (as part of their course requirement for practical experience) and the faculty member (establishment of a business plan with his involvement to be carried out within the campus). These activities will be followed-up and investigated, to assess and develop the model further, for the benefit of all involved.



# SNI - LIST OF RECENT PUBLICATIONS\*

## Recent Neaman Institute Reports (in English)

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Avnimelech, Y., Ayalon, O., **National Environmental Priorities of Israel**, July 2000.

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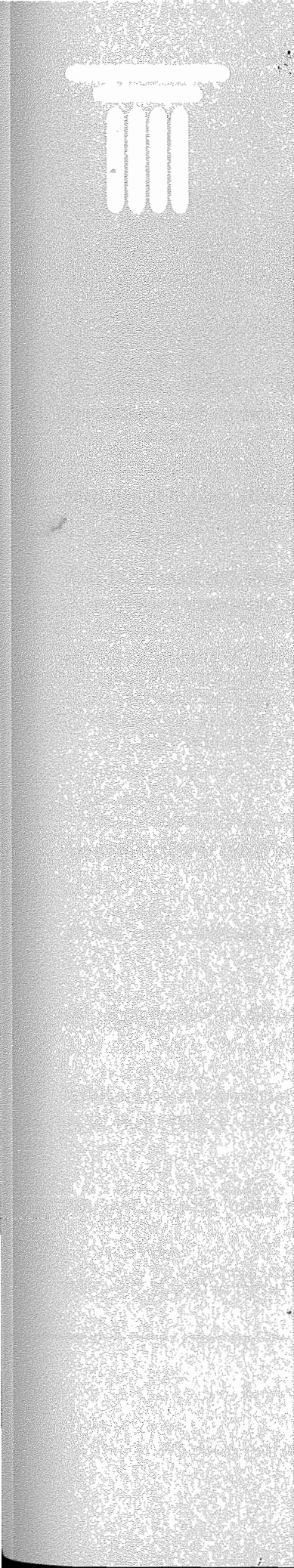
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\* *The list of previous publications is available separately.*



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Breznitz, D., **The Military as a Public Space—The Role of the IDF in the Israeli Software Innovation System**, Science, Technology and the Economy Program (STE) - Working Papers Series, May 2002.

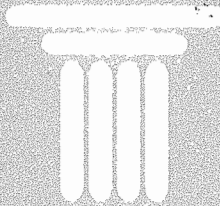
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# ABOUT THE INSTITUTE

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 the 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 and industry, through research, workshops and publications.

The main emphasis in the professional activity of the Samuel Neaman Institute is in the interface between science, 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 devoted his time to the activities of the Institute, until he passed away in 2002.

## Organization

The Director of the Samuel 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. 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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