



Samuel Neaman Institute

FOR ADVANCED STUDIES IN SCIENCE AND TECHNOLOGY

# ANNUAL REPORT 2001-2002



POLICY FOR PROGRESS



Technion - Israel Institute of Technology

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# ANNUAL REPORT 2001-2002

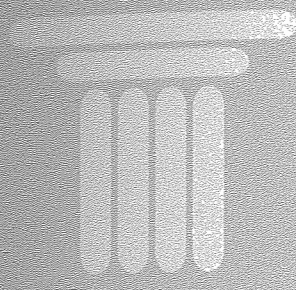
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The S. Neaman  
Institute Building ▶



Mr. Samuel Neaman  
The Founder



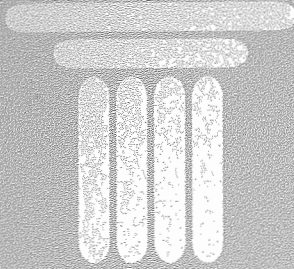


# F OREWORD BY THE CHAIRMAN OF THE BOARD

Henry Kissinger once was asked in an interview whether public service expanded the resources of his knowledge base. His answer was, not at all. What happens in high-level public service, he said, is that the daily issues and their urgency leave no time for intellectual contemplations and, in fact, one gradually uses up the previously accumulated knowledge base. Similarly, Robert McNamara in his book "In Retrospect" (Times Book 1995, New York) says: "One reason the Kennedy and Johnson administrations failed to take an orderly, rational approach to the basic questions underlying Vietnam was simply the staggering variety and complexity of other issues we faced. Simply put, we faced a blizzard of problems, there were only 24 hours in a day, and we often did not have time to think straight. This predicament is not unique to the administration in which I served or to the US. It has existed at all times and in most countries. I have never seen a thoughtful examination of the problem. It existed then, it exists today, and it ought to be recognized and planned for when organizing a Government."

These two comments alone, by people who experienced public service at the highest levels and at critical times, would suffice to justify the creation and operation of public policy think tanks like the S. Neaman Institute. Policy research institutes, rooted in universities with their centuries-long tradition of academic freedom and independent thinking, as well as pool of top scientific talent in all fields of human endeavor, are the natural places for dealing with such problems.

The foregoing comments made by Dr. Kissinger and Mr. McNamara are, of course, relevant to all public policy issues, not only foreign policy and defense-related issues, and are applicable to all countries, as McNamara points out. They are first and foremost relevant to Israel, which has been called upon to resolve a myriad of public policy issues in the midst of a continuing historic conflict with most of its neighbors. In addition, the country has experienced a tenfold increase in its population since its inception; a profound economic transformation from a socialistic, agricultural-oriented economy to a free market-driven, high technology oriented one. And all this has occurred amidst growing cultural diversity of its population.



Mr. Samuel Neaman, the founder of our institute, recognized this need decades ago when he suggested the creation of the institute to Mr. Pinchas Sapir, then Israel's Minister of Finance. They both agreed that in view of the key role science and technology ought to play in the future of the country the Technion is the most appropriate host for such an institute. Indeed, as evident from the report of our director, Prof Bentur, that follows, the institute fulfills its commitment and is involved in a rich, yet focused, selection of science-technology-economy-higher education-infrastructure and societal policy issues - all crucial to the future of our country.

I would like to express the Board's congratulations to Prof. Bentur, for his creative leadership and convey its appreciation to the talented researchers and staff of the institute. Special thanks also go to Mr. David Kohn who, among his other responsibilities, edits and publishes our annual report.

Finally, I would like to congratulate our founder, Mr. Samuel Neaman, on the occasion of his 89th birthday and the publication of his retrospective book "Eretz Yisrael Inside Out - Contemplations" published (in Hebrew) by the Ministry of Defense Publishing House, Tel Aviv 2002. The book not only describes his most extraordinary life story as a farmer, foot and mounted policeman in the British Palestine, soldier in His Majesty Army in World War II (where he started as an enlisted man and ended with a rank of major), his fundraising for the State of Israel during its most crucial stage, and his exceptional success as a CEO of great American corporations; but also illuminates the history, creation and early years of the State of Israel through first hand, sharp and incisive insights. These can only serve as a source of strength in these difficult times.

**Professor Zehev Tadmor**  
Chairman of the Board



# DIRECTOR'S REPORT

## Vision

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

"The S. Neaman Institute is established to help seek solutions for national problems in economic, scientific and social development in the State of Israel."

"The choice of subjects of activity will be determined by the desire to seek solutions for the country's problems for the medium and long-term, using the scientific and technological human resources at Technion, and recruiting teams composed of Technion and other experts for limited time periods, to concentrate their efforts in the areas described".

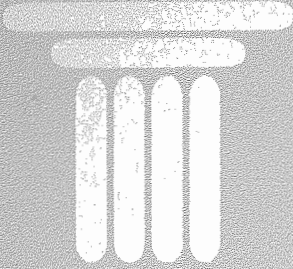
## Objectives and Scope of Activity

The main emphasis in the professional activity of the S. Neaman Institute is in the interface between science & technology - economy - society. 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 non-profit organization. This enables it to be effective in fulfilling its goals, providing it with the flexibility to establish research and expert teams including also representatives from other universities and other agencies, outside the Technion, required for such interdisciplinary



activity. The S. Neaman Institute, therefore, absorbs its power from the Technion, but its independent and objective status enables other researchers to take part in its various projects.

### **Professional Activity**

S. Neaman Institute is currently in the midst of a multi-annual initiative for a continuous activity in a variety of topics related to national R&D policies. Special emphasize is given to science policies and technological innovation and their impact on advanced industry and national infrastructure. The program was initiated by the S. Neaman Institute with an aim of establishing an on-going activity that will include in-depth studies and application activities in order to influence decision-makers.

The area of national policy studies related to science and technology has become the core activity of the S. Neaman Institute. It is supported and complemented by additional activities associated with industry as well as activities designed to increase awareness in the general public. Special emphasize is given to the exposure of the studies to decision-makers in the public, government and business sectors, in order to develop avenues for their implementation.

### **Core Activities**

The core activities of the S. Neaman Institute are within four main fields directly related to science and technology. The following is a short overview of these areas.

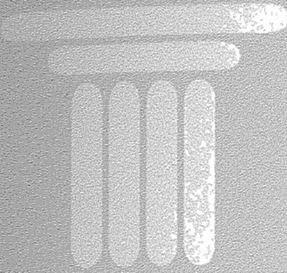
#### ***Science, Technology and Economy***

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

#### ***University Education and Human Capital***

The activity in this area interfaces and often overlaps with activities in the first area. Science, technology and economic growth are tightly linked with development of human resources and integration of universities' research abilities within the national technological innovation system. An international working group studying the future of research universities was recently established. Several studies on university technology transfer and university-industry relations are underway, sponsored by the Israeli Academy of Science and the Ministry of Science. In addition, the Neaman Institute launched several projects with the intention of affecting campus life, such as the Green Campus Project and activities related to Ethics in the Academy and Leadership Education in Science and Engineering.





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

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," which is currently in its first stages. We are in the midst of the development of other projects related to infrastructure, such as Energy and Water, in cooperation with other Technion Institutes. In each of these areas there is an intention of holding an annual conference presenting the "State of the Art" in Israel. Such mode of operation has been established in the area of National Environmental Policies where the second annual conference was recently held. It was well attended by key people in the Ministry of Environment and other national organizations.

### ***Technology and Society***

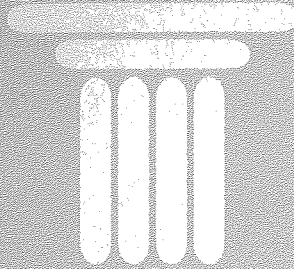
The activities in the areas of technology-society interactions have been extended with the objective of building up the expertise required for policy studies in these fields. The specific topics addressed include technology for the elderly and the impact of technology on school structures.

### **Application and Support Activities**

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

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, academic guest program, policy papers presented to decision makers, publications and databases. The impact within the Technion will take place by the initiation of policy studies 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**



# LIST OF PROJECTS

## New Beginnings

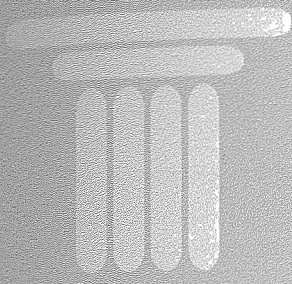
- 9 The Future Research University of Israel
- 11 The Future of the Chemical Industries in Israel
- 12 Energy Policies in Israel: Towards Sustainability, Efficient Use and Equitable Burden
- 13 The Water Resources Crisis
- 15 Development of Sustainable Agriculture Under the Constraints of Water Limitation
- 16 Women in Computer Science
- 17 A National Survey of Israeli Medical Graduates
- 18 The "School+" Project
- 19 The Operation Room of the Future

## Ongoing Projects

- 20 The Science, Technology and Economy (STE) Program
- 26 University-Industry Relations: Policies Guiding University-Industry Technology Transfer
- 27 Enhancing Industrial Innovation Through University Transfer of New Technologies
- 28 Financing Innovation Schemes: The Israeli Experience
- 29 The Zvi Grinliches Research Data Center
- 31 National Environmental Priorities of Israel - 2001
- 32 The Green Campus
- 33 From "Israel 2020" to "Israel 2050"
- 34 Sustainable Energy: Wind Energy
- 35 OPET Israel (Organization for the Promotion of Energy Technology)
- 36 Aging and Technology: Internet for the Elderly
- 37 Molecular Epidemiology of Colorectal Cancer (MECC)

## Consortia

- 38 The S. Neaman Institute Information Center
- 40 The Israeli Software Radio Consortium (ISWR)
- 42 Information Superhighway In Space Consortium (ISIS)
- 44 Emerging Dielectrics and Conductors Technology Consortium (EDCoT)
- 45 Large Scale Rural Telecommunication Consortium (LSRT)
- 47 Streaming Rich Media Messaging Consortium (STRIMM)
- 48 Wafer Fab Cluster Management Consortium (WFCM)
- 50 Consortium for Industrial Software Tools (CONSIST)
- 52 Digital Printing Consortium (DPI 2000+)
- 54 Development of Magnesium Technologies Consortium
- 55 Izmel Consortium



# THE FUTURE RESEARCH UNIVERSITY OF ISRAEL

PROJECT LEADER:

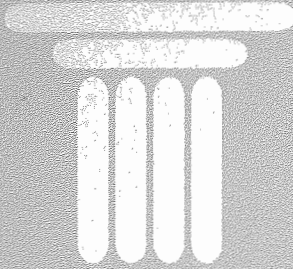
PROF. Z. TADMOR

An international working group was established by the S. Neuman Institute to study in depth: **"The Future Research University of Israel - Structure, Organization, Operation & Governance"**. The members of the working group are: Professor Arnon Bentur Director of Neuman Institute and Professor of Civil Engineering, Professor Hanoch 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, Lord Claus Moser, Chairman of the Board of the Open 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 Neuman 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.

In addition, in order to gain a complete overview of the Israeli higher education system, a second working group reevaluating the goal and mission of the colleges in Israel was also established. 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 Zahor of Ben Gurion University and President of Sapir College in the Negev.

The rationale of the study stems from the profound changes that took place both in the higher education system in Israel and in its social, cultural and political environment over the past decades. These developments triggered the Israeli Government to instruct the Planning and Budgeting Committee (P&BC) of the Council of Higher Education to establish a Public Commission to look into the organization and Governance of the Israeli Universities. The Commission headed by Judge Maltz submitted its report last year, and made a series of useful, however not binding, recommendations regarding the role and structure of the boards of governors, the councils, and the senates. However, the Commission was not mandated to make a thorough and in depth analysis of the research university as a whole.

A step in this latter direction was recently taken by the Israel Academy of Sciences and Humanities. The Academy, concerned about the foregoing developments in the Israeli



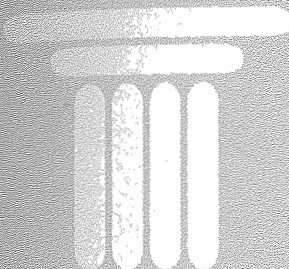
higher education and the threats posed to the universities by social and political developments in the Israeli society, jointly with the Planning and Budgeting Committee of the Council of Higher Education established a Committee to study in some depth the future of the Israeli Research Universities. In this framework two international workshops took place and three subcommittees were established: one dealing with technology transfer<sup>1</sup>, the second with budgeting issues and the third with university relations with the society at large. The work of the Committee and subcommittees continues.

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

We believe that the foregoing developments in the Israeli higher education system, the quickly changing Israeli social and political scene, as evidenced by the recent actions of the Minister of Education and Culture Ms Limor Livnat in restructuring of the Council of Higher Education and perhaps more importantly, the profound global technological, scientific and economic changes that emerge at the dawn of the 21st century, **demand a thorough and complete reevaluation of the research university as a whole and rethinking of the complete higher education system in Israel.** The challenge is how to meet the needs and tasks of the new emerging era, answering the growing demand for higher education, while retaining the character, goals and ideals of the classical research university. How will the future research university look like? What will be its disciplinary distribution? How will it interact with industry and society? What will be its size? How will it be organized? What will be its missions?

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

<sup>1</sup> The Committee has commissioned the Neaman Institute to carry out a detailed study of technology transfer in all Israeli universities.



# THE FUTURE OF THE CHEMICAL INDUSTRIES IN ISRAEL

## RESEARCHERS:

PROF. YORAM AVNIMELECH

DR. GILEAD FORTUNA

ARNON GOLDFARB

PROF. EFRAIM KEHAT

REUVEN VACHS

DR. TUVIA ZISNER

## INFORMATION SPECIALISTS:

ORLY NATAN-SHATS

KEREN TONCIULESCU

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 has started in the beginning of 2002 and was scheduled to evaluate and consider the following:

1. The trends in the global chemical industry, studying few national policies in details.
2. The "inventories" of the chemical industry in Israel covering current businesses and plans for the future.
3. Environmental considerations and its implications, including preferred locations for new industries.
4. Maturing new technologies, which are relevant to the industry and could affect its growth directions.

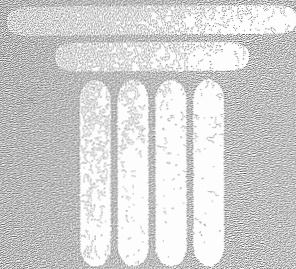
During the first quarter the following actions were undertaken:

1. Detailed data was collected about the chemical industries in Switzerland, Belgium, Holland, Taiwan, Singapore, Korea and others.
2. Data was collected of many multinational chemical companies and their policies were studied.
3. Initial data was collected on most of the large and medium Israeli chemical companies and preliminary analysis was done.
4. Some material on modern relevant technologies was collected. This dealt mainly with biotechnology, nanotechnology and advanced materials.

Very preliminary observations are:

1. Successful multinational chemical companies have gone through a process of refocusing, moving back to emphasize core competencies.
2. Combining biotechnology and basic chemical companies has not succeeded in most cases.
3. It makes sense to differentiate between the classical chemical industry and the new industries, which are based on the chemical technologies towards new applications. We will try to study both and to evaluate implications later.

In the next months we expect to interview the leaders of the Israeli chemical industries and learn about their plans and views.



# E

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

**COORDINATOR:**

PROF. D. CZAMANSKI

The goal of the 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. A 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 considerations 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 gathered around a variety of themes to conduct background research and to develop policy papers that will serve as a basis for workshops of experts and decision makers. The purpose of the workshops will be to examine the issues and to develop policy alternatives. Each of the activities is led by a coordinator and supported by an appropriate data base 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 WATER RESOURCES CRISIS

## BOOK AUTHOR:

PROF. DAN ZASLAVSKY

The book presents the complete background of the water resources management in the past years, with the purpose of pointing out the mistakes and oversights in the water resources management.

The water crisis is not a new or unexpected phenomenon. For several years now, the water resources have been undergoing an acute crisis, which 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 chief water resource of the country, and of the groundwater aquifers throughout the country, far below the recharge rate; 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 the right and timely decision making. In fact, 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**

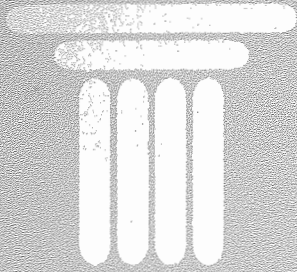
In Israel, there is severe water shortage and the deficit in the water balance, as a result of the water demand which causes an over-pumping that exceeds the recharge of the water sources and results in the fast drainage of the natural water basins. Low water levels in Lake Tiberias and the aquifers 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. The 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, at times even toxic waste water from the industry, are causing serious damages 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**

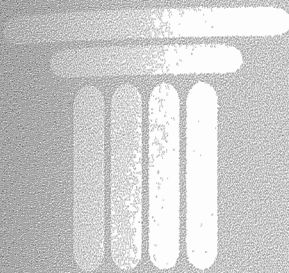
For years, the Israeli water resources have been managed unprofessionally, due to dispersed authority and lack of well defined responsibilities at the decision management level, and due to short sighted behavior guided by personal interests and pseudo-interests.

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 small factor of the economical damage caused by not doing or by doing the wrong thing.

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





# DEVELOPMENT OF SUSTAINABLE AGRICULTURE UNDER THE CONSTRAINTS OF WATER LIMITATION

## RESEARCHERS:

PROF. Y. AVNIMELECH

NOA FELLER

CHAIM ZABAN

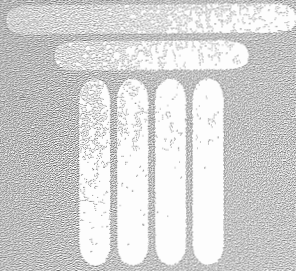
The role of agriculture in either GNP or number of employees had gone down in the last two decades. Yet, agriculture is still the major water consumer in the country. There is a demand to reduce the water consumption by agriculture, even further than its present level.

The basic assumptions and demands were:

1. The state of Israel has to preserve its dwindling water resources and reduce water usage.
2. Water should be used in agriculture only if the total resulting benefit is higher than the integrated cost of the water.
3. The goals of any agricultural planning is to preserve at least the present income and lively-hood of the farming community.
4. The external contributions of agriculture should be included in the overall consideration.

## The main conclusions of the study are:

1. The most efficient tool to control water usage is through the pricing of water. However, even though the government plans to compensate farmers for water price increase, this will reduce the income of the agricultural sector by about 160 million NIS (MNIS) annually.
2. Reducing agricultural water consumption by 200 MCM (Million cubic meters) will further reduce farmers income by about 180 MNIS.
3. Many crops such as citrus and most field crops give a negative return in respect to water cost (i.e. the income resulting from irrigation is lower than the water cost). However, several crops (orchards, vegetables, flowers) give positive return. Irrigation with potable water should be limited to crops that give significant positive return. A compilation of the water return in crops is given.
4. The external contributions of agriculture are discussed. These contributions include environmental services (Sequestering CO<sub>2</sub>, sink for municipal solid waste and treated effluents), preservation of landscape and culture, tourism, preservation of national land etc. The annual value of these services is estimated to be around 1,200 MNIS, higher than the loss of income due to water pricing and limitation.
5. The external contribution of agriculture is different in the different regions. Inclusion of the external contributions of agriculture enables to plan a sustainable and profitable agriculture.
6. It seems that it is feasible to have sustainable agriculture in Israel even under conditions of severe water scarcity. Operative details, such as regional planning, development of legal and economic tools and the proper pricing of different water classes is still to be worked out.



# WOMEN IN COMPUTER SCIENCE

## RESEARCHER:

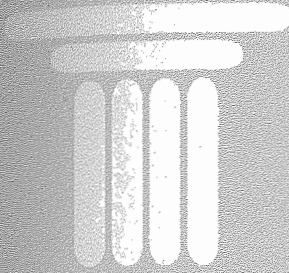
DR. O. HAZZAN

Formal and informal data indicate that the percentages of the high-school girls who study computer science at the levels of O and A for matriculation exam remain relatively low. For example, in the years 1998, 1999 and 2000 the percentages of girls who took the level A computer science matriculation exam was 26%, 27% and 29% respectively. US surveys indicate similar findings (Camp, 1997; The MIT EECS Women Undergraduate Enrollment Committee, 1995). Furthermore, certain reasons that discourage girls from choosing computer science as their professional carrier have been identified in the US (Margolis & Fisher, 2002). As a result several organizations across the US which deal with this issue have been established.

The Israeli high-school curriculum in computer science is among the leading ones in the world. This fact together with the data mentioned above, led us start examining the reasons that may explain the data. On October 2001, within the framework of the Samuel Neaman Institute, we started conducting the first stage of the research which focuses on data collection. In general, at the end of this stage we hope to be able to describe the situation in Israeli high schools with respect to boys and girls learning about computer science. In particular, analysis of the reasons that encourage and discourage high school students from choosing the learning of computer science, will guide us in the development of a set of activities for encouraging girls to consider the learning of computer science in high school.

To increase the impact of this activity, the research is done in collaboration with "Machshava" - The Israeli National Center for High School Computer Science Teachers. So far, during the first six months of the research we distributed a questionnaire among computer science teachers, organized three workshops with teachers about the topic in order to learn about their perspectives, presented the subject in the second national conference of high school computer science teachers, met leading women in computer science and collected data from various resources. One of the leading activities of the project is the recruitment of teachers to join the research by inviting them to be involved in the data collection and analysis. At the beginning of May 2002 a meeting will take place in which the teachers will present preliminary data. Towards the end of the first year of the research (October 2002) a one-day workshop for preparing the future of the research is planned.

Although we are only at the beginning of the research some findings can be identified even at this stage. For example, and in very general terms, the reasons that discourage girls from selecting computer science in high school can be categorized into cognitive factors, social factors and affective factors. Such data is important for the next stages of the research.



# A NATIONAL SURVEY OF ISRAELI MEDICAL GRADUATES

## PROJECT LEADER:

DR. N. BITTERMAN

The medical profession is undergoing major changes - it has become a multidisciplinary occupation requiring a wide variety of new skills in "cutting edge" of biomedical research and advanced techniques, as well as expertise in healthcare economics, management and proficiency in ethics and legal issues.

Based on the growing importance of biomedical research and life sciences technologies in the new era, there is a need for development of a human infrastructure of physicians working both in basic and applied medical research and in its application to the industry. Recently, there is an increased trend of medical graduates and physicians shifting from pure medical occupations towards the biomedical industry, Hi-Tech companies and also life science research. A special concern and thought must be granted to evaluate and perhaps deal with this brain defection from the medical field.

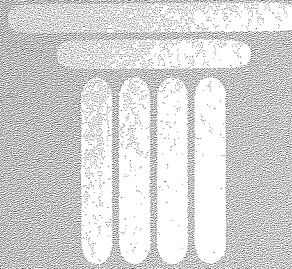
The S. Neaman Institute with the support of the Chief Scientist of the Ministry of Health and the Deans of the four Medical Schools in Israel initiated a national survey of Israeli medical graduates. This project is directly related to the framework of other large scale projects of the Neaman Institute such as University-Industry Relationship and Technology Transfer, The Future Research University Of Israel, The "School +" Project and "Infrastructure and Israel 2050".

A detailed questionnaire will be distributed among graduates of the four medical schools in Israel that completed their studies between the years 1981-2001.

The primary aims of this National survey are:

1. To characterize the academic background and training of the graduates (in addition to the MD 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 fitness to the needs of the current and future requirements from medical occupation in Israel. The graduates will be asked to rank their preferences for alternative medical education programs.

The findings and results of the survey will be presented to the policy makers in the national medical authorities and shall serve as a base for re-evaluation and further discussions of future medical education programs in Israel. The recommendations will be assessed in light of the changing requirements from the medical occupation, 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

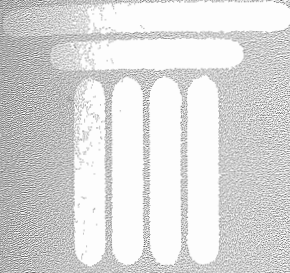
I. HAYER M.SC.

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

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

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

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



# THE OPERATION ROOM OF THE FUTURE

## PROJECT LEADER:

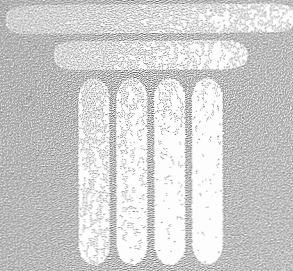
DR. N. BITTERMAN

The Operating Room of the Future is one of the most rapidly developing fields in medicine today. The most advantageous advances in the future operating room include: Minimally invasive procedures, robotics and computer-aided surgery, image-guided surgery, virtual reality, Telemedicine (Telesurgery, Teleradiology, etc.), voice-activated systems, and advanced Bio-materials. An increasing number of scientists and engineers are partaking in the development of innovative concepts, methods and instrumentation in medical, biotechnological, and high-technology projects being part of the operating room of the future.

The operating room of the future raises major multidisciplinary issues in technology (man-machine interface), education (teaching and tutoring of the surgical team), healthcare economy, legal and ethic dilemmas and social issues such as equal opportunities for providing surgical services for all citizens.

The S. Neaman Institute has decided to gather under one roof a number of the best experts from the Technion and other institutions in Israel, to deliberate on the various aspects of the Operating Room of the Future. The team, on an ad hoc base, will perform research projects.

An International Symposium entitled "The Operating Room of the Future" is planned, sharing expert speakers from Israel and abroad. The symposium will present an interdisciplinary approach to the operating room of the future, focusing on: Innovative technology in the operating room, Ergonomics and Human Factors, Industrial Design aspects, Healthcare Economics, Ethics and Legal Aspects, Enterprise and High Tec, and local national aspects related to this field.



# THE SCIENCE, TECHNOLOGY AND ECONOMY (STE) PROGRAM

## HEAD OF STE PROGRAM:

PROF. M. TRAJTENBERG

## ACADEMIC COORDINATOR:

PROF. D. PELED

The Science, Technology and Economy is a core program dealing with a central mission of developing national policy alternatives in the fields of science, technology and economics. Prof. Manuel Trajtenberg chairs and coordinates its activities together with Prof. Dan Peled. There are about 15 additional researchers participating regularly in the program mostly economists from various universities and research organizations. This is a novel program in several ways. First, it cuts across university boundaries trying to bring under one roof the best researchers in the field; second, it is an attempt to harness the vast economical and technical knowledge of the team to practical policy issues; third, it is meant to educate a cadre of young policy research scholars for Israel, and fourth, it will help to place the S. Neaman Institute and the Technion into the center of national policy making. The activities of this program started in late October 1999, so that we are now in the midst of the program's third year.

## New Research Projects

This year the STE program adopted a "diversification" strategy, in that it sought to support research projects covering a wider spectrum of disciplines and topics, going beyond the almost exclusive focus on economics as the paramount disciplinary base. Indeed, as the following list of approved projects shows, many of the researchers are based in Business Schools, and cover fields from Finance to Marketing to Entrepreneurship. The projects approved include five new full-blown projects, and two "seed" projects. The latter receive only a small amount of funding, meant to allow for a feasibility check; if proven viable these projects will get full support in the future. The 13 researchers engaged in these projects actively participate in the monthly meetings of the STE program, as well as in its other activities.

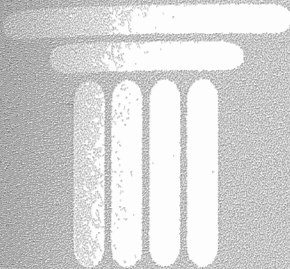
### 1. Government support of R&D

Dan Galai and Zvi Wiener, School of Business Administration, The Hebrew University

### 2. The R&D Subsidies Data Set

Saul Lach, Department of Economics, The Hebrew University of Jerusalem  
Haim Regev, Central Bureau of Statistics

### 3. The Chasm in the Growth of New Innovative Products and Technologies: Theory and Application to the Israeli High-Technology Market



Jacob Goldenberg, School of Business Administration, The Hebrew University  
Barak Libai, Faculty of Industrial Engineering and Management, Technion  
Eitan Muller, Graduate School of Business Administration, Tel Aviv University

**4. How Entrepreneurs Evaluate Technological Opportunities:**

**A Proposal for Research Funding**

Avi Fiegenbaum, Faculty of Industrial Engineering and Management, Technion  
Scott Shane, Chairman of Entrepreneurship Department, Robert H. Smith School of  
Business, University of Maryland

**5. Protecting the Rights (intellectual property) of Plant Breeders and the Flow of  
Innovation**

Dan Rymon and Baruch Bar-Tel, ARO - The Agricultural Research Organization (The  
Vulcani Institute)

**“Seed” Projects:**

**6. Internet Usage, Language and Demographics: Is There a Digital Divide?**

Neil Gandal, Department of Public Policy, Tel Aviv University

**7. Assessing the Relative Efficiency of University Technology Transfer Offices in the  
U.S., U.K., and Israel: A Distance Function Approach**

Donald S. Siegel, Nottingham University Business School, University of Nottingham, UK

**8. Info-gap Methodology for the Formulation and Evaluation of Public Policy.**

Yakov Ben-Haim, Faculty of Mechanical Engineering, Technion.

In addition, three projects initiated the previous year are still being pursued this year:

**9. “The Davids go Global: The Politics of High-Technology Industrial Development in  
Peripheral States - Ireland, Israel and Taiwan”**

Danny Bresnitz, Political Science Department, MIT

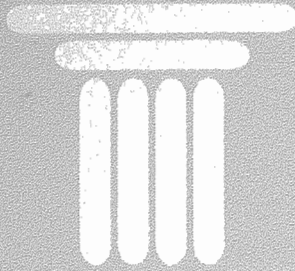
**10. “Silicon Valley, Israel and Taiwan: A Comparative Study of Spillovers Flows with  
the Aid of Patent Data”**

Manuel Trajtenberg, Eitan Berglas School of Economics, Tel Aviv University

**11. “Evaluation of Technology Spillover in Peripheral (Rural) Areas”**

Dr. E. Gelb, Dr. D. Getz, Gilad Oberman

Notice that two of the newly funded projects include researchers from abroad: Professor  
Scott Shane, Chairman of Entrepreneurship Department, Robert H. Smith School of  
Business, University of Maryland, and Professor Donald Siegel, of the Nottingham  
University Business School, University of Nottingham, UK. This reflects the stated intention  
of the STE Program to have international reach.



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

### Scholarships

Since its inception we understood at the STE Program that one of the limiting factors facing policy-oriented research in this field is the scarcity of economists and researchers in related disciplines that specialize in Science and Technology. It was thus decided to support graduate students in order to encourage them to write dissertations in this area. We made a modest start in the academic year 2000-2001, awarding scholarships to two students writing MA dissertations:

1. **"A Computational Approach to Duopoly Equilibrium with Capital and R&D Investments: Application to the AOI Industry"**

Tali Harel, Economics, Haifa University

2. **"Universal Banking and R&D Investments"**

Aaron Shaked, Economics, Tel Aviv University

This year we received many more applications, and awarded scholarships to 5 students, from a variety of backgrounds:

3. **"Transforming Ultra orthodox (Haredi) religious Scholars into Hi-tech professionals"**

Yohai Hakak, Ph.D. Candidate, The Paul Berwald School of Social Work, The Hebrew University

4. **"How does the Internet affect the stock markets?"**

Granit San, Ph.D. Candidate, School of Business Administration, Tel Aviv University

5. **"Choice of R&D Strategy"**

Amitai Alter, MA Student in Economics, Tel Aviv University

6. **"Technology International strategic alliances - trends, patterns and antitrust policy implications"**

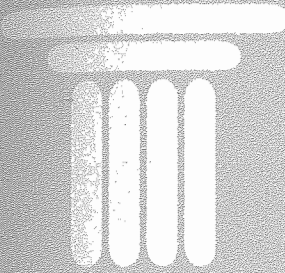
Yaron Bar Nathan, MA Student in Economics, Tel Aviv University

7. **"Specialization, Structure and Growth of the Economy"**

Husni Zuabi, Lecturer, Department of Economics, Hebrew University

These seven students actively participate in the activities of the STE Program, and add a great deal to the diversity and freshness of ideas discussed.





## Working Papers

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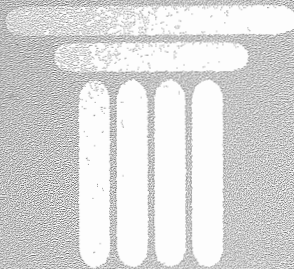
One of the intended goals of the STE Program is to influence the national agenda and policy making in Science and Technology. Thus, dissemination of the research outputs resulting from the projects supported is key to the success of the Program. The main vehicle to that end is the Working Papers Series, comprising the end results of STE projects, as well as other papers of related interest, written by researchers connected to the Program. From late 2000 until February 2002 nine papers were published, with at least two more currently under way:

- STE-WP 1-2001 Lach, Saul, "Do R&D Subsidies Stimulate or Displace R&D? Evidence from Israel".
- STE-WP 2-2001 Trajtenberg, Manuel, "R&D Policy in Israel: An Overview and Reassessment"
- STE-WP 3-2001 Frank R. Lichtenberg, Frank R. "Sources of U.S. Longevity Increase, 1960-1997"
- STE-WP 4-2001 Peled, Dan, "Defense R&D and Economic Growth in Israel: A Research Agenda"
- STE-WP 5-2001 Trajtenberg, Manuel, "Innovations in Israel 1968-1997: A Comparative Analysis Using Patent Data"
- STE-WP 6-2001 Silipo, D.B. and Weiss, Avi "Cooperation and Competition in R&D with Uncertainty and Spillovers"
- STE-WP 7-2001 Lach, Saul, and Sauer, Robert M. "R&D, Subsidies and Productivity"
- STE-WP 8-2001 Bizan, Oded, "The Determinants of Success of R&D Projects: Evidence from American-Israeli Research Alliances"
- STE-WP 9-2002 Ber, Hedva, "Is Venture Capital Special? Empirical Evidence from a Government Initiated Venture Capital Market"

## Monthly Meetings

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The STE Program continued holding the traditional monthly meetings in which members of the group present and discuss ongoing projects. One of the significant advantages of this forum is that it allows to provide feedback at earlier stages of the projects in an unpretending, 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 3 hours, and typically includes 2 - 3 presentations, and discussions of additional topics of interest to the group.

In the course of the fall semester of this academic year (2001-02) 3 meetings were held, comprising 11 presentations of ongoing research projects (including those by scholarship recipients). During the spring semester there will be four meetings, including a special session at the Annual Meetings 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.

### **Visitors and Outreach Activities**

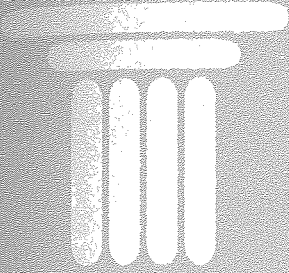
The flaring of the "Intifada" in the last year and a half seriously impaired the coming of foreign visitors. Still, the STE Program was fortunate to host a visit by Professor Donald S. Siegel, of the Nottingham University Business School, University of Nottingham, UK, in late December 2001. Professor Siegel, who specialized in University Technology Transfer (a topic of high interest to the STE Program), presented a seminar at the December meeting of the STE group, addressed a forum of Deans and Heads of Research Institutes at the Technion, and participated in the Levinson Annual Economic Forum, organized by the Tel-Aviv-Yaffa Academic College. Professor Siegel is also involved in a "seed" project, trying to collect data so as to deploy the methodology that he has developed to investigate Technology Transfer in other countries, to the case of Israel.

Professor Yakov Ben-Haim, Itzhak Modai'i Chair in Technology and Economics, at the Faculty of Mechanical Engineering, Technion, has joined the STE Program, and actively participates in its activities. Professor Ben-Haim recently presented a seminar on "Info-gap decision theory: applications to economic analysis and planning."

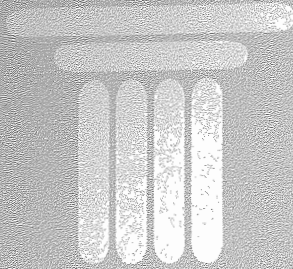
Professor Manuel Trajtenberg was invited to participate in the Second Conference on Innovation Policy and the Economy, that took place in Washington D.C. in April 2001. The conference, organized by the National Bureau of Economic Research, brings together policy makers from the major US government branches that deal with R&D and Innovation, and economists doing research in this area. Prof. Trajtenberg presented there a paper entitled "Government Support for Commercial R&D: Lessons from the Israeli Experience." Professor Trajtenberg was also invited to give a keynote address to the 4th Technology Congress in Istanbul, Turkey, organized by the TUBITAK, TTGV and TUSIAD.

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

Haim Regev, the former Associate Director of the Central Bureau of Statistics, was joined by Dr. Shaul Lach of the Department of Economics at the Hebrew University, in order to



develop the data bases that form the core of the Center. In particular, they made a great deal of progress in the development of the data provided by the Office of the Chief Scientists of the Ministry of Trade and Industry, which included highly detailed information on every single R&D project supported by the OCS since the mid 1980s. Significant progress was achieved also in the discussions with the CBS on the establishment of Research Rooms.



# UNIVERSITY-INDUSTRY RELATIONS: POLICIES GUIDING UNIVERSITY-INDUSTRY TECHNOLOGY TRANSFER

## RESEARCHERS:

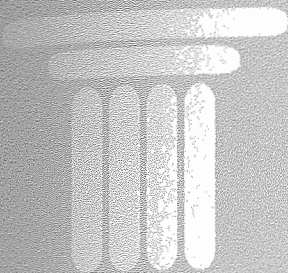
PROF. D. SHEFER

DR. A. FRENKEL

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

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

**Sponsor: The Israel Academy of Science and Humanities**



# ENHANCING INDUSTRIAL INNOVATION THROUGH UNIVERSITY TRANSFER OF NEW TECHNOLOGIES

## RESEARCHERS:

PROF. D. SHEFER

DR. A. FRENKEL

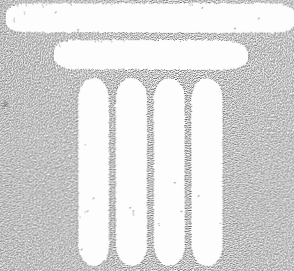
Closer integration of the universities in the national innovation system is in the interest of the universities since it enhances teaching and research at the universities, and demonstrates the universities' contribution to the economic welfare of the state, thus justifying continuous public support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

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

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

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

**Sponsor: Ministry of Science, Culture and Sport**



# **F**INANCING INNOVATION SCHEMES: THE ISRAELI EXPERIENCE

## **RESEARCHERS:**

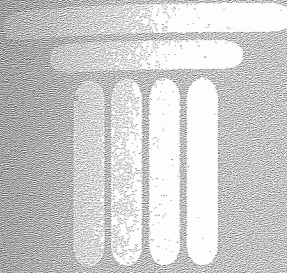
PROF. D. SHEFER

DR. A. FRENKEL

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

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

**Sponsor: European Union 5th Program**



# THE ZVI GRILICHES RESEARCH DATA CENTER

## ACADEMIC COORDINATOR:

H. REGEV

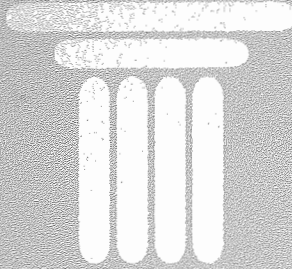
The main scope of the Zvi Griliches Research Data Center is to promote economic research on R&D, Innovation, Human capital, Firm Productivity and related topics, based on Israeli data. The center is a part of the activity of the group of researchers on science technology and economy, within the framework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

The main activities of the Zvi Griliches Center are:

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

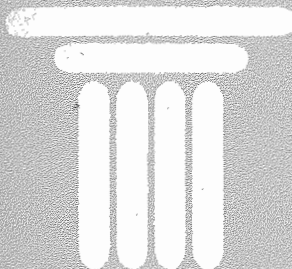
The first activities of the center are:

1. **Publications with Statistical Data.** Up to now 10 publications on Industrial R&D, National R&D expenditure, Innovation and Industrial Statistics were received from the Central Bureau of Statistics and others and were captured in the Internet site. The site provides easy access to every table in each publication and allows retrievals of each table as a single excel file.
2. **Research Data File.** The center is promoting the creation of the following 4 micro research data sets:
  - **The Panel of Industrial Firms, 1970-1998** provides a basis for estimating production functions and related models. This file has already been used by Griliches, Regev and others in studies on firm productivity and R&D support. The file will be available for research toward the beginning of 2002.
  - **R&D Support, 1986-1999.** The Chief Scientist provided the CBS with a very detailed file on R&D support at the project and firm levels, which covers the development of this activity over the past 15 years. The new file will also be matched with the R&D and Industrial surveys and will be available for research at the beginning of 2002.
  - **Linked employer-employee files, 1983, 1995.** The CBS considers the creation of employer - employee data files. These files provide a basis for investigating various issues related to labor economics, through simultaneous analysis of supply and demand of the labor market. The CBS constructed a preliminary file based on data on employees from the National Security, matched with population censuses and the above mentioned panel of industrial firms.



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





# NATIONAL ENVIRONMENTAL PRIORITIES OF ISRAEL- 2001

## PRINCIPAL

## INVESTIGATORS:

PROF. Y. AVNIMELECH

DR. O. AYALON

## RESEARCHERS:

PROF. A. ADIN

D. BASEL, M.SC.

DR. D. BAUM

DR. M. JUANICO

ADV. O. KARASSIN

PROF. M. SHECHTER

DR. H. ZABAN

The second report of National Environmental Priorities was published in 2001.

The working method was similar to that used in preparation of the first document (published in 1999)- Background material was made available to teams of professionals, each of which included a central figure in the area from the Ministry of Environment. The background material was discussed both in writing and verbally. The PIs of this publication summarized the teams' work, returning it to them for their comments and final touches, before preparing it for publication.

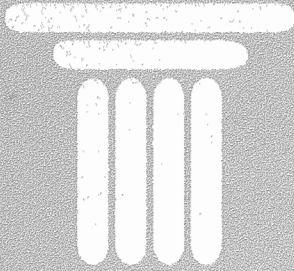
The first part of the report includes follow-up, examination, critique and update of several aspects of subjects derived from the first report. The subjects are: open spaces and urban environment, transportation, water and wastewater, air quality, hazardous substances and solid wastes.

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

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

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

The third issue of the project has already been launched. In addition to the assessment of the implementation of the second report recommendations, we shall include an overview on alternatives of energy production, an overview about green building and an overview about the effects of the environment on human health.



# T HE GREEN CAMPUS

**PRINCIPAL INVESTIGATOR:**

PROF. Y. AVNIMELECH

**PROJECT COORDINATOR:**

DR. O. AYALON

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.

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

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

The Green Campus activities and projects embrace a broad range of issues including Water Conservation, Waste Minimization, Energy Conservation, Resource Conservation and Pollution Prevention.

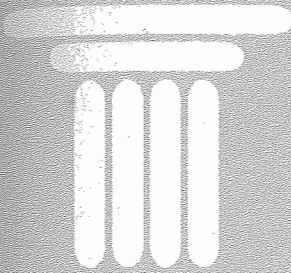
(visit our web site for full description of our activities <http://tx.technion.ac.il/~greenweb>).

It appears that the Green Campus project is stamping its mark and a change in thinking and behavior across the campus is already being observed. As a result of the promotion, Technion employees, students and faculty are getting involved, offering suggestions and comments.

In addition, the ecological garden, a green corner in the heart of a modern technological world, was opened to the public. During an open day, guided tours were conducted and more than 800 visitors were exposed to the complex and essential relation among human activity, plants and the environment.

We will continue to develop and market the environmental studies and research carried out on campus, in order to encourage business and government groups to view the Technion as a model of environmental technologies- demonstration and use of an electrical car, use of recycled glass for paving roads on campus, continuing the competition for technological innovation for students at the Technion and even expanding it to other academic institutions across the country.

With the initiative and cooperation of the Ministry of Environment we will act to transfer the Green Campus initiative to other universities so they can follow our lead.



# FROM "ISRAEL 2020" TO "ISRAEL 2050"

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

### PROJECT LEADER:

PROF. ARCH. A. MAZOR

### COORDINATORS:

DR. A. FRENKEL

L. TANGY M.SC.

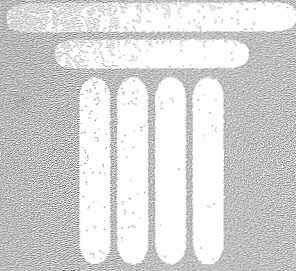
### Continued activity of the "Israel 2020" Project at the S. Neaman Institute

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

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

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

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



# SUSTAINABLE ENERGY: WIND ENERGY

## PROJECT LEADER:

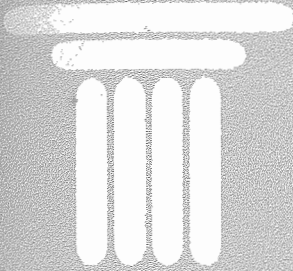
PROF. A. ROSEN

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

Israel has good wind energy resources. One wind farm operates on the Golan Heights, while others are planned. Yet because Israel is one of the most 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.

**Sponsor: Ministry of Infrastructure**



# OPET ISRAEL (ORGANIZATION FOR THE PROMOTION OF ENERGY TECHNOLOGY)

## **STEERING COMMITTEE:**

DR. Y. SHARAN

Y. ASIA

A. EINAV

PROF. A. BENTUR

M. SHATON

## **RESEARCHERS:**

D. KOHN M. PHIL.

E. SINGER

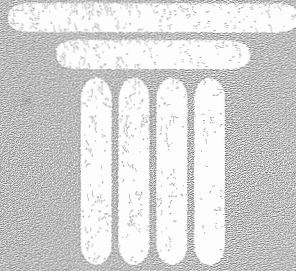
OPET ISRAEL (OPETI), was established in January 1998 by a Consortium consisting of the Interdisciplinary Center for Technological analysis and Forecasting (ICTAF) at the Tel-Aviv University, the Israeli EU RTD Center (ISERD), the S. Neaman Institute for Advanced Study in Science and Technology (SNI)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

OPETI's mission is to promote efficient use of energy in Israel and to help sustainable economic growth through the use of advanced energy production technologies. OPETI will also help enhance Israeli participation in EU RTD programs on energy and will disseminate information on EU RTD activities and achievements in this field. OPETI 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 academy, industry and government.

**Sponsor: EU RTD Program**



# AGEING AND TECHNOLOGY; INTERNET FOR THE ELDERLY

## RESEARCHERS:

DR. N. BITTERMAN

I. SHALEV

It is the challenge of the new century how families, businesses and governments will respond to the needs, preferences and lifestyle of the growing number of older adults. The population of the developed countries that is over 65 is growing rapidly, and continues to expand as a result of an increase in life expectancy and decrease in birth rate.

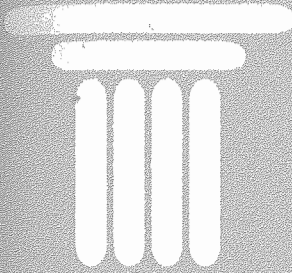
Old adults are forming today an active and healthier population with improved education and considerable political and economical power, that will keep working until their mid 70's. Computers and especially the Internet are becoming an integrated part of our "knowledge society" both at work environment, household, education, commerce and healthcare, and communication between people (e-mail, chats, virtual groups, etc). The interactive computer applications can improve dramatically the social and economical life quality of older adults as individuals and of our society as a whole. A recently developing area is the E-health (E-care). Proving Interactive Health Services will decrease healthcare expenses, improve the chain of treatment, enhance quality and efficiency of healthcare, and increase the fairness and equality of the distribution of medical services mostly for elderly population and citizens of remote areas.

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

The S. Neaman Institute established a new field of research in the domain of technology and society with an emphasis on technology and the needs of the aging society. The Neaman Institute published a comprehensive brochure entitled "Internet for Senior Citizens". The manuscript presents the information available in the literature about Internet and the aging population and the problematic of Internet usage and Human Computer Interface in the light of the deleterious procedures in the perceptive, cognitive, and mechanical capabilities of senior citizens.

The primary research project conducted in S. Neaman Institute explored the differences in Internet usage and navigation pattern of young and old Internet users, and studied web design guidelines (links configurations).

Based on the importance of E-health and Interactive Health Services for the elderly population we are focusing our further research projects in the field of adapting E-health programs for the elderly population.

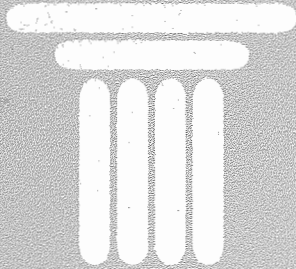


# MOLECULAR EPIDEMIOLOGY OF COLORECTAL CANCER (MECC)

**PROJECT LEADER:**

PROF. G. RENNERT

MECC is a large case-control epidemiologic study aimed at studying the causes of colorectal cancer in the Israeli population. Specifically the study is evaluating interactions of genes and environmental/behavioral exposure. Specific genes such as the 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 1,800 new cases of colorectal cancer and 1,200 controls have already been included. This study is conducted by Prof. Gad Rennert of the CHS National Cancer Control Center at Carmel Medical Center together with Dr. Steve Gruber of the University of Michigan, Ann Arbor. Other members of the Israeli Team are Dr. Ronit Almog, Mr. Marcelo Low, Mrs Hedy Rennert, Mrs. Mila Pinchev and others.



# THE S. NEAMAN INSTITUTE INFORMATION CENTER

## INFORMATION

### SPECIALISTS:

E. BARZANI

O. BERL

E. GILAD

O. MALBERGER

O. NATHAN-SHATS

K. TONCIULESCU

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

### Information Center Goals:

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

### 1. Internal Information Site

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

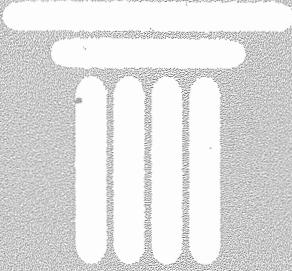
### 2. External Technical and Scientific Information Supply

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

### 3. Information Retrieval

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





### **Hardware and Servers**

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

### **Security of Information**

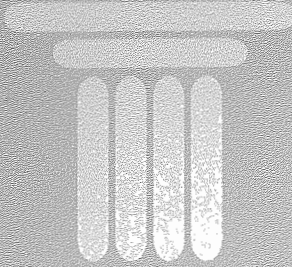
The information center site is protected by a Checkpoint Firewall. Consortium members may enter selected categories in this site, according to permission defined by consortium management.

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

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

### **Human Resources**

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



# THE ISRAELI SOFTWARE RADIO CONSORTIUM (ISWR)

## RESEARCHERS:

PROF. Y. BE'ERI

PROF. B. Z. BOBROVSKI

PROF. M. FEDER

PROF. I. KALET

PROF. S. LITSYN

PROF. H. MESSER-YARON

PROF. D. RAPHAELI

PROF. S. SHAMAI

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

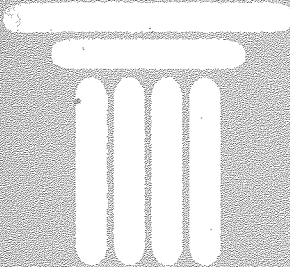
### Base Station Project

#### Aims

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

#### Applications

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



## **Mobile Radios Project**

### **Aims**

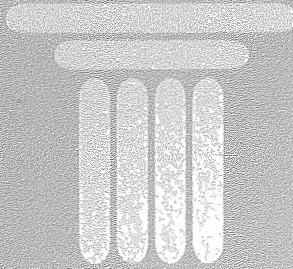
Development of end user station for "intermediate" information rate.

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

### **Applications**

- Mobile Wireless Network (Tadiran Spectralink)
- Building Blocks for 3G Wireless (Galram)
- Programmable Radio (Tadiran 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.



# I NFORMATION SUPERHIGHWAY IN SPACE CONSORTIUM (ISIS)

## RESEARCHERS:

PROF. Y. AFEK

PROF. J. AZAR

DR. S. BROS

DR. Y. BIRK

DR. R. COHEN

PROF. E. HEYMMAN

PROF. R. KESTNER

PROF. H. LEVI

PROF. Y. LEVIATAN

DR. A. ORDA

PROF. A. SEGAL

DR. R. SHAVIT

## ACADEMIC COORDINATOR:

J. LINHART M.SC.

A "revolution" is changing the role of satellite systems in telecommunications and international services. The satellite communication market could claim close to 10% of the total global telecommunications market by the year 2005, or nearly \$100 billion. No longer well removed from the end user, satellite systems will play an increasingly critical role in providing direct access to the telecom services subscriber.

Direct-to-the-consumer satellite services will grow on a global scale, along with fiber-optic cable and wireless communications systems in a hybrid or merged information superhighway. The impact of this newly merged market will be enormous.

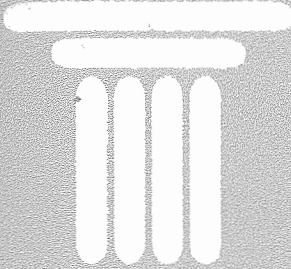
More than 2.5B\$ (1.5B\$ in 1999 alone) had been raised for the new generation of satellite-based networks (Teledesic, Astrolink, SkyBridge, Spaceway, etc.) in conjunction with massive investments carried out by the traditional satellite industries (such as Eutelsat, Astra, Intelsat, etc.), in the broadband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

These satellite constellations will create a "gap" between the existing and the future satellite earth-stations and terminals technologies for the following main reasons:

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

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

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



The ISIS consortium incorporated under the MAGNET program consists of six 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.

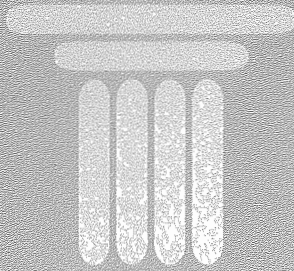
Six Israeli satellite companies, Gilat Satellite Networks, Orbit, Harmonic Data Systems, Scopus, and Shiron and three academic institutes, the Technion, the Tel Aviv University and the Ben Gurion University, joined the consortium in 1999.

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

Overall 42 research projects (31 in the industry and 11 in the academy) are conducted under the framework of 3 main topics: Networking and Resource Management, Indoor Units and Outdoor Units.

During the three years of the consortium activity significant progress was made in all of the projects. Fruitful cooperation was established between the academic teams and the industry partners. Bi-monthly groups meetings took place on 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 the industry requirements and the vision of the academy.

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



# 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

## ACADEMIC COORDINATOR:

Y. ADORIAN

The semiconductor industry is reaching rapidly the stage of development where the currently used materials and fabrication processes will limit the devices performances. The requirements for miniaturization and increasing component operation speed cannot be achieved by the current technology.

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

The EDCoT consortium is focused on developing technologies for utilizing such materials in semiconductor components fabrication.

The activities include: Development of materials processing methods, testing procedures, test equipment, components performance evaluation etc.

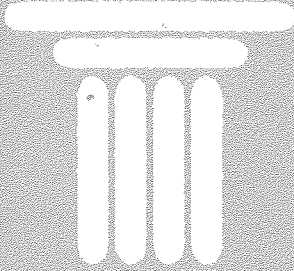
### Research subjects:

- Conformal Diffusion Barriers for Cu Metallization.
- Morphological, structural and physical-chemical properties of High K dielectric films.
- Development of criterions 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, Israel 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.



# LARGE SCALE RURAL TELECOMMUNICATION CONSORTIUM (LSRT)

## RESEARCHERS:

PROF. R. BEN-YEHUDA

PROF. Y. NAOR

PROF. A. SCHUSTER

## ACADEMIC COORDINATOR:

DR. D. GETZ

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 in their lives. According to an ITU (International Telecommunications Union) survey, 40% of the world's populations are situated over 2 hours away 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.

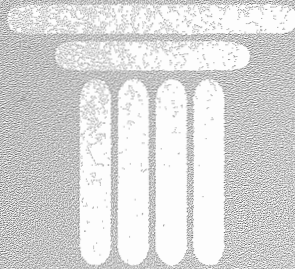
The consortium will develop technologies that will serve as a basis for future products and innovative solutions for this market.

## 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 for 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.

**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 response to unique needs - simple installation, minimal energy consumption, easy maintenance, simple tests without need for skilled manpower.

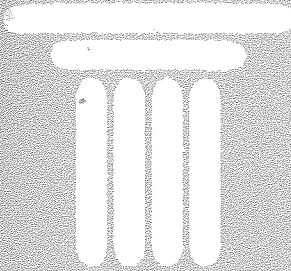
This requires the development of:

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

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

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





# 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 Email, 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

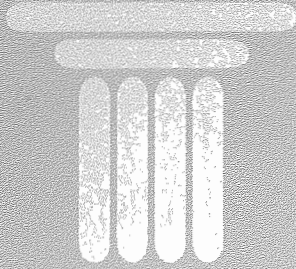
Together, these four groups develop the following technologies: Architecture that fits mass market, and which is both scalable and reliable. Servers that interoperate with existing systems, extending and enhancing Email standards. Protocols and mechanisms that optimize and improve networks' ability to 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 Institute - Technion, BGU - Ben-Gurion University, RAMOT - Tel Aviv University



# WAFER FAB CLUSTER MANAGEMENT CONSORTIUM (WFCM)

## RESEARCHERS:

PROF. Y. BARAM  
PROF. A. BRUCKSTEIN  
PROF. M. HEYMANN  
DR. R. KIMEL  
PROF. R. LAVIE  
PROF. D. LEWIN  
DR. E. RIVLIN  
PROF. I. YAVNE

## ACADEMIC COORDINATOR:

DR. D. GETZ

## WFCM Mission Statement

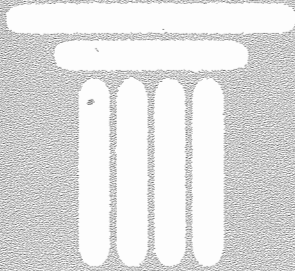
WFCM seeks to develop architectures, algorithms and communication infrastructures for process control that will facilitate the integration of process and control equipment (wafer FAB clusters) with an automated management control system. The vision is to implement production processes in future FABs 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, and they are interested in obtaining a rapid return on their investments. With the decrease in the critical dimension and the rise in the complexity of the IC, higher yield and shorter cycle time are essential for keeping the competitive advantage.

Production plans today have a single production system that controls each of the process and measurement tools separately. These are based on simple manual control where the reaction time and operator's involvement are extensive. This causes high production costs and often rejection of many components.

The 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 3 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:**

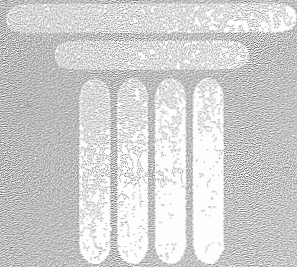
1. Process control.
2. Infrastructure - Adaptation and implementation of communication protocols, information transfer and standards.
3. Industrial engineering - scheduling workflow and developing tools for production management.
4. Data fusion between the various metrology tools and the process control 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:** The S. Neaman Institute at the Technion, The Hebrew University, Jerusalem, Ben-Gurion University, Tel-Aviv University.



# CONSORTIUM FOR INDUSTRIAL SOFTWARE TOOLS (CONSIST)

## RESEARCHERS:

PROF. G. ELBER

DR. A. FISHER

PROF. B. GOLANY

DR. Y. RUBINOVICH

DR. D. SINREICH

PROF. A. SHTUB

## ACADEMIC COORDINATOR:

DR. D. GETZ

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

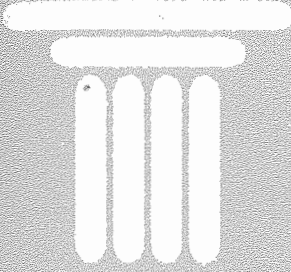
The goal of CONSIST - Consortium for Industrial Software Tools - is to develop generic software infrastructure for most, or all, software applications used in the various phases of the industrial process.

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

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

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

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

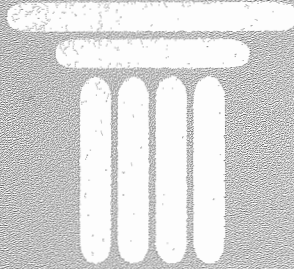


Consist consortium has started its 2nd phase activities centered on the work with IAI (Israel Aircraft Industries) a strategic partner acting as the voice of the customer. The objective of the 2nd phase is to face the challenge of real manufacturing environment and bridging the critical gaps in order to make the generic platform developed in the 1st phase productive.

**CONSIST members:**

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

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



# DIGITAL PRINTING CONSORTIUM (DPI 2000+)

## RESEARCHERS:

PROF. S. FISHMAN

PROF. D. HORN

PROF. A. MARMUR

PROF. R. SEMIAT

## ACADEMIC COORDINATOR:

DR. D. GETZ

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

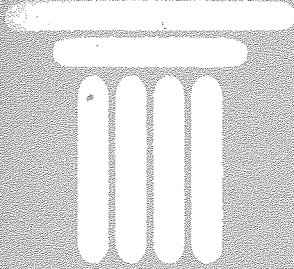
Mass production and long production series characterize the 20th century. Experts foresee the forthcoming century as the century of the client - namely adjusting the product to the demands of the individual customer. The market will have to respond qualitatively and economically to smaller production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

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

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

**The consortium, an organization of 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, Technion, has defined the following objectives:**

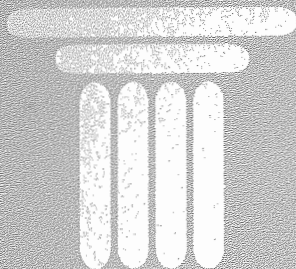
- Develop and study new technologies as a basis for developing new products, systems and perishable materials which will put the industrial members in leading positions and control of over 20% of the market.
- Create an academic research infrastructure with industrial vision, to support long-range new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



Specific R&D efforts focus on the following themes:

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

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



# DEVELOPMENT OF MAGNESIUM TECHNOLOGIES CONSORTIUM

## RESEARCHERS:

PROF. D. SHECHTMAN

PROF. M. BAMBERGER

PROF. A. ROSEN

PROF. E. ALTUS

PROF. M. WEISS

DR. L. GAL-OR

Z. KOREN M.Sc

## ACADEMIC COORDINATOR:

DR. A. ROTEM

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

The Dead Sea Magnesium Co. (DSM) produced during the year 2000 over 30,000 tons of metallic Magnesium and alloys (production started in December 1996).

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

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

### The four fields of activities of the Consortium R&D program are:

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

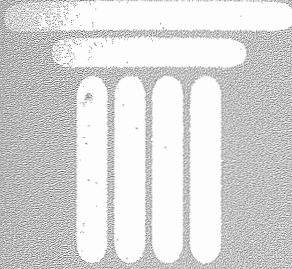
### The consortium consists of the following Israeli companies:

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

### Two Academic Institutes are also members of the consortium:

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





# IZMEL -

## A MAGNET CONSORTIUM FOR THE DEVELOPMENT OF GENERIC TECHNOLOGIES FOR IMAGE GUIDED SURGICAL THERAPY

### **CHAIRPERSON:**

DR. VARDA GOTTFRIED

### **PROJECT LEADERS:**

DR. TOM BONASERA

OFER DVIR

ORI HADOMI

DR. EHUD KATZENELSON

DR. TAMI KUSHNIR

### **ACADEMIC COORDINATOR:**

DR. DAPHNE GETZ

**The Consortium Mission:** to develop technologies that will serve the future Operating Room in: Therapy, Intra-operative imaging (MRI, US, nuclear medicine), Tissue viability (end point for tumor destruction), Registration and augmented visualization of surgical-relevant data.

Izmel is the first consortium embracing medical centers (and not only universities) as an essential partner.

### **The Consortium manages six projects:**

- **Project 1: Tissue Viability Controlled Treatment for Minimally Invasive Procedures**
- **Project 2: Radiolabeled Tumors**
- **Project 3: Highly Accurate Tracking Systems**
- **Project 4: Real time registration (CT/ Tracker/Patient/X-Ray)**
- **Project 5: Intra-Operative Imaging by Interventional MRI**
- **Project 6: Novel Imaging and Therapeutic Applications in the future operating room**

**IZMEL Network** - The S. Neaman Institute is in charge of managing the Information Center of the consortium.

### **Companies associated with the project:**

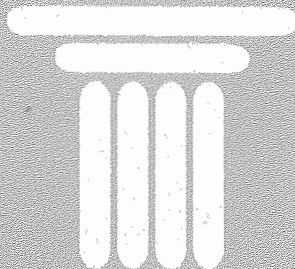
Algotec; Applied Spectral Imaging; Biomedicom; ContecMedical; Elgems - GE; Envision; Galil-Medical; GE- Ultrasound; Lumenis; Peptor; Odin.

### **Universities associated with the project:**

Technion - Israel Institute of Technology; Tel Aviv University; Hebrew University- Jerusalem.

### **Medical Centers associated with the project:**

Ha'emek - Afula; Rambam - Haifa; Sheba - Tel Hashomer; Ichilov - Tel Aviv Medical Center



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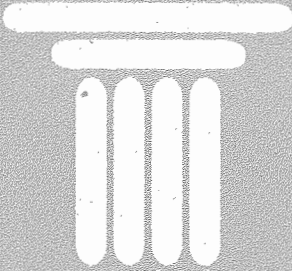
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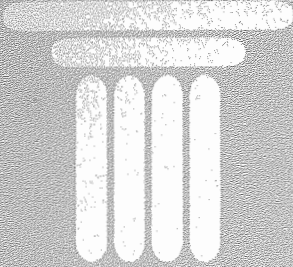
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**Arnon Bentur**  
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# ABOUT THE INSTITUTE

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 since retirement devoted his time to the activities of the Institute.

## **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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