

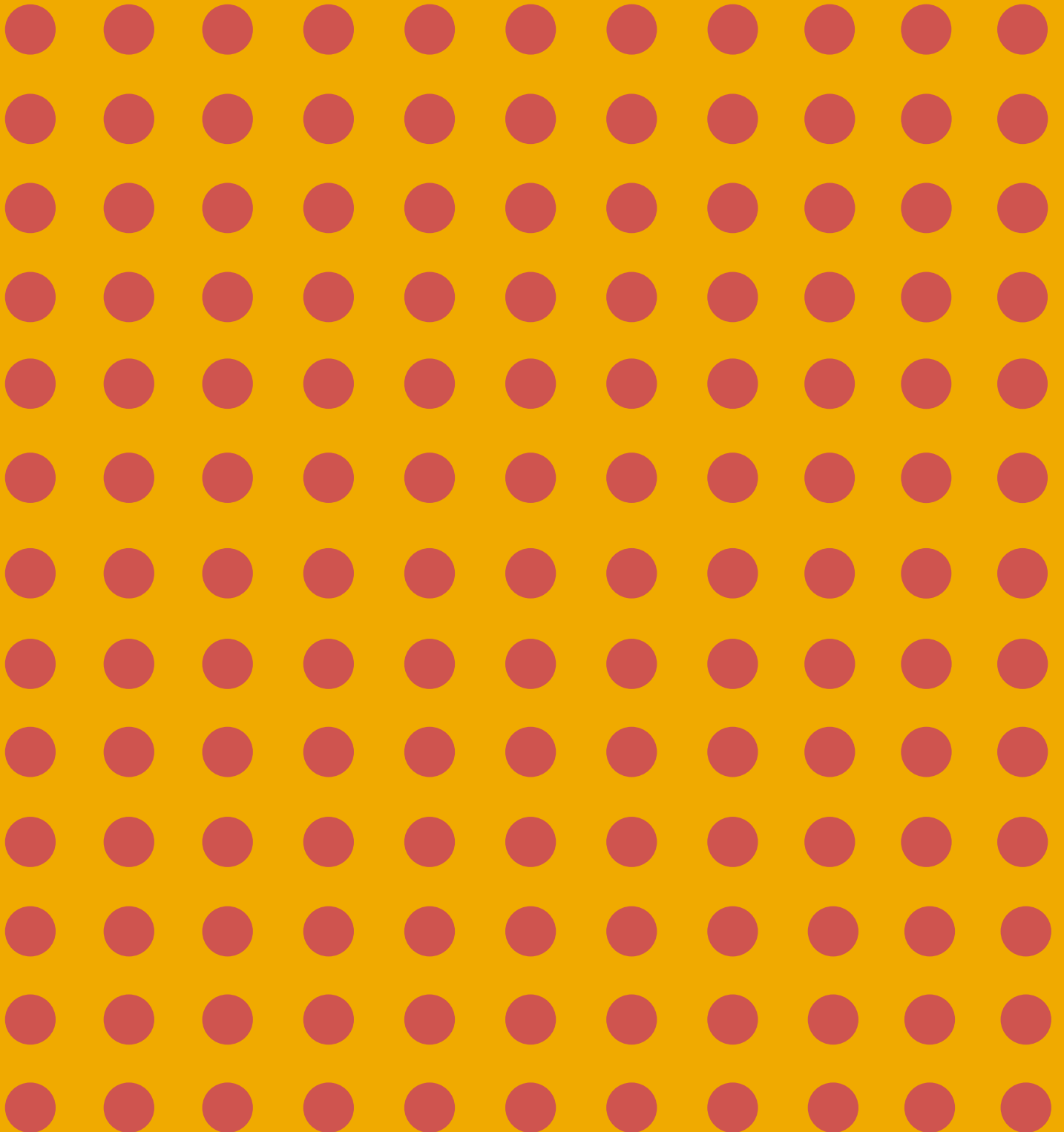
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Samuel Neaman Institute
FOR ADVANCED STUDIES IN SCIENCE AND TECHNOLOGY



Technion - Israel Institute of Technology



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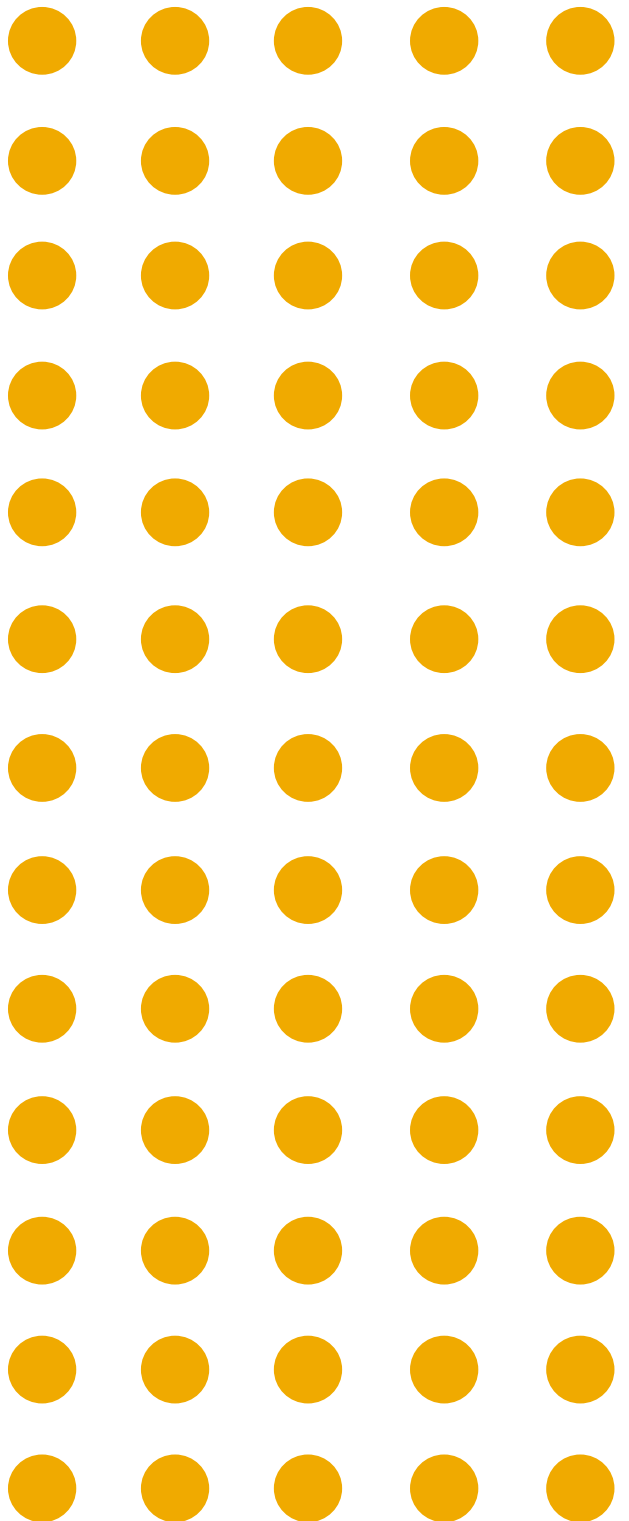


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THE SAMUEL NEAMAN INSTITUTE

The S. Neaman Institute for Advanced Studies in Science and Technology is an independent, interdisciplinary public-policy research institute, established in 1978 and located at Technion-Israel Institute of Technology. The mission of the Institute is to research, identify and evaluate solutions for national problems in the areas of science and technology, education, economics, industry, and social development. Through its sponsored research, workshops and publications, the Institute serves as a bridge between academia and decision makers in government, public institutions and industry.

The scope of professional activity at the S. Neaman Institute is the interface between science, technology, economy and society. In Israel, as in many parts of the world, science and technology are major driving forces behind economic growth and prosperity, and are making a profound impact on almost all areas of society. As such, the Institute's multi-disciplinary research activity is more important than ever before.

To achieve its mission, the Institute undertakes **sponsored research, organizes workshops and implements continuing education activities on topics of significance for the development of the State of Israel.** It also 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. As an independent not-for-profit research organization, the Institute does not advocate any specific policy or embrace any particular social philosophy. Each research program undertaken by the Institute is designed to be a significant scholarly study worthy of publication and public attention.



With its academic and national agenda, the Institute is ideally situated at Technion, Israel's leading scientific-technological university. The Institute draws on Technion faculty and staff, as well as scientists from other institutions in Israel, and specialists from abroad.

As befits a democratic society, choosing among policy alternatives is the prerogative and responsibility of the elected representatives of the citizenry. The Samuel Neaman Institute endeavors to empower the process of informed choice with the authority of academic research.

Origins

The initiative for establishing the Institute in Israel was undertaken by Mr. Samuel Neaman, who resolutely brought the idea to fruition with an agreement signed in 1975 between himself, the **American Society for Technion and Technion. It was ratified in 1978 by the Technion Senate. 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, devoted his time to the activities of the Institute until he passed away in 2002.

Organization

The Director of the Samuel Neaman Institute, appointed jointly by the President of Technion and the Chairman of the Institute Board, is responsible for formulating and coordinating policies, recommending projects and appointing staff. The Director is Professor Nadav Liron. The Institute Board of Directors is chaired by Professor 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 Technion's Senate and distinguished public representatives, consults on program development.



ABOUT SAM NEAMAN

"I was born in Rosh Pina in 1913, the eldest son of Esther and Pinchas Neaman. My mother was born in Rosh Pina and my father was a pioneer of the Second Aliyah. When I was three years old, my migrations began." Thus, Samuel (Sam) Neaman began telling the story of his life in the book "The Land of Israel from Inside and Out" (Ministry of Defense Press).

This volume tells the fascinating story of Sam Neaman, following his life's path across Israel, to France, Syria, England, the United States, Canada, Mexico, and onward. Yet throughout all his life's journey, Sam never lost his identification with Israel, which led him, in 1978, to establish the Samuel Neaman Institute at the Technion.

Sam died on the 13th of November 2002 at the age of 89, and up to his final days he was involved in the activities of the Institute, making invaluable contributions through his innovative ideas and vision. Sam was a well known businessman and philanthropist, who always placed the State of Israel as an ultimate value. His vision, generosity and love for his homeland, which characterized him so well, are what brought him to the realization that Israel needed a research institution that would both support and leverage the advanced technology so impressively developed in the country. Most importantly, this research institute would create a link between researchers and policy makers, giving them the benefit of the wealth of knowledge available in the country's academic institutions, and provide them with sound, well-researched policy alternatives.

Sam is no longer with us, but his vision continues to guide all of us at the Neaman Institute. As he would have wished.



Sam Neaman

FROM THE CHAIRMAN

In a democracy, it is the responsibility of the elected officials to make decisions on a myriad of issues that affect the lives of the people and the future of the country. They must do so often, generally under pressure, and without sufficient data. Most of these issues are difficult, with long-lasting impact, beyond the term of the politicians. Choices are complex, and can baffle even experts in the field. Issues that involve science and technology are even more complex and challenging.

Elected officials may have many skills, life experience, knowledge of the political enterprise, an understanding of how vast bureaucracies work, negotiation skills, a personal agenda and a party ideology. Yet very few have the expert knowledge needed to make sound decisions on the multiplicity of issues they have to deal with. In fact, one person cannot possess such an encyclopedic range of knowledge. For this reason, in all democracies, think-tanks have been established, where experts from different walks of life – academia, industry, military, government etc. - come together to analyze issues dispassionately, scientifically and rationally, prepare alternative scenarios reflecting the consequences of policy decisions, and offer recommendations. The product of their work is open to all, offered freely to all branches of the government and to the public at large.

Most think-tanks are privately sponsored by visionary philanthropists, out of purely altruistic motives; this unconditional sponsorship frees them from outside control, either from the government or other entities. The opportunity for purely rational, unbiased study is a cherished freedom that bears with it great responsibility, that the work performed should be salient, relevant and well researched.

Our institute is an ideal example of such a think tank, established by a visionary – Mr. Samuel Neaman - whose ultimate concern was to help mankind. The S. Neaman Institute focuses on what



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Professor Zehev Tadmor

are, perhaps, the most difficult policy issues that a nation in the 21st century must face - issues related to industry, R&D, science and technology, the economy, higher education, infrastructure, the environment and national planning, among others.

On the pages of this report you will find a description of the multitude of topics that we tackled over the past year. For more detailed information, full reports on many of the Institute's activities can be accessed on our website.



FROM THE DIRECTOR

This edition of our Annual Report reflects a year that was characteristically full of activity. We continued and expanded our traditional spheres of work – Science, Technology and Economics (STE) and the Environment – and initiated many new activities in different fields.

This year we significantly expanded the scope of our work to include a number of international programs, mainly those emerging from STE. The S. Neaman Institute presented an entire session on Enhancing Entrepreneurship and Innovation in Israel at the annual meeting of the American Technology Transfer Society (T2S). In this forum, a collaborative project was initiated with the Kauffman Fund, to address issues of innovation and entrepreneurship. In addition, we continued our efforts to establish joint initiatives related to India with the Israeli Ministry of Industry and Commerce. Our cooperative work in the context of the European Network of Excellence and the European Union's PRIME program gathered momentum and we are involved in four different projects related to this work. It is worthwhile noting that Professor Morris Teubal was recently elected to serve on the Managing Committee of PRIME, which indicates the recognition we are accorded.

Of special note is the agreement signed between the S. Neaman Institute and the United States Department of Energy, to advance clean energy-producing technologies and to implement energy conservation. This important collaboration positions the S. Neaman Institute as one of 10 Centers of Excellence in the world proclaimed by the Department of Energy as part of a network they established in the field of energy. We are the Israeli node in this network. In parallel, we established an Energy Forum headed by Professor Gershon Grossman of the Technion, which is intended to serve as a meeting point for professionals in the field of energy in Israel, where discussions can be held and projects advanced in the alternative energy and energy conservation fields.

The issue of higher education in Israel has been central to the S. Neaman Institute for some time now, in recognition of its critical role in determining



Professor Nadav Liron

Israel's future. The S. Neaman Institute, together with the Bashaar organization and the Fulbright Foundation, has assumed a leading role in creating a forum of college and university presidents, where, for the first time, open dialogue on issues of common interest is systematically being conducted. The meetings have created a basis for a common pact between universities and colleges.

The Economics of Higher Education was also adopted as a theme by the STE Program this year, in cooperation with the Sapir Forum. In accordance with the STE format, a call for proposals was announced, research projects and students were supported, and monthly meetings on this topic were held. These studies are undoubtedly invaluable towards determining higher education policy and its funding in Israel.

In a tradition we began last year, our Annual Report places special emphasis on one of the S. Neaman Institute's fields of activity; this year we are highlighting one of our flagship projects, STE, which is specifically addressing "The Prospects and Perils of R&D in Israel".

Since we launched our S. Neaman Institute website in Hebrew as well as in English, the number of entries to the site has increased to some 16,000 visitors a month.

We are continuing to invest significant energy and resources towards identifying and studying topics that are of central national interest, bringing together the country's leading minds in creative synergy, in the spirit of the S. Neaman Institute.

RESEARCH PROJECTS AND ACTIVITIES OF THE S. NEAMAN INSTITUTE

I. Science, Technology, Economy and Industry

R&D in Israel – Prospects and Perils

- A National Plan for the Chemical Industry in Israel
- Israeli Science and Technology Indicators (ISTI)
- STE
- Survey of Public Opinions on Science, Technology and Higher Education in Israel
- Developing a Northern Biotechnologies Cluster in Israel – add website
- Balancing Innovation. Quality and Efficiency in R&D Organizations

II. Universities, Education and Human Resources

- Economics of Higher Education (EHE) Program
- Forum of University and College Presidents
- Investments in Higher Education and Scientific Research in Israel: an International Comparative Perspective
- University Patent Commercialization (Entrepreneurship Lab)
- Women in Computing
- Academia in a Changing Environment

III. Infrastructure and National Planning

- Energy
- From "Israel 2020" to "Israel 2050"

IV. National Security

- Economics of National Security Program (ENS)
- Society and National Security

V. Conditions for Survival and Prosperity in Israel

VI. Environment

- National Environmental Policy
- Policy Towards Reducing Transportation-Related Air-Pollution in the Dan Region
- Waste Management in Israel
 - Management of Packaging Waste
 - Applying Sustainability Principles in Waste Management
 - Separation of Waste in Haifa
- Agriculture and the Environment
- Evaluation of the Current Situation and Preparations Towards Establishment of Environmental Committees in the Local Councils
- The Green Campus at the Technion

VII. National Strategies – International Collaborations

- PRIME
 - PRIME – ENIP
 - Prime Venture Fun
 - PRIME – GLOBPOL Project
- National Innovation Strategies: Some International Comparisons and Collaborations (India, Australia)

VIII. Evaluating National Programs

- Evaluation and assessment of the infrastructure program
- Quality of Engineering/scientific Research at the Technion and at other Israeli Universities – A Global Comparison
- Evaluation of the Magnetron Program

IX. MAGNET

- Neaman Institute Activities in MAGNET Consortia

X. Data Resources

- The S. Neaman Institute Website
- The Zvi Griliches Data Center

R&D IN ISRAEL: PROSPECTS AND PERILS

Prof. Manuel Trajtenberg, Head, Science, Technology and the Economy Program

Large investments in R&D, backed by a proactive and well designed government policy, have been the main force propelling Israel's vibrant High Tech sector, turning it into one of the most innovative and dynamic in the world. In fact, Israel invests about 4.5% of its GDP in R&D, much more than any other country, has one of the highest patenting rates per population, is second only to the US in terms of Venture Capital investments, and engenders hundreds of startups per year, that are eagerly sought by major international High Tech players.

The Israeli High Tech sector was, of course, badly affected by the bursting of the "bubble" in 2000, yet it has fully recovered since, with less exuberance, and grounded on an economically sounder base. Yet there are looming challenges ahead: first, the Israeli economy as a whole has not benefited much from the meteoric rise of the High Tech sector, economic growth in traditional sectors has been mediocre, and thus the issue is how to deploy the innovative capabilities and the ICT prowess gained in the High Tech sector so as to propel the rest of the economy forward. Second, globalization and the rise of the new Asian economic giants, China and India, mean that Israel can hardly afford to "go solo", and to rely on "plain vanilla R&D." Indeed, we have to find ways to link up with the new global players, keep climbing up the technology ladder and reposition ourselves accordingly. This necessitates a renewed national commitment to cutting edge scientific research that could feed into industrial R&D, not only in ICT, but also in bioengineering and nanotechnology.

The STE program conducted at the S. Neeman Institute has been at the forefront of applied research aimed at those issues, and its activities and outputs have already had a tangible impact on policy making in Israel. Here are some examples: (i) the new R&D law enacted in 2005 incorporates for the first time the notion that the rationale for government support to R&D lies primarily in the fact that innovative activities generate spillovers and therefore there will be underinvestment in R&D – this has been a major motif in many of the research projects supported by STE; (ii) the Chief Scientist of the Ministry of Industry and Trade has lately adopted a proactive policy of support of innovation in traditional sectors – again, this issue has been championed by the STE program; (iii) the S. Neeman Institute has initiated a joint research program with India, on issues related to international collaboration in R&D; (iv) currently the "Economics of Higher Education" program is examining policy options for the higher education system in Israel, so as to enable it to excel in scientific research while providing mass education.

It is thus evident that the S. Neeman Institute has positioned itself at the forefront of key policy issues for Israel, and in so doing, it has become one of the most influential think tanks in Israel.

A NATIONAL PLAN FOR THE CHEMICAL INDUSTRY IN ISRAEL

Steering Committee Chair: Dr. Gilead Fortuna; Coordinator: Col. (Res.) Moshe Elad

This research project, which aims to define a national plan for the chemical industry in Israel, was launched at the beginning of 2004. In addition to the S. Neaman Institute, the Israeli Government and the Industry Association are also active participants. The project, which is currently close to its final phase, has achieved significant progress during the last year. The four sub-committees ("Chemistry Education", chaired by Prof. Judith Dori, "New Technological Directions", chaired by Prof. Yoel Sasson, "Infrastructure and Green Industry", chaired by Prof. Yoram Avnimelech, and "National Policy", chaired by Mr. Ohad Orenstein and Mr. Reuven Vax) have successfully completed the process of data collection and analysis. In early March 2006, they submitted a first draft to the steering committee, chaired by Dr. Gilead Fortuna.

Both the steering committee and the sub-committees chairs participated in a brain storming process in order to define a final draft which later will be presented to Israeli policy makers. The steering committee decided that the document will undergo further revisions following a meeting with the leaders of the Israeli chemistry industry, where they will present their comments on the draft. In general, the committee plan will deal with the following subjects:

1. Improvement of chemistry education and teaching at all age levels, and upgrading educational investment.
2. Creating a basic solution to the mixture of environmental and industrial infrastructure.
3. Making the chemical industry an active partner in absorbing new technologies listed by the Chief Scientist and supported by the government.
4. Implementing all above-mentioned subjects within the framework of national policy.

The final report, once it is available, can be downloaded at the S. Neaman Institute website: www.neaman.org.il

ISRAELI SCIENCE AND TECHNOLOGY INDICATORS (ISTI)

Investigators: Prof. Arnon Bentur, Dr. Daphne Getz, Prof. Dan Peled, Marian Shumaf-Tehawko, Sivan Frenkel, Arkadi Katzman

The goal of this project, which is operating under the auspices of the S. Neaman Institute, is to create datasets and indicators of scientific, technological and R&D activities taking place in Israel over time, for evaluation and monitoring of these activities on an internationally comparable basis. This benchmarking activity provides quantitative assessments of Israel's R&D activities, scientific capabilities and infrastructure, and how they are funded. The databases are developed in close cooperation with the Israeli Central Bureau of Statistics and in accordance with the guidelines officially adopted by the EU. Databases by other international organizations such as the OECD's Directorate for Science, Technology and Industry, the Statistical Office of the European Communities (Eurostat) and the US National Science Fund are also used.

Phase 1 in this project deals with collecting and processing data in key areas related to science and technology. This phase was completed in July 2005, when the first report, "Science and Technology Indicators in Israel: An International Comparison", was published. The report can be downloaded (in Hebrew) from the S. Neaman Institute website. The format of the report closely follows the one used by similar documents from international sources, (the European Commission ERA-STI Key Figures, the OECD STI Scoreboard, and the US NSF S&E Indicators), modified to shed light on specific aspects of the Israeli economy. Most data is presented in comparison to selected countries (the US and part of the EU countries), including those with similar characteristics of

population size and education (Finland, Ireland, etc.). The report includes three chapters, featuring benchmark data on the three aspects of R&D activities:

- **National Expenditure for Civilian R&D:** R&D expenditures at the national level and in the business sector. Indicators presented include: national R&D expenditures as a percentage of GDP, (R&D intensity); R&D expenditures by sources of funds, (government, industry and higher education), and by performance; Business R&D expenditures by industrial sectors; and R&D expenditure at the higher education sector.
- **Human Resources in Science and Technology:** Data in this chapter provides characteristics of R&D workers in the business sector, (share of R&D employees in the business sector and in the work force, and business employees by category), R&D employees in academic institutions, (teaching and research faculties in universities according to rank), and university graduates in science and technology fields, (BSc, MSc and PhD recipients). Data is also presented regarding the proportion of female university graduates and their share in the business sector R&D work force.
- **Science and Technology Performance:** indicators regarding patents and scientific publications are presented as a proxy to output of R&D activities:
 1. **Patents** - Data on patent applications in Israel and overseas is used to demonstrate technological achievements. For example, number of patents per million population,

number of patents in relation to R&D expenditures, annual growth rate in applications for patents, etc. An international comparison of patents per million population is also presented.

2. **Scientific Publications** - Indicators measuring scientific productivity, such as the number of scientific publications per million population, and international comparison of publications in different fields of science. In order to reflect the quality of research, an indicator based on a citation index is also presented.

The importance of the ISTI Report is evident in that it is the most downloaded publication from the Neaman Institute website. The report will be updated every year and expanded in various ways, depending on the progress we make in obtaining the required data. Work on the next update of the ISTI Report, due in late summer 2006, started at the end of 2005. The next version will include, in addition to the updated and expanded existing chapters, a new chapter on the economic impact of scientific and technological R&D activity, as well as the technology balance of payments. An English version of the next report is also planned.

The second phase of the project attempts to use these indicators and data in order to perform policy analyses focusing on R&D activities and the building of a scientific-technological infrastructure, and their impact on the national economy. Such policy analyses may include: examination of the demographic trends in human

resources working in R&D in different industry sectors; the mobility of highly skilled human resources; funding of research in public institutions; and direct government support to R&D activities in the business sector. This second phase began at the end of 2005, with the intention of carrying out policy analyses on various topics, in possible cooperation with the National Council for Civil Research & Development (MOLMOP), in order to prepare supporting data towards recommendations for a national policy for R&D support and for the preservation of nation's scientific capabilities.

THE SCIENCE, TECHNOLOGY AND THE ECONOMY (STE) PROGRAM

Head of Program: Prof. Manuel Trajtenberg;

Academic Coordinators: Prof. Dan Peled, Prof. Saul Lach

STE is a core program of the S. Neaman Institute, aimed at developing national policy alternatives for key issues lying at the interface between Science, Technology and the Economy. Prof. Manuel Trajtenberg chairs and coordinates its activities, aided by Prof. Dan Peled and Prof. Saul Lach. There are about 15 researchers participating regularly in the program, mostly economists from various universities and research organizations, in addition to a range of other participants. During 2005, the program focused on a specific and timely topic, the Economics of Higher Education – Towards Redesigning the Israeli Model.

The program has been characterized since its inception by several outstanding features: First, it cuts across university boundaries trying to bring under one roof the best researchers in the field; second, it attempts not only to promote top academic research in STE-related areas, but also to harness the academic expertise so created for current policy issues; lastly, it aims to educate a cadre of young, policy-oriented research scholars for Israel. Hopefully this modus operandi will help place the S. Neaman Institute and the Technion at the center of national policy making. The activities of this program started in late October 2000, thus we are now in the midst of the program's sixth year.

I. New Research Projects

The academic committee of the STE Program selected five projects and one continuation project,¹ which bring in an excellent group of researchers from various universities and disciplines, and cover

¹ Continuation projects refer to those that were carried out the previous year and for which the researchers submitted interesting and valuable follow up research plans.

a range of topics of interest to the Program. We undertook to support fewer new projects, in view of the fact that in 2003-04 we supported an unusually large number of projects, quite a few of those are still ongoing, and the researchers conducting them participate in the meetings this year as well. Following is the list of projects:

1. *"The role venture capital plays in the life sciences sector in Israel"*
Morris Teubal and Yuval Markus, Department of Economics, Hebrew University
2. *"Why do Foreign Firms Register Their Patents in Israel? An Empirical and Theoretical Study"*
Benjamin Bental, Department of Economics, Michal Gal, Law School, Haifa University
3. *"Start-up funding inefficiencies due to VC's limited horizon."*
Eugene Kandel, Harry Yukleah, Business School, Hebrew University
4. *"Incentives, Constraints and Objectives in Technology Licensing Offices and the Effectiveness of Technology Transfer Activities"*
Mark Schankerman, LSE, UK, and Saul Lach, Department of Economics, Hebrew University
5. *"The Longitudinal Panel of Israeli Manufacturing Firms: 1955-1999. Report for 2004, Plan for 2005"*
Haim Regev, CBS
6. *"Growth Profiles in the Israeli Enterprise Software Sector"* (continuation project)
Jonathan Menuchin and Niron Hashai, Business School, Hebrew University

Several of the projects supported by the STE program in past years came to completion in the course of this academic year. The results were

presented during the periodic meetings of the group, and published in the STE Working Papers series (see below).

II. 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. Since 2000-2001 we have supported some 20 students writing MA and Ph.D. dissertations at various universities, and this year we awarded scholarships to the following seven graduate students (notice the variety of institutions):

1. Edo Eshet, Law School, Tel Aviv University, *"Service Innovations"*
2. Danny Breznitz, Ph.D. candidate, MIT *"A Misunderstood "Miracle" – The State and the Growth of the IT Industry in Ireland"*
3. Ity Shurtz, Eitan Berglas School of Economics, Tel Aviv University *"Estimation of Network Effects and Learning in the Diffusion of New Technology"*
4. Shiri Breznitz, Cambridge University, UK *"The Role of the University in Regional Economic Development – The University as a social agent."*
5. Amit Epstein, Technion *"Location Choice of High-Tech Firms in Intra-Metropolitan Area"*
6. Nir Brueller, Business School, Tel Aviv University, *"Creation and Capture of Value in Technology-Grafting Acquisitions"*

7. Ofer Tur-Sinai, Law School, Hebrew University *"Patent Law and Sequential Innovations"*

III. Working Papers

One of the intended goals of the STE Program is to influence the national agenda and policy making in Science and Technology. Thus, dissemination of the research outputs resulting from the projects supported is key to the success of the Program. One of the main vehicles 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. These are the working papers published lately (several more are currently in the making):

- Menuchin, Jonathan, and Nir Hashsi, "Firm Growth Profiles (FGPs): Towards an Action-Based View of Firm Development." STE-WP-24-2004 January 2005.
- Avimelech, Gil and Morris Teubal, "Evolutionary Innovation and High Tech Policy: What can we learn from Israel's Targeting of Venture Capital?". STE-WP-25, March 2005.
- Frenkel, Amnon, Daniel Shefer, Michal Miller, "Public vs. Private Technological Incubators Programs: Privatizing the Technological Incubators in Israel." STE-WP-26, March 2005.

An additional research project, not under the auspices of STE but in its field of study, was entitled: "A Typology of New Business Formations Based on Psychological Contract Theory", by Zipi Shperling and Michael Lubatkin.

SCIENCE AND TECHNOLOGY IN ISRAELI PUBLIC OPINION

Project Leader: Prof. Ephraim Yaar, Tel Aviv University

In early 2006, Prof. Ephraim Yaar of Tel Aviv University submitted the findings of a survey he conducted on "Science and Technology in Israeli Public Opinion", commissioned by the S. Neaman Institute. The survey examined different ways that the Israeli public relates to the place of science and technology in Israeli society. The survey examined several issues, including: the importance of maintaining a level of science and technology in Israel, national pride in the areas of science and technology as compared to other areas, professional/occupational priorities in science and technology compared to other professions in the country, the level of trust in institutions supplying science and technology information, etc.

The findings of the survey indicate:

- 1) There is an extremely broad consensus among the Israeli public regarding the importance of science and technology; that they are critical to Israel's security, economic development and quality of life for its citizens. Israel's achievements in science and technology are also an important source of national pride, above the country's accomplishments in other areas, including its national defense capabilities. Based on these findings, there seems to be a discrepancy between the importance placed on science and technology by the Israeli public, and by Israeli policy-makers, as reflected in the diminishing resources allocated for their promotion, as well as the gradual deterioration over the last few years in the position of higher education institutions in this country.
- 2) In light of the relatively high prevalence of irrational beliefs, a systematic and broad effort should be made by the education system to expand the awareness and understanding among the Israeli public of the significance of science and the values that lie at its core.

DEVELOPING A NORTHERN BIOTECHNOLOGIES CLUSTER IN ISRAEL

Project Leader: Dr. Abraham Rotem

The S. Neaman Institute is leading an initiative to establish a '**Northern Biotechnologies Cluster in Israel**' incorporating all those companies and academic researchers interested in joining. The rationale for this initiative is that biotechnology has become the fastest growing industrial sector in Israel and worldwide, and is reshaping science, particularly the life sciences, medicine, food and agriculture. The decision to lead this initiative was taken after a survey conducted by the S. Neaman Institute found that biotechnology industries usually develop as 'clusters' in the vicinity of academic institutes and successful biotechnology researchers. That survey produced the following findings:

- The number of new biotechnology firms in Northern Israel has increased significantly over the last 10 years.
- The number of biotechnological inventions originating in Northern Israel, as measured by the number of filed patents, has increased significantly in the last 10 years.
- About 20 biotechnology companies have been operating in Northern Israel for over 10 years, and over 50 new companies/start-ups have recently entered this industry sector.
- The main academic biotechnological activities are taking place at the Technion, at the Faculties of Biotechnology and Food Engineering, Biology, Chemistry, Bio-Medicine and Civil Engineering. Additional biomedical activities are taking place at the Rambam Health Care Campus, the Technion Faculty of Medicine, the Rappaport Institute for Medical Research, and Bio-Rap.

In order to promote this initiative, the S. Neaman Institute has organized meetings of all leading scientists in the area, including scientists from the academy as well as leading personnel from companies located in the North. The aims of those meetings were to bring together all forces involved, enabling them to develop close professional relations, and to determine the best organizational structure for the Northern Cluster.

The first meeting dealt with biomedicine topics, and took place in October 2004; the second meeting, which addressed issues related to biochemistry, took place in March 2005. During this meeting, a plan to establish a "Biotechnology Communication and Information Network" within the S. Neaman Institute was adopted, and Prof. Karl Skorecki, Director of the Rappaport Institute, was elected as its Chairman.

In its first activity, a website has been established, bringing together efforts of five different organizations which are contributing to the site:

- 1) The Haifa Economic Corporation Ltd;
- 2) The Technion, Israel Institute of Technology;
- 3) The Rappaport Institute for Research in the Medical Sciences;
- 4) Rambam Health Care Campus;
- 5) S. Neaman Institute for Advanced Studies in Science and Technology

This www.bionorth.org.il website is a first step towards establishing "A Northern Cluster for Biotechnologies". It is designed to serve as an "Interactive Live Network" for all those involved in biotechnology fields in this region, and to promote communication and synergy among its participants, encourage development in biotechnology sciences, and make a positive impact on the economy of Northern Israel.

The BioNorth website was presented for the first time at the "**Boston Haifa Life Science Initiative (BHLSI) BioSeminar**" that took place in April 2006 at Haifa University.

BALANCING INNOVATION, QUALITY AND EFFICIENCY IN R&D ORGANIZATIONS

Project Leader: Professor Miriam Erez; **Project Team:** Dr. Eitan Naveh, Ella Miron-Spektor

During 2004-5, our study focused on how to manage innovation while maintaining quality and efficiency in R&D organizations. We suggest that successful management of new product development is crucial for the competitiveness of Israeli high tech, which has gained worldwide recognition for its technological advancement. However, the uniqueness of a technology may lose its attractiveness if it does not meet quality requirements, and time and budget constraints. The purpose of our research was to study the factors that facilitate or inhibit the balance between innovation, quality and efficiency. The study was conducted in 42 R&D units and 28 Manufacturing units in two divisions of a large R&D organization, in the defense industry. The research was focused on three main issues:

1. During 2004-5 we collected and analyzed data at the organizational unit level. We studied whether the leadership style and team characteristics that lead to product innovation in R&D units also promote process innovation in manufacturing units. We found that managers affect innovation performances, and that different management styles are needed for promoting innovation in R&D vs. manufacturing units. A paper entitled: "Same leadership and team characteristics, yet different effects on innovation in R&D versus manufacturing", was presented at the Annual Meeting of the Academy of Management, Honolulu, August, 2005.
2. We examined the team composition that leads to innovative performance. We found that

innovative teams were composed of a few creative team members, a few initiative-oriented members, and a few conformists, while most of the team members focused on the details of the idea implementation. A paper entitled: "The personal attributes that enhance individual versus team innovation", was accepted to the Annual Meeting of the Academy of Management, Atlanta, August, 2006, and is currently under Revise and Resubmit to Organization Science, a leading journal in the field.

3. In addition, we are now searching for the optimal cultural configuration that leads to an organizational unit's innovative performance, which consists of both idea generation and implementation. The cultural configuration includes the cultural values of innovation, attention to detail and outcome orientation. At this stage, we are testing for this optimal configuration and intend to publish our findings soon. This research is part of Ella Miron-Spektor's dissertation and is planned to be sent to a leading journal in the field.

THE ECONOMICS OF HIGHER EDUCATION (EHE)

Project Leader: Manuel Trajtenberg

This year the Science, Technology and the Economy (STE) Program undertook to tackle a highly focused topic, "*The Economics of Higher Education: Towards the redesign of the 'Israeli model'*" (in short, the EHE). The Higher Education system in Israel is undergoing a profound crisis, which calls for a swift revision of the basic premises upon which it has functioned over the past half

century. Unfortunately, there is little expertise in Israel on the Economics of Higher Education, and hence the current public debate on how to design a viable model is ill-informed and poorly argued. To fill this void, this year we launched a research program on this topic, in collaboration with Forum Sapir. The following are research projects supported by the EHE Program:

Researchers	Research Proposal
1. Dr. Elise S. Brezis	Government Intervention in Higher Education and the Quality of Universities: Israel and the Western World
2. Prof. Niva Elkin-Koren	The Ramifications of Technology Transfer Based on Intellectual Property Licensing
3. Yoav Friedmann	Liquidity Constraints in Tertiary Education: The Case of Israel
4. Prof. Moshe Justman Dr. Yaakov Gilboa	Student participation in funding higher education: Theoretical analysis and lessons from other countries
5. Dr. Osnat Lifshitz	Survey of the Literature on the Economics of Higher Education
6. Dr. Dmitri Romanov, Tom Caplan, Dr. Noam Zussman	Differences in the Quality of Education between Universities and Academic Colleges: Analysis Based on Returns to the Labor Market
7. Dr. Ami Volansky, Nissan Limor	Towards restructuring the financial model of the higher education system in Israel
8. Prof. Adrian Ziderman	Cost-sharing in Israeli higher education: a role for student loans schemes?

As in the past, we hold monthly meetings where the projects are presented and discussed, and plan to have an open conference by the end of this academic year, where hopefully we will present results from the research projects as well as policy recommendations.

Information on the researchers, activities and publications of the STE-EHE project, as well as the publications presented in the working group meetings, can be accessed through the S. Neaman Institute website: http://212.143.67.150/neamanheb/data_centers/econ_he_issues_list.asp

FORUM OF UNIVERSITY AND COLLEGE PRESIDENTS

The Forum for Higher Education was created as an offshoot of the International Conference entitled "Transition to Mass Higher Education Systems: International Comparisons and Perspectives", which was held at the S. Neaman Institute in December 2004. One of the conclusions of the conference was that a forum for open discussion between Israel's universities and colleges should be created, in order to reach a broad and better understanding of the common goals of the higher education system in Israel, and of the role each of these players has to fulfill within it, while ensuring the long-term existence of a stable and thriving higher education system.

The forum was established by the S. Neaman Institute, in cooperation with "Bashaar" Academic Community for Israeli Society and the U.S.-Israel Education Fund (Fulbright Foundation). To date, six meetings have been held, with extensive participation on the parts of the universities and the colleges, and fundamental thoughts and issues have been raised.

Each of the meetings was filmed and can be viewed on the S. Neaman Institute website under the Universities and Human Resources section:
http://www.neaman.org.il/publications/by_issue_list.asp?fid=633&parent_fid=489

INVESTMENTS IN HIGHER EDUCATION AND SCIENTIFIC RESEARCH IN ISRAEL: AN INTERNATIONAL COMPARATIVE PERSPECTIVE

Project Leaders: Amnon Frenkel and Eran Leck

The research investigates the relationship between investments in higher education and scientific research, on the one hand, and the economic performance of developed countries on the other. The study's longitudinal economic and higher education inputs were collected from various comparative cross-country databases (e.g., WDI, OECD Statistics Portal, UNESCO, etc.). The first part of the study is mostly descriptive and focuses on the development tracks of Israel and OECD countries. It investigates the variation in higher education and economic indicators over four time periods. Special interest is given to the examination of Israel's relative position among the 30 OECD member countries. The second part of the study is empirical. It employs two models (two-stage model and multivariate regression model), in order to test the main hypothesis of the research stating that a positive and significant linkage exists between higher education investment and economic growth.

Findings from the descriptive section of the research show a significant decline in the relative ranking of Israel in comparison to other OECD nations. Higher education expenditure per student relative to the GDP decreased more than 60% during the last fifteen years. Israel is ranked last among OECD countries in the percentage of growth in science students relative to its population. The data show a continuous decline in the relative position of Israel in the number of science students, from third place in 1960 to seventeenth place in 1995.

Small countries such as Ireland and Finland show an impressive and steady growth in the relative rankings over these years. The status of Israel in

the engineering field is a little better. Israel keeps its relative position within OECD countries in the number of engineering students over all four time periods.

Empirical results from the second section suggest that an indirect relationship exists between higher education investment and economic growth. Evidence shows that higher education inputs translate into human capital outputs (trained workforce in the computing, science and engineering fields), and these turn back into inputs which explain the economic performance of OECD countries. Israel is successful in translating its high investment rates in higher education into a high-quality labor force, but fails to leverage its human capital inputs into strong economic performance. The two main activities of universities - teaching and research, were found to be connected to enhancing the GDP per capita of OECD countries. The research shows that a 1\$ investment in R&D expenditure per student, *ceteris paribus*, will result in an increase of 2.8\$ in GDP per capita.



UNIVERSITY PATENT COMMERCIALIZATION

Managing the opportunity discovery and evaluation process to enhance expected value.

Project leaders: Prof. Uzi de-Haan, Prof. Miriam Erez, Prof. Avi Fiegenbaum, Tali Sivan, Ella Miron

The S. Neaman Institute supported program, **Entrepreneurship Laboratory**, led by Professors Miriam Erez and Avi Fiegenbaum, was finalized with the design of an action-learning course in entrepreneurship called E-lab, in which business plans for Technion patents were developed by teams composed of MBA students together with the patent inventor(s), and coached by venture capital managers. After a successful pilot during Spring 2003 by Dr. Zipi Shperling, assisted by Galit Lev-Ran, the course was given during Spring 2004 and Fall 2004 by Professor Uzi de Haan and Tali Sivan, a doctoral student, with great success.

Since then, the number of participating students for the course given in Winter 2005/2006 has doubled, and now there are two parallel E-labs: one for Life Science patents and one for Hi-tech patents. Students from life science faculties have also joined the course and serve as technological experts in mixed teams with MBA students. This approach was encouraged by the deans of life sciences faculties, interested in exposing their graduate students to practical entrepreneurship.

The E lab course enables students to develop a research model for the management of the opportunity discovery and evaluation process in universities in such a way that the expected value of the patent is enhanced. The research proposes a new theoretical framework to enhance the economic value of universities' patents in the commercialization stage. We introduce a management intervention within the university before it is presented to external interested parties.

The intervention is aimed at creating competitive knowledge, which feeds into the discovery–evaluation process and as a result, enhances the economic value of the initial opportunity presented by the inventor.

The model assumes a spiral process, namely, the discovery–evaluation process is an iterative cycle, ending in an exploitation of an opportunity, which most likely will be different from the initial one with a higher expected economic value. The model proposes two sources for creating competitive knowledge. One is by using an entrepreneurial management team (EMT) consisting of MBA students who work together with the patent inventor. Their joint prior knowledge is greater than the prior knowledge of a single inventor. The second uses external knowledge resources, including the course instructors, venture capitalists and technology-business experts, who served as consultants and provided feedback to the entrepreneurial management team.

The research model was empirically examined on six teams during Fall 2004. Initial findings supported the proposed theory and model. The results demonstrated that this process leads to the creation of competitive knowledge that stimulates the re-conceptualization of the initial opportunity discovered by the inventor, and the evaluation process, resulting in an opportunity more attractive to investors.

Three papers written on the first phase of this study were accepted for presentation in two global entrepreneurship conferences: Babson Kauffman Entrepreneurial Research Conference (Boston, June

2005), ICER Entrepreneurial Conference (Amsterdam, February 2005) and the Technology Transfer Conference (Kansas City, October 2005).

The model has been further developed and validated with the following research objectives:

- a) To focus on the opportunity discovery and evaluation phase of the patent.
- b) To explore the competitive knowledge effect on the opportunity expected value.
- c) To explore the effect of team cooperation with the inventor on competitive knowledge.
- d) To explore the effect of team's network on competitive knowledge.
- e) To explore the effect of team diversity on competitive knowledge.
- f) To explore our model in the university commercialization setting, by applying it to future E-lab courses.
- g) To explore the effect of team processes on the opportunity discovery process.

A paper on the effects of team composition and processes on the opportunity discovery process was accepted for presentation at the 2006 Babson Entrepreneurship Research Conference.



WOMEN IN COMPUTING

Project Leader: Prof. Orit Hazzan

This year the project has expanded its activities by focusing on how gender and diversity are expressed in the Israeli National Informatics Olympiad. This research is being conducted by Mrs. Ornit Sagy and is described below.

Background: There are numerous international and national science Olympiads which present an opportunity for developing and demonstrating intellectual and scientific skills; as such, they attract highly talented and gifted students. Participation in these contests develops a student's talent and enhances the chances for future professional success. The different competitions are usually annual events. Accordingly, unlike many other programs for gifted pupils, for which children have only one opportunity to be screened, in the case of the science Olympiads the chance to participate is reopened each year. Furthermore, the Olympiads give talented pupils a chance to join the competition even if they were not previously identified as "gifted". At the same time, however, a huge gender difference is exhibited in these competitions. Accordingly, a relevant question to be asked is: What does this fact reflect with respect to the expression of diversity in this context? In this study we aim to examine this question by focusing on how diversity is expressed in the Israeli National Informatics Olympiad.

Preliminary Research Setting: The preliminary stage of this study uses qualitative methods for data collection and analysis, as follows:

- In-depth interviews with organizers, teachers, and participants; Observations in a preparatory

meeting, at the local contest, and at the national level;

- Documents: the list of participants (between the years 2003-2006), notebooks handed in at the 2001 national contest, and an Internet forum.

Main observations:

- A. In terms of gender, sector and region, the diversity among the participants is very low. All the 18 participants, who succeeded and became a part of the team for the international Olympiad (between 1997 and 2005), were Jewish males, and only 3 out of the 18 came from small locations outside the center of the country. An examination of the entire student population which participates in the national competition reveals greater diversity (e.g. about 10% are female pupils); still the large majority is male pupils from cities in the center of the country.
- B. All the teachers who were interviewed and are involved in the Olympiad and encourage their students to participate, started their career in the industry or in the IDF, and only at a later stage of their career switched to education.

ACADEMIA IN A CHANGING ENVIRONMENT Israel's Higher Education Policy, 1952-2004

Dr. Ami Volansky

The book "Academia in a Changing Environment - Israel's Higher Education Policy, 1952-2004", (in Hebrew) was published in 2005 with the support of the S. Neaman Institute. The book addresses higher education policy issues such as the significance of increased political intervention; budget cuts and their impact on research and teaching; the threat to academic autonomy in the future; psychometric testing and its different ramifications; and the implications rising from the operation of branches of foreign universities in Israel, with critical, in-depth analysis. This is the first book of its kind in Israel that presents the history of the higher education system, and it has been critically well-received.



NATIONAL POLICY IN THE FIELD OF ENERGY

Project Leader: Prof. Gershon Grossman; **Project Coordinator:** Dr. Ofira Ayalon

During 2005, energy issues topped public agendas in countries around the world. Driven by geo-political conflicts between the Western and Arab worlds, and the accelerated growth in the East (China and India), the demand for, and price of, oil has steadily risen, in Israel as in the rest of the world. In light of the short and long-term implications of this situation, and the S. Neaman Institute's central role in addressing national issues related to science and technology, we are now leading several initiatives in the field of energy.

In 2005, the S. Neaman Institute signed a cooperation agreement with the United States Department of Energy to jointly promote technologies that produce clean energy, and conserve energy sources. In this agreement, which was signed by the Director of the Institute, Prof. Nadav Liron and Global Energy Network, Executive Director, Mr. Doug Newman, the Neaman Institute is recognized by the U.S. Department of Energy as one of 10 Centers of Excellence in the world which are involved in applied research in the field of energy. This recognition renders projects that are carried out at the S. Neaman Institute eligible to receive special funding from the U.S. Government.

In addition, the S. Neaman Institute has taken the leading role in an Energy Forum, led by Prof. Gershon Grossman and coordinated by Dr. Ofira Ayalon, with the aim of creating a professional platform for discussions related to the field of energy in Israel. The forum is broad in its scope and provides a meeting place for sharing ideas

and promoting projects in the fields of alternative energy and energy conservation. Through the activities of the forum, ideas are developed and professional policy determined by relevant entities in the field and by decision makers from the various governmental agencies.

FROM "ISRAEL 2020" TO "ISRAEL 2050"

The Challenge of Planning the State of Israel towards its Second Jubilee

Project Leader: Prof. Arch. Adam Mazor; **Professional Coordinator:** Tamar Lanir-Shatsberg;

Planner: Ran Dressler Msc

The "Israel 2020" Plan articulated the concept of long term comprehensive planning for the State of Israel, and profoundly affected current planning practices. Following the accumulation of knowledge and the formulation of tools for long-range, interdisciplinary planning, it was decided to continue this huge research effort at the S. Neaman Institute, expanding it to include coordination of long-term planning with the Palestinian Authority and Israel's neighbors, and extending it to the centennial of the State of Israel in the year 2050.

The activity during 2005 was focused in two directions: first, promoting projects which place great importance on shaping and enabling a common, prosperous future for the State of Israel and its neighbors, relying upon the long term planning tools that were acquired through previous work; and second, the assimilation of the principals of comprehensive, long term planning, at the academic level, among decision makers and as a tool for future planners.

1. The Main Plans, Emerging from "Israel 2020":

- **Master Plan for Cross-Border Cooperation Between Israel and its Neighbors**

The Plan was initiated as a joint initiative of the former Israeli Ministry of Regional Cooperation and the Ministry of the Interior. The S. Neaman Institute, in the framework of "Israel 2050" was asked to prepare an inclusive cross border Master Plan for Israel and its neighbors. The work began in August 2002 under the leadership of Prof. Adam Mazor

("Israel 2020") and Prof. Arie Shachar (National Outline Plan for Building, Development and Preservation, NOP no.35) The idea is to coordinate the nation's goals with those of its neighbors, formulating principles for the planning stages and policies toward the target year in order to achieve an overall future regional picture. The first stage has been completed and includes a database of 480 proposed projects for cooperation between Israel and the neighboring countries, as well as a wide foundation for future planning. The plan is on hold following the closing of the Ministry of Regional Cooperation. Lately, the initiative to continue the work under the Planning Administration at the Ministry of the Interior was renewed.

- **"Israel 2020" and "Palestine 2015" - Coordinating the Palestinian and Israeli long-term plans**

The overall aim of this project is to create a basis for long-term planning cooperation between Israeli and Palestinian teams, using existing long term planning by both Israelis and Palestinians as its point of departure. The Israeli plan, "Israel 2020" - Master Plan for Israel in the 21st Century, and the Palestinian plan, "Palestine 2015", which was carried out by the Palestinian Ministry of Planning and Cooperation (MOPIC). The main goal is a joint effort towards a long term planning process in which goals from both sides will be coordinated and mutual principals for a planning concept and policy will be founded. The merit of the project was recognized by



the German Foreign Ministry and the Academy of the Arts, "Akademie der Künste" Berlin: who intend to host and finance the project to its completion.

2. **Promotion of Activities by the "Israel 2050" team, to assimilate long term comprehensive planning:**

- Prof. Adam Mazor is a member at the **Statutory National Planning and Building Board** as a representative of the engineering professions, planners and architects in Israel. Prof. Mazor is up to date on the national issues that are on the government and public agendas.
- An active dialog is taking place with the **Commission of Future Generations** for collaboration in long term planning and its future impact.
- Assimilation of long term comprehensive planning in the **academic arena**, at the Technion through its Faculty of Architecture and Town Planning, and at other universities worldwide.
- Exchange of ideas and continuous contacts with **academic and professional institutions** worldwide: Germany, Switzerland, the Netherlands and the United States.

ECONOMICS OF NATIONAL SECURITY PROGRAM (ENS)

Program Chair: Prof. Dan Peled; **Program Coordinator:** Col. (Res.) Moshe Elad

Academic Committee: Prof. Dan Peled, Prof. Manuel Trajtenberg, Prof. Dani Tsiddon

The ENS Program, established in late 2003, is an inter-mural program which seeks to initiate, encourage, and facilitate high quality academic research on the interconnections between economics and defense. While the close ties between economic strength and development on one hand, and defense capabilities and security on the other, are well recognized, there is little theoretical and empirical research on these links by the academic community in Israel available to support policy making in these critically important matters.

There are some 40 active participants in the ENS Program, (and altogether some 70 participants), mostly economists and researchers from other disciplines from various universities in Israel, members of research departments in the Bank of Israel and other government organizations, and some current and past officials in government defense related organizations and defense industries. The Program holds monthly research meetings during the academic year, and provides financial support on a competitive basis to proposals by researchers and graduate students submitted in response to widely circulated Calls for Proposals.

During the past year, seven research meetings were held with an average of 25 participants present in each meeting. Members of the group presented their ongoing research, and outside invited speakers presented their views on pertinent issues pertaining to the links between economics and national security. Outside speakers included: Nir Gilad, (former Accountant General, Ministry

of Finance); Lt. Colonel Issak Gurvich, (former Head of Economic Unit, Office of the Coordinator of Government Activities in the Territories); Dr. Avi Ginzburg, Vice President for Development, Rafael; Prof. Chaim Eshed, the Space Program at the Israeli Ministry of Defense; Supreme Court Judge (ret.) Zvi Tal and Haaretz reporter Shachar Ilan on recruiting yeshiva students; and Miko Gilat, owner and chairman of Soltam Group.

Several ENS-funded projects were concluded this year, and their final reports are available through the ENS Web page on the S. Neaman Institute Internet site.

The ENS Program conducted a workshop in June 2005 on the topic "Demographic Perspectives of the Israeli-Palestinian Relationships", with official representatives from the Palestinian Authority. Mr. Loay Shabaneh, Director, the Palestinian Central Bureau of Statistics talked about "Palestinian Population – Current Situation and Future Projections". Other participants included Mr. Ahmad Hleihel, Director of Demography Department at the Israeli Central Bureau of Statistics, Mr. Bennett Zimmerman and Mr. Itzhak Ravid.

SOCIETY AND NATIONAL SECURITY

Project Chair: Prof. Nehemia Friedland; **Coordinator:** Col. (Res.) Moshe Elad

This program was initiated at the beginning of 2004 and ended in March 2005. The aim was to create a forum for the research of national security that will be an independent research group sponsored by the S. Neaman Institute. The objective of the forum was to establish a research infrastructure on national security with the aid of, and potential incorporation of, Israeli research institutes, the aim of which would be to base the knowledge in this field on thorough and methodical research. The forum was intended to deal with subjects such as: what is the sociological infrastructure of national security? What are the psychological and social “resources” needed for maintaining a suitable level of national security? What is the definition or definitions of “social strength” and what is its characterization with regard to the variables and the processes that manifest the level of social strength. Three research scholarships were approved by the program and given to four researchers who investigated the subject of social strength. These researchers were: Prof. Asher Arian of the Haifa University who produced an article entitled **Social Resilience in Israel**, Prof. Avi Kirshenbaum of the Technion who wrote about **Adapting Behaviors of Israeli Civilians to Palestinian Terror**, and Dr. Karin Amit and Ms. Nicole Fleischer of the Carmel Institute whose article is **Between Social Resilience and Social Capital**. The three articles have been published by the S. Neaman Institute, with an introduction by Prof. Friedland called **The “Elusive” Concept of Social Resilience**. This publication is generating a high level of interest.

CONDITIONS FOR THE PROSPERITY OF THE JEWISH PEOPLE AND THE STATE OF ISRAEL

Project Team: Prof. Aviezer Ravitzky, Prof. Zehev Tadmor, Prof. Moshe Halbertal, Prof. Shlomo Avineri, Prof. Ruth Gavison; **Coordinator:** Col. (Res.) Moshe Elad

At the end of 2004, the S. Neaman Institute established a research project to address the fundamental problems facing the State of Israel and the Jewish people. To that end, the Institute assembled a group of the country's top thinkers and researchers in different areas of expertise – philosophical, social, legal, political and technological. Each group member agreed to write an independent document analyzing the present situation in their area, and present recommendations for the future, with a focus on the chances and risks involved. The documents were to reflect the personal positions of each author, and an effort was made to cover as wide a range of topics as possible, while coordinating between the different areas covered.

The purpose of this project is to focus on the fundamental questions currently facing the nation, which will influence the future of the Jewish people and the State of Israel. The group members were to analyze the existing data, follow the processes that created them, and put together recommendations for the future. The group members will then try to rise above immediate events and opposing interests, and observe reality from a reflective perspective, in order to recommend ways for improvement.

As such, this activity is being carried out with an integrated, interdisciplinary approach, and will focus on cultural and practical aspects. It will integrate individual work by experts in different fields, and include mutual critiques. The aim is for the S. Neaman Institute to publish these documents

as a series of brochures. Once the brochures are published, compilation into a single book will be considered.

Group Members and their Topics:

Prof. Aviezer Ravitzky – The Jewish People Today: From Determinism to Freedom

Prof. Zehev Tadmor – Science and Technology as Necessary Conditions for the Survival and Prosperity of Israel

Prof. Moshe Halbertal – Modern Jewish Identities and the Future of the State of Israel

Prof. Shlomo Avineri – Comments on National Governance in Israel

Prof. Ruth Gavison – The Necessity of Strategic Thinking: A Constitutive Vision for Israel and its Implications.

NATIONAL ENVIRONMENTAL POLICY

Project Leaders: Prof. Yoram Avnimelech and Dr. Ofira Ayalon

The S. Neaman Institute's environmental activities are considered to be significant and influential at the national decision-making level. In addition, the "National Environmental Priorities of Israel" Position Papers, published periodically by the Institute, serve as important working documents for various government agencies. During 2005, the main environmental activities at the SNI focused on air pollution reduction, solid waste management, agriculture and the environment, continuing the Green Campus project, etc.

POLICY TOWARDS REDUCING TRANSPORTATION-RELATED AIR POLLUTION IN THE DAN REGION

Project Leader: Dr. Ofira Ayalon; **Project Team:** Mr. Ofer Ben Dov and Dr. Noam Gressel, Assif Strategies Ltd.; Ms. Michal Chen and Mr. Doron Lavee, Pareto Engineers Ltd.; Dr. Yaakov Garb, Floersheimer Institute for Policy Studies; Mr. Yitzhak Goren

A policy paper was submitted to the Dan Region Association of Towns for Environment and Waste Water, which included recommendations to the Association and its member authorities for an operative plan, at the local level and for the short term, to reduce transportation-related air pollution. Out of a range of 40 policy options that were presented to the Association, options in five areas – enforcement, technology, information, planning and changing public attitudes – were selected and an in-depth feasibility study was conducted for each one. The policy options were presented and examined for their applicability at the local level, including examples from other parts of the world, and in certain cases, with cost/benefit analyses, based on the data received from the Association.



WASTE MANAGEMENT IN ISRAEL

1. MANAGEMENT OF PACKAGING WASTE

Project Team: Dr. Ofira Ayalon; Gadi Rosenthal and Nachum Yehoshua, Kivun, Ltd.; Prof. Mordechai Shechter, Center for Natural and Environmental Resources Research, University of Haifa.

This joint research project, carried out by the S. Neaman Institute and ELA, the recycling cooperative, examined the following parameters:

- Economic feasibility of the Packaging Law in Israel
- Implications of expanding the Deposit Law to 1.5 liter bottles
- Implications of imposing a tax on 1.5 liter bottles
- Quantitative measures to determine the worldwide scope of bottle deposit laws

Results of the studies indicate that the bottle deposit law in its present form, taking into account the overall

costs - internal and external benefits, is more costly than beneficial. In fact, the bottle deposit law imposes excessive costs on the economy, while the environmental benefits it yields are very low. Yet at a cost that is lower than that of the bottle deposit law, it is possible to institute a solid waste policy that will lead to recycling on a much broader scale, with more efficient utilization of resources. This can be achieved by implementing a packaging law, similar to those which are operating successfully in many European countries, which are leading the world in waste management policy.

2. APPLYING SUSTAINABILITY PRINCIPLES IN WASTE MANAGEMENT IN ISRAEL

Project Team: Dr. Ofira Ayalon, Ms. Limor Spektorovsky and Dr. Noam Gressel, Assif Strategies Ltd.

A joint project with the Ministry of Environment and NESHER - ISRAEL CEMENT ENTERPRISES LTD.

The project includes:

- Coordinating an operational team comprised of professionals and interested parties from the various related sectors.
- Evaluation of the various technological options according to cost/benefit and sustainability models.
- Examination of relevant issues for mixed waste management, including technologies, necessary legislation, responsibilities of the different entities, public involvement and means for conflict

resolution, and sustainability principles as a basis for evaluating the compatibility of alternative technologies for application.

- Defining strategies to encourage higher levels of involvement and commitment of the environmental organizations, the government and academia, for a system-wide approach to waste management (including an appropriate landfill tax, government investment and resolution of conflicts associated with public objection).
- Creating the infrastructure for a public lobby to encourage sustainable waste management.

3. SEPARATION OF WASTE IN HAIFA

Project Team: Prof. Yoram Avnimelech; Dr. Ofira Ayalon; Avi Novik, Shahaf Consultants Ltd.

In the near future, the waste landfills in Northern Israel will be filled and closed, a fact which is forcing Metropolitan Haifa to make imminent decisions regarding solutions for its waste management needs.

These decisions will need to take into account that disposal of biologically-degradable organic waste, which is now prohibited in Europe because of greenhouse gas emissions, will soon be prohibited in Israel as well. As such, pre-treatment of organic waste is necessary, using one of two main options –

aerobic composting or anaerobic fermentation. The “dry” waste will be sorted, recycled and the residues will be disposed of in landfills.

The Haifa Municipality, with assistance from the S. Neaman Institute, is examining the economic and organizational aspects of a waste separation plan which would affect 50,000 citizens in the neighborhood of Neve Shaanan.

AGRICULTURE AND THE ENVIRONMENT

Project Team: Dr. Haim Zaban and Ms. Liron Amdur, Zenobar Consultants Ltd.; Prof. Yoram Avnimelech; Dr. Ofira Ayalon

A report that was submitted to the Sapir Foundation of the Mifal HaPays Organization, addressed the need to protect rural spaces, and presented recommendations for applying “sustainable agriculture” in selected agricultural areas. The report was based on an examination of agricultural areas with different characteristics, reaching conclusions in light of their agricultural functions. Four agricultural areas were studied: The Valleys (Jezreel and Megiddo), South Sharon County, Emek Hefer and the Adulam Strip in Mateh Yehuda County. In each region the characteristics and agricultural trends, needs and directions for development, and the extent that various tools to promote agriculture can be used, were studied. In the Valleys area, the work was performed under the guidance of a steering committee which included representatives from the counties, farmers and various government and public agencies. In other areas, the work was performed in cooperation with the county heads and heads of agricultural committees. Meetings were held at the Ministry of Agriculture, the Israel Lands Authority, the Ministry of Environment, the Ministry of Tourism and the Ministry of Finance, in order to identify practical measures to promote agriculture. A model was built to create incentives for public values of agriculture, and economic and institutional aspects were evaluated. Furthermore, several measures to promote agriculture were examined, where each one addresses a different aspect of agricultural activity.

This approach, which was introduced and promoted by the S. Neaman Institute, has been broadly assimilated by the Israeli public, and has led to significant shifts in attitude towards agriculture and the environment. Among the general public, and the agricultural sector in particular, this new approach is being warmly embraced; furthermore, the Ministry of Finance has recognized the external contributions of agriculture, and is interested in promoting economic policy beneficial to agriculture.

EVALUATION OF THE CURRENT SITUATION AND PREPARATIONS TOWARDS ESTABLISHMENT OF ENVIRONMENTAL COMMITTEES IN THE LOCAL COUNCILS

Project Team: Dr. Ofira Ayalon, Ms. Yael Atar-Peled

A joint project with the Ministry of Environment

In February 2005, the Knesset approved a law obligating Local Councils to establish Environmental Committees whose role is “to initiate and plan activities in the fields related to environmental protection, and ensure sustainable development and use of the environment”. In the context of this joint activity between the S. Neaman Institute and the Ministry of Environment, a survey was carried out, as well as other activities, to evaluate the existing situation and prepare for establishment of Environmental Committees in the Local Councils.

THE GREEN CAMPUS AT THE TECHNION

Project Leaders: Dr. Ofira Ayalon and Prof. Yoram Avnimelech

The Green Campus project at the Technion, led by the S. Neaman Institute, is intended to instill values of environmental quality and protection. The project began in May 2000 with the goal of not only talking about the environment, but also of doing something about it. The Technion, as a leading research center serves as a role model for academic institutions in Israel and the rest of the world. The Technion is a veteran and central technological institution in Israel, responsible for educating engineers and scientists, operating at the forefront of research and development to advance, among others- environmental issues.

The management staff of the project includes representatives from the student association, who take a full part in its activities and initiatives; the Green Campus council, which was appointed by the President of the Technion, is comprised of representatives from the academic faculties and key individuals in the management of the Technion, managers in the administrative and maintenance branch, the Technion spokesperson, and more.

The Green Campus project's activities are in the areas of education and consciousness-raising, saving of resources (water, energy, recycling, etc.). At the initiative of the Green Campus, and supported by donations, an Ecological Garden was developed and it is now open to the public. This garden is intended to educate and raise awareness of the importance of environmental protection among the generations of the future. A tour of the garden strengthens the awareness of the public of the importance of a natural environment, of the resources within it, and the importance of protecting them. The Ecological Garden

is a place for recreation and relaxation for Technion students and faculty, workers, and for the general public. A virtual tour of the Ecological Garden can be taken through the project's website (see below).

Moreover, the Green Campus project also sponsors lectures that are open to the public and free of charge, which present different aspects of environmental protection, presentation of new research projects in the field, and development and ideas from the Technion, to introduce into the public consciousness the subject of the environment and its protection. This year, the lectures were presented as a joint effort with the National Museum of Science, Technology and Space.

Additional information on this project can be found at: <http://techunix.technion.ac.il/~greenweb>

PRIME - 2005

Investigators: Dr. Daphne Getz, Prof. Dan Peled, Prof. Morris Teubal, Dr. Amnon Frenkel, Naftali Moser, Yuval Marcus, Orly Nathan-Shats.

Within the EU sixth framework program, the S. Neaman Institute has joined along with 48 other institutions from 16 different countries in a network of excellence called PRIME. The network started its official activity in January 2004. PRIME stands for Policies for Research and Innovation in the Move towards the European Research Area. These policies are facing major transformations. The first relates to the changing dynamics of knowledge production, with the new search regime of the leading science fields, and with the research intensification of many industries and services. The second is linked to the changing relationship between science and society, with the burgeoning controversies and public debates over priorities and research practices (such as GM field trials). The third concerns the growing importance of both regional and European public authorities. This means that one can no longer simply equate public intervention with national policy, and that we must fundamentally reassess our accumulated knowledge on Research and Innovation policies.

The project has certain key characteristics. It is truly international and interdisciplinary, bringing together over 250 researchers (half with established international reputations) and 150 PhD students from four main disciplines (economics, management, political sciences and sociology) from over 45 institutions and 16 countries. A Joint Program of Activities that balances three research activities dedicated to producing world-class research was constructed. In addition, three structural activities, focusing on database and indicators issues, training, and interactions with

the full range of stakeholders, are aimed at achieving lasting effects in terms of structuring the field at the European level.

Among the ongoing and ad-hoc research programs conducted at the S. Neaman Institute, several programs are relevant to PRIME:

- (1) STE – The Science, Technology and Economy Program.
- (2) ISTI - Israeli Science and Technology Indicators Project.
- (3) The Future University Project.
- (4) Magnet R&D Consortia Management: managing several, industry-specific, government supported infra-structural R&D consortia of industrial interests and academic research institutions in Israel.

PRIME-ENIP

Project Leader: Dr. Daphne Getz; with Orly Nathan-Shats

The S. Neaman Institute is taking part in ENIP – European Network of Indicators Producers – which is one of the projects of PRIME. The aim of the ENIP project is to create a network of science and technology indicators producers, based on the experience of recognized institutions, labs or groups, and to develop the capacity for the interpretation of existing indicators and for the research and development of new ones. The ENIP project is conducting comparative analyses between different countries, and identified areas that are less developed among its members, for which measures should be taken to promote them. ENIP's activities have contributed to a deeper knowledge connected to existing data on R&D in science and technology, and to developing new indicators, with the goal of strengthening the comparability of data across Europe, and to strengthen the interaction between the members. These are all essential to build a long-term European Network of Indicators Producers. Dr. Daphne Getz of the S. Neaman Institute participated in a ENIP conference in September 2005, which discussed the science and technology indicators situation through an analysis of policy, the current situation, needs and new developments.

PRIME - VENTURE FUN

Project Leader: Prof. Morris Teubal, with Yuval Marcus

This research project focuses on the financial and non-financial characteristics of the venture capital (VC) industry. We adopt an evolutionary perspective according to which venture capital is part of a policy-influenced selection environment. This environment influences the performance of economic systems with regard to innovation and growth. The interactions of the VC industry within the system go far beyond providing firms with financial support, and include the intermediation function, that is, VC firms provide their portfolio companies with value-adding capabilities with regard to activities such as management, headhunting, marketing, networking, certification and reputation

The study has a special focus on ICT and Life Sciences (biotechnology) industries, and examines the extent to which different institutions/organizations in different countries fulfill the intermediation function, and the success of policies in promoting VC intermediation.

The countries participating in the study provide different profiles in terms of VC development, with Israel a prime case of success in VC development and policies, and other countries offering different institutional contexts (different mixes of public-private institutional developments).

The results of the research are:

- A comprehensive report on Israel's VC industry (which incorporates the project's first year of research and other, parallel and previous research done in the area);

A summary of VC policies worldwide, with a focus on the Israeli Yozma project, and implications for other countries;

- A preliminary draft of a platform paper (in collaboration with Terttu Luukonen, the coordinator and head of the Finnish team) where we compare VC emergence and non-emergence; VC policies; and innovation policies across five members of the consortium. This paper will be presented to the S. Neaman Institute for possible publication;
- A preliminary draft of a paper on Intermediation and Market Building, where we conceptualize a process for arriving at an appropriate intermediation form linking VCs and startups prior to the emergence of a VC market. This is a promising paper which will be significantly developed during 2006, and eventually submitted to the S. Neaman Institute and a professional journal for publication.

PRIME – GLOBPOL PROJECT

Investigators: Naftali Moser, Dr. Dan Breznitz, Prof. Morris Teubal, Dr. Daphne Getz.

The PRIME workshop: "Globalization of R&D: The Policy Dimension" was held in Vienna on May 24-25 2005, and was organized by Fraunhofer ISI, Karlsruhe and Joanneum Research, Vienna within the PRIME Network of Excellence.

The aim of the workshop was to further develop the analysis of internationalisation of R&D in the policy perspective: its main focus being on what science, technology and innovation (STI) policy can learn from the current analysis of the internationalisation process – and how it can react to, and influence it. Participants at the workshop comprised policy makers and researchers from the following countries: Austria; France; Germany; Hungary; Ireland; Israel; Italy; Norway; Spain; UK.

A presentation given by Naftali Moser on behalf of the S. Neaman Institute, entitled "An Israeli Perspective on the Globalization of R&D...an Initiative in the Process of New Policy Creation" described the project, initiated by the Institute, to foster mutual learning and cooperation on the subject of industrial R&D between Israel and India. Participants found the presentation to be very novel and instructive. Various proposals were discussed for follow-up activities.

NATIONAL INNOVATION STRATEGIES: SOME INTERNATIONAL COMPARISONS AND COLLABORATIONS

Steering Committee: Prof. Nadav Liron, Dr. Eli Opper, Dr. Orna Berry, Prof. Manuel Trajtenberg, Prof. Morris Teubal, Prof. Shlomo Maital. **Steering Committee, India – Israel project:** Dr. Shuki Gleitman (Chairman), Prof. Nadav Liron, Yair Amitai, Azi Hemar, Haya Miller, Dr Amnon Frenkel.

Project Coordinator: Naftali Moser

The international environment in which the Israeli high tech industry operates has vastly changed, as R&D has become globalized. Powerful new forces have emerged, namely India in software and China in hardware. Many countries all over the world are determined to build up their high tech industries and capture a share of the global market. Companies now perform R&D at multiple locations around the world. At the same time, whole new industries are emerging. In order for Israel to maintain its leadership position globally, academia, industry and government must cooperate more closely than in the past, especially since government budgets for R&D are under pressure.

To maintain its competitive advantage and leadership, Israel must address these challenges and develop new policies and initiatives. The extensive expertise built up over the years under the STE Program of the S. Neaman Institute represents a unique resource for this purpose.

In 2004, the S. Neaman Institute initiated a project to address these issues, working with the Office of the Chief Scientist (OCS), at the Ministry of Industry, Trade and Labor. This project brings together representatives from Israel and from foreign countries in a series of bilateral workshops, exchanges, research projects and other activities, to facilitate mutual learning of national innovation systems and policies, and to help build the infrastructure for bilateral partnerships. It was decided to start the project with activities between Israel and India.

ISRAEL - INDIA PROJECT

- 2005 started with the Governments of India and Israel having signed the India-Israel Industrial R&D Cooperation Agreement.
- The S. Neaman Institute project team worked intensively throughout the year meeting with companies, academics, government officials and other organizations from both countries to further understand the challenges in binational cooperation; how our project can address these issues; and to engage them as partners in the project. Prof. Nadav Liron met our partners at the Department of Science & Technology, Government of India (DST) and TIFAC, the Technology Information, Forecasting & Assessment Council during a trip to Delhi.
- Following meetings with the Indian Department of Science & Technology in Israel, the Neaman Institute was invited to write a section in the India-Israel Joint Study Group report, identifying key factors inhibiting measures for the improvement in the level of cooperation between the two countries in industrial R&D.
- Later in the year we had the opportunity to meet the Indian Minister of Commerce & Industry, Mr Kamal Nath, in Israel.
- As a culmination to all of the work on the project, we held the first workshop entitled "India and Israel: R&D as a Strategic Bridge" at the Neaman Institute in May. The workshop was opened by Mr Kapil Sibal, Indian Minister for Science & Technology. The dinner which was held following the opening, chaired by Prof. Nadav Liron, was addressed by Minister Kapil Sibal; the President of the Technion.

Prof Itzhak Apeloig; Prof Anand Patwardhan, Head of the Indian delegation; Ambassador Arun Kumar Singh and the Chief Scientist. Dr Eli Oppen.

- The Indian delegation consisted of representatives of TIFAC; DST; Institute of Genomics & Integrative Biology; Indian Institute of Management, Bangalore; National Institute of Design; Confederation of Indian Industry (CII) and Tata Consultancy Services, Ltd. Israeli participants came from the Neaman Institute, the Office of the Chief Scientist, Matimop, Israeli universities and the private sector.
- The workshop consisted of two days of intensive presentations and discussions at SNI; a day of company visits in the north; and a day of meetings with the Government of Israel and company visits in the Tel Aviv area. All of the presentations are available on the SNI website. The Indian delegation attended the Bi-annual Conference of the STE Program entitled "R&D and Innovation in the Era of Globalization" and presented a paper entitled "Facilitating Innovation and Technology Transfer: Experience from India".
- The intensive exchanges and discussions at the workshop confirmed for us both the need and the timeliness of our project and that this need is not currently being met by other organizations. We started preparations for a workshop to be held in Bangalore and a visit to Delhi to be held in February 2006.
- During the year we made a presentation entitled "An Israeli Perspective on the Globalization of R&D...an Initiative in the Process of New Policy Creation" in Vienna at a workshop organized by the PRIME Network of Excellence EU Sixth Framework Program.

EVALUATION AND ASSESSMENT OF THE INFRASTRUCTURE PROGRAM

Investigators: Dr. Daphne Getz, Prof. Dan Peled, Dr. Mor Peleg, Avi Raveh, Arkady Katzman.

The project's goal is to evaluate the Scientific Infrastructure Program of the Ministry of Science and Technology (the ministry is financing this project together with the S. Neaman Institute). The Infrastructure program was established eleven years ago, with the purpose of utilizing existing scientific potential in order to develop knowledge fields with added value and economic potential for Israel, and to bridge the gap between basic and applied research to shorten the time required for the maturation of practical ideas.

The objective of this study is to develop tools and methodologies which will help evaluate and assess the contributions of the Infrastructure program to the Israeli economy and society, to study the performance of the program, its actual accomplishments and failures, and to help decision makers set priorities in R&D policies and investments.

At the first stage of the project:

- A comprehensive survey of the Infrastructure program graduates and a preliminary analysis of its results were carried out.
- Methods for the evaluation of R&D programs were reviewed and studied
- Indicators for R&D project success were developed, relevant indicators from foreign R&D supporting programs were adopted (such as: number of patents created as a result of the program; number of publications created and their citations; contribution to training of skilled graduates - the number of students involved in the projects; the number of new companies and start-ups established).
- A preliminary statistical analysis of project success factors was carried out, based on the survey data. One of the conclusions is that the main parameters which have a positive impact on a project's success probability are the number of students taking part, and – to a lesser extent - the chief investigator's academic position.
- An information system was designed which will help to evaluate and assess the contribution of the research projects, which were supported by the Ministry of Science & Technology within the Infrastructure program framework.
- In June 2005, the initial findings from the evaluation of the Ministry of Science and Technology's Infrastructure Program were presented at the Rehovot Conference on Science and Technology.

QUALITY OF ENGINEERING/SCIENTIFIC RESEARCH AT THE TECHNION AND AT OTHER ISRAELI UNIVERSITIES – A GLOBAL COMPARISON

Project Leader: Dr. Daphne Getz; **Researchers:** Marian Shumaf-Tehwkho, Vered Segal, Orly Nathan-Shats, Prof. Gideon Czapski.

The goal of this study, which was commissioned by the Technion and conducted at the S. Neaman Institute, was to examine the level of engineering research at the Technion and at other Israeli universities in comparison to other countries, using objective tools. In addition, the study examined the tools which are being used for evaluating the impact that research has on the economy, industry, and society in Israel. The study includes five parts:

In the first part, a literature review of the criteria and methods for the evaluation of engineering and scientific research was prepared. The review covers the differentiation between applied/engineering research and basic/scientific research and the different dimensions for their evaluation, the two main methods being: peer review and bibliometrics. In addition, we prepared a review of the world universities' ranking as well as the criteria and methods they use.

In the second part, a literature survey was conducted on the indicators for evaluating the impact that research has on the industry, economy and society. The main evaluation dimensions were: effectiveness of knowledge transfer from the universities to the market; qualifying graduates and qualifying for advanced degrees; technologies transfer from the universities to the industry; the impact of the research on economic growth using economic models; research impact on society and quality of life.

In the third part, we presented indicators for comparison between Israel and countries which were chosen for bibliometrics comparisons (presented in the fourth part). The countries which were chosen for comparison are divided into two groups: countries which are similar to Israel in terms of population size or GDP per person, or both, and other group of countries which include the EU-15 and four countries from the G8 group. The indicators were presented in three dimensions: general indicators (i.e.: population, GDP), high education indicators, and R&D expenditure indicators.

In the fourth part, bibliometrics analyses were conducted on the basis of the ISI (Institute of Science Information, Philadelphia, USA) databases, in order to compare the scientific production of Israel with other countries in the world, and the scientific production of the Technion in relation to other institutes. The ISI databases we used include data on 180 countries and 200 institutes - mainly from Israel, USA, UK, and Canada. The comparisons were conducted in three groups of indices:

- Productivity indices- number of publications per capita at the country or number of publications at the institute.
- Index of priority of research in a field.
- Quality indices- the citation index.

The countries and institutions were ranked according to these indices. The use of five additional ISI databases, which include the "HOT" and most cited papers, helped us to draw the full picture of the status of Israeli research in the different fields and subfields.

The last part of the work focused on three fields of knowledge: ICT (Information and Communications Technologies), Biotechnology and Aerospace Engineering. The data and indicators for these fields were presented. The development of each field was reviewed, and trends were examined along the last few years in several indicators.

EVALUATION OF THE MAGNETON PROGRAM

Project Leader: Dr. Daphne Getz; **Researcher:** Mariana Ardetz

The S. Neaman Institute conducts research evaluating the Magneton Program, in order to analyze its effectiveness as a tool for encouraging technology transfer from academia to industry, and for the commercialization of technologies and their application to products and services. The results of this research provide important feedback to investors (Government, Industry), participants (Academia, Industry, Government), and executives, to support policy-making decisions.

The Magneton Program was established by the Chief Scientist of the Ministry of Industry and Trade to encourage cooperation between academia and industry. The Magneton Program's objective is to increase the accessibility of Israel's industry to the achievements of economic-industrial oriented scientific research. The pilot of the program began in 1999 and in 2002 the program was officially accepted. By the end of 2005, 250 projects were submitted and 99 were approved. To date, 69 Magneton projects have completed their activities.

The study is based on a field survey in which researchers from the academy and project managers from the industry were interviewed. The interviews were held with participants of projects that completed their activities (2 years duration in most cases).

Researcher characteristics: The majority of the researchers who participated in the study had previous work experience with the industry. In addition, over 80% of the researchers reported that they had previous experience in commercialization or application of the technology they developed, mostly through patent registration.

Company characteristics: 38% of the companies that participated in the Magneton program are large companies, 42% medium, and 20% small. The percentage of employees working in R&D exceeds 25% in half of the companies. Most of the companies are located in the metropolitan areas of Tel Aviv and Haifa.

Project characteristics: Over 35% of the projects were from the fields of electronics and computers; a third were from the biomedical and biotechnology fields, and the rest from chemistry and material sciences.

Project outputs: In 60% of the cases a new technology was developed, and 50% of the projects, prototypes were developed. 24% of the projects resulted in development of a new product.

Indirect results of the projects: Student training, expanding relations with industry, new products or services developed as a result of the project, and students involved in the project were presented with new employment opportunities.

Suggestions for improving the program proposed by the researchers included regulation of the IPR issue and recruitment of faculty members from the academy for marketing assistance.

The research results indicate that the program is successful in reaching its goals and in establishing communication channels between the academy and industry that lead to the implementation of ideas and inventions developed in the academy. A word of caution: due to the relatively small sample, it is still too early to reach definitive conclusions.

NEAMAN INSTITUTE ACTIVITIES IN MAGNET CONSORTIA

The S. Neaman Institute has been active in the MAGNET program for over 10 years. MAGNET is a unique, nationwide program responsible for encouraging the development of innovative, generic, pre-competitive technologies and R&D, and promoting the collaboration between industrial companies and scientists from Israeli research institutes. It was launched in 1992 by the Office of the Chief Scientist of the Ministry of Industry, Trade and Labor; MAGNET currently includes 15 active consortia and supports three additional channels for the development of technology rich industry, using the reservoir of knowledge in the Israeli academic institutions.

The S. Neaman Institute was instrumental in developing the program together with the Chief Scientist, and acted as a bridge between academia and industry to foster joint R&D and technology transfer between the two sectors. Currently, the S. Neaman Institute fulfills two functions related to the MAGNET program. First, the Institute represents researchers from the Technion in a number of MAGNET consortia. In addition, the Institute has established and operates one of the largest information centers in the country on behalf of many of the consortia.

MAGNET CONSORTIA INFORMATION CENTERS

Information Center Manager: Dr. Daphne Getz

The MAGNET Consortia Information Center was established to fulfill the information needs of the consortia working in the framework of the MAGNET program. It is based on a dedicated system, designed according to requirements of the S. Neaman Institute team in cooperation with the consortia. During 2004 the system was upgraded and a new interface, features and modules have been developed in order to supply supporting tools for organizational management. Currently, three consortia are working with the new system and each new consortium that joins will use it as well.

Currently, eight information centers for MAGNET

Consortia are active within the framework of the S. Neaman Institute:

- Nano-Functional Materials (NFM) Consortium
- The Israeli Consortium for the Development of Micro Optical Electro Mechanical Systems (MOEMS)
- Pharmalogica
- REMON -Israel 4G Consortium
- The Israeli Consortium for Short Range, High Data Rate Wireless Communication (ISRC)
- Large Scale Rural Telephony (LSRT)
- Streaming Rich Media Messaging (STRIMM)
- Imaging Machines-the 4th Generation (IMG4)
- Magnesium Technologies Users Association.

Information Center Goals:

- Knowledge collaboration among consortium members.
- Managing relevant internal information.
- Information supply from international databases.
- Modules supporting organizational management.

Internal Information Site

The internal information of each consortium includes reports of researchers and project managers. An Internet site is designated to store and retrieve all the documents produced in the consortium, as well as to enable technical administration of its activities. The knowledge management system has a web interface which enables user-friendly access to information, while ensuring the necessary protection of data.

External Technical and Scientific Information Supply

The site is designed to keep consortium members updated with information published about their subjects of interest. 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.

Organizational Management Supporting Modules

The new information system enables the consortia to manage their activities through several tools such as a calendar for schedule

management of work groups, mailing lists for distribution of messages and alerts, secured forums for unstructured communication and discussions among consortia members.

Information Retrieval

Users may access information by three methods:

- Using the search engine of the knowledge management system.
- Surfing via libraries and categories.
- Notification by personal profile defined by each user.

Consortia Open Internet Sites

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

Human Resources

At present, six information specialists supply information and maintain the Information Center: E. Barzani; O. Berl; E. Gilad; O. Malberger; O. Nathan-Shats, B. Zalmanovich. Computing infrastructure: G. Tamir.

THE ZVI GRILICHES RESEARCH DATA CENTER

The Zvi Griliches Research Data Center was established by Haim Regev, former Associate Director of the Central Bureau of Statistics (CBS), and Prof. Saul Lach of the Department of Economics at the Hebrew University, to incorporate data from the Office of the Chief Scientist (OCS) of the Ministry of Industry, Trade and Labor, with data from the CBS. The data center, which was established and operates at the S. Neaman Institute, comprises data on R&D projects which were supported by the OCS, and on companies which carried out projects since the mid 1980s. The establishment and development of this data center are a part of the ongoing activities of the STE group, operating under the auspices of the S. Neaman Institute. The data center can be accessed by researchers through the internet and at a special research room at the CBS.

The main goal of the data center is to promote R&D, encourage innovation, and advance areas related to human resources, business productivity, etc.

The main activities of the Zvi Griliches Center are:

- Establishment of comprehensive data sets, which enable research at the level of commercial entity. The data infrastructure is located at the CBS, and comprises data collected over the years and from managerial files received from different government ministries.
- Assisting research based on data included in the Center, including confidential data in research rooms at the CBS. Use of this data is made possible through a special arrangement between

the CBS and the S. Neaman Institute. The data center is an integral part of the S. Neaman Institute website, under the responsibility of Orly Nathan-Shats, Information Specialist at the Institute.

Activities in 2005

Haim Regev continued his work of incorporating new data into the Center, aided by Simcha Bar-Eliezer and Soli Peleg from the CBS.

Dan Rymon and Baruch Bar-Tel have developed a database on new plant varieties.

THE S. NEAMAN INSTITUTE WEBSITE www.neaman.org.il

The S. Neaman Institute website is considered one of the most important resources for data relating to science and technology in Israel. At the site, which is in English and Hebrew, all of the Neaman Institute publications can be accessed, as of 1987, and can be downloaded at no charge.

Regular users of the Neaman Institute website include national leaders and decision-makers and leading researchers in Israel and abroad. The site-use statistics show that two-thirds of the publications downloaded from the site are by users in Israel, and the rest, by users in countries including the United States, Malaysia, China, France, Germany, Australia, Tunisia, Spain and more.

The Neaman Institute website is easily navigated and the contents are divided according to the Institute's main topics of activity:

- Science, Technology, Economy and Industry
- Universities, Education and Human Resources
- National Planning, Infrastructure and Environment
- Social and Health Policy
- Data Centers

In addition, the dates for seminars organized by the Neaman Institute are posted, as well as registration information. Videos and presentations from past seminars can also be viewed.



SEMINARS AND COOPERATIVE PROJECTS

1. Samuel Neaman Memorial Lecture Series

This year, the third lecture in a series commemorating the memory of Samuel Neaman, was delivered by Professor Moshe Halbertal on the subject of "On Sanctity and Violence – From Political Conflict to Religious War". The first lecture was delivered by former MK Dan Meridor on the subject of "Zionism – An Interim Accounting at a Critical Junction".

The second lecture, by Israel Prize Laureate Professor Avi Ravitzki, was entitled "The Jewish People in our Times: Between Determinism and Independence".

2. Science, Technology and Economy (STE)

- As in previous years, during 2005, the STE program continued to host its traditional monthly meetings, where group members present the progress in their research, and other related subjects. One of the advantages of this forum is the opportunity it provides to get feedback at early stages in a project, in a supportive and constructive academic atmosphere. Each meeting lasts over three hours and includes two-three presentations, as well as discussions on topics relevant to the group. During the Fall semester of the 2004-2005 academic year, three STE meetings were held, which featured presentations of research proposals (including those of grant recipients) and seminars.
- Prof. Mark Schankerman of the London School of Economics gave a seminar in the context of the STE meetings in January 2005.
- In June 2005, at the Rehovot Conference on

Science and Technology, initial findings of the study Evaluating the Infrastructure Program of the Ministry of Science and Technology were presented by the S. Neaman Institute.

• Biotechnology Industries Cluster

During March 2005, one meeting of the Biotechnology Cluster Forum was held at the S. Neaman Institute, focusing on biochemistry, with an emphasis on food engineering, agriculture and the environment.

- In September 2005, the S. Neaman Institute presented a session on Enhancing Entrepreneurship and Innovation in Israel at the annual meeting of the American Technology Transfer Society (T2S). Lectures were delivered by Dr. Orna Berry, Prof. Uzi de-Haan, Prof. Miriam Erez, Dr. Dan Breznitz and Prof. Nadav Liron. In this forum, a collaborative project was initiated with the Kauffman Fund.

3. Universities and Human Resources

- During 2005, a series of meetings were held with academic researchers and representatives from the Israeli Education system, in the framework of the STE program, which is focusing this year on the Economics of Higher Education (EHE).
- The S. Neaman Institute, in cooperation with the School of Education at Tel Aviv University, led a conference in November 2005, entitled "The Rules of the Game for Higher Education in Israel – Where To?", scheduled to coincide with the publication of "Academia in a Changing Environment" (see description in Universities, Education and Human Resources section).
- The S. Neaman Institute held five meetings of

the Forum of University and College Presidents over the past year. The purpose of these meetings was to create a channel for open discussion between the colleges and the universities, on issues of common interest, towards a healthy and thriving higher education system.

4. Infrastructure and National Planning

During 2005, the S. Neaman Institute chose to focus on the subject of Energy and, to that end, established an Energy Forum. The Forum held its first conference in May 2005 at the Institute.

5. Economics of National Security

- In the context of the S. Neaman Institute's National Security program, 7 research meetings were held, with some 25 researchers participating in each meeting.
- The ENS Program conducted a workshop in June 2005 on the topic "Demographic Perspectives of the Israeli-Palestinian Relationships".

6. Environment and Energy

- During 2005, the S. Neaman Institute led a number of environmental seminars: "The Sea as a Resource", in cooperation with the Department of Natural Resources and Environmental Management at University of Haifa, in March 2005; and "Israel's Future: Black, Grey or Green", in cooperation with the Ministry of the Environment, in May 2005.
- The S. Neaman Institute presented a paper at the Caesarea Economic Forum, entitled

"Environmental Technologies – Leverage for Israeli Growth in the Global Economy", in June 2005.

- In June 2005, SNI presented its role in Setting National Environmental Priorities in the Dubrovnik Conference on Sustainable Development of Energy, Water and Environment Systems.
- In July 2005, the Institute participated in a Focus Group on the Subject of "Environmental Committee for the Local Councils", in cooperation with the Centers for the Local and Regional Councils, and the Ministry of the Environment.
- In December 2005, the Neaman Institute presented "A Strategic Plan to Reduce Emissions in the Dan Region" to the Tel Aviv Municipality, "Adam, Teva, V'Din", and the Tel Aviv Green Party.

7. MAGNET

Within the framework of the MAGNET program, the consortia supported by the project held periodic meetings at the S. Neaman Institute.

THE SAMUEL AND CECILIA NEAMAN PROGRAM FOR DOCTORAL AND POST-DOCTORAL FELLOWS

In honor of the memory of Samuel and Cecilia Neaman, and in the spirit which led to the creation of the S. Neaman Institute, the Samuel and Cecilia Neaman Program for Doctoral and Post-doctoral Fellows was established. The new program, which was inaugurated at the 2004 Board of Governor's Ceremony, provides support each year for outstanding students doing their doctoral and post-doctoral research at the Technion, who show potential to become leaders in their fields.

Fellowships over the last two academic years were awarded to:

Doctoral Fellows

2003-2004: Amir Rosenthal, Mayan Duvsheni, Gabriel Zaiden, Eyal Ackerman, Avner Fleisher, Alon Polski, Or Yizhar

2004-2005: Daniel Melamed, Avner Fleisher, Nirit Egoz, Sharon Shoham, Michal Aharon

2005-2006: Abigail Wachter, Guillaume Weick, Sara Naftali, Emily Silverman, Hagai Shorer, Igor Rasin, Sageev Yesodharan, Amir Sapir

Post-doctoral Fellows

2004-2005: Dr. Michael Tzareski, Dr. Milan Sidelka, Dr. Amir Sapir, Dr. Samach Samaan

2005-2006: Dr. Dalia Shalom-Shezifi

LECTURE SERIES IN HONOR OF SAMUEL NEAMAN

In 2004, an annual lecture series was established in commemoration of Samuel Neaman, featuring national leaders distinguished for their depth of knowledge and vision regarding the challenges faced by the State of Israel.

The third annual lecture was delivered by Professor Moshe Halbertal on the subject of "On Sanctity and Violence – From Political Conflict to Religious War".

The first lecture was delivered by former MK Dan Meridor on the subject of "Zionism – An Interim Accounting at a Critical Junction". The second lecture, by Israel Prize Laureate Professor Avi Ravitzki, was entitled "The Jewish People in our Times: Between Determinism and Independence".

PUBLICATIONS OF THE S. NEAMAN INSTITUTE

Publications in English

Transition to Mass Higher Education System: International Comparisons and Perspectives.

Proceedings of the international conference of the same name, December 5-6 2004.

Organizing Committee: Zehev Tadmor (Chair and Editor), Eli Avraham, Sarah Guri-Rosenblit, Hanoch Gutfreund, Alex Keynan, Nadav Liron, Mordechai Shechter, Neal Sherman

Firm Growth Profiles (FGPs): Towards an Action-Based View of Firm Development

Niron Hashaj, Jonathan Menuhin

Evolutionary Innovation and High Tech Policy: What Can We Learn from Israel's Targeting of Venture Capital

Gil Avnimelech, Morris Teubal

Public vs. Private Technological Incubator Programs: Privatizing the Technological Incubators in Israel

Amnon Frenkel, Daniel Shefer, Michal Miller

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Editor: Abbie Rosner
Design: Graphic Touch Ltd.