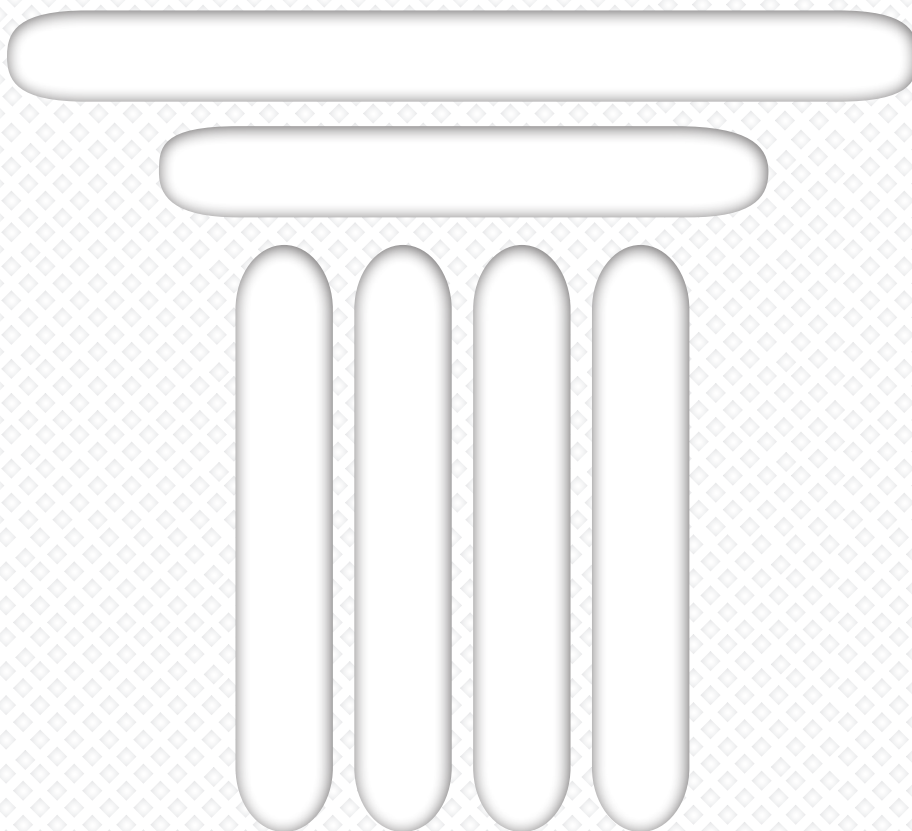




Samuel Neaman Institute
for National Policy Research

Samuel Neaman Institute Annual Report 2015



Technion - Israel Institute of Technology

THE SAMUEL NEAMAN INSTITUTE

The Samuel Neaman Institute was established in 1978 in the Technion at Mr. Samuel Neaman's initiative. It is an independent multi-disciplinary national policy research institute. The activity of the Institute is focused on issues in science and technology, education, economy and industry, physical infrastructure, and social development, which determine Israel's national resilience.

National policy research studies and surveys are executed at the Samuel Neaman Institute and their conclusions and recommendations serve decision makers at various levels. The policy research is conducted by the faculty and staff of the Technion and scientists from other institutions in Israel and abroad and specialists from industry.

The research team is chosen according to their professional qualifications and life achievements. In many cases, the research is conducted in cooperation with governmental offices and in some cases at the initiative of the Samuel Neaman Institute and without the direct participation of governmental offices.

So far, the Samuel Neaman Institute has performed hundreds of exploratory national policy research projects and surveys that serve decision makers and professionals in the economy and government. In particular, the institute plays an important leading role in outlining Israel's national policies in science, technology, and higher education.

Furthermore, the Institute supports national projects, such as the Ministry of Industry, Trade & Labor clusters - the MAGNET program in nano-technologies, media, optics and communication, chemistry, energy, environmental and social projects of national importance. The Institute also organizes comprehensive seminars in its leading fields of research.

The Samuel Neaman Institute's various projects and activities can be viewed at the Institute's Website.

The chairman of the Samuel Neaman Institute is Professor Zehev Tadmor and the director is Professor Omri Rand.

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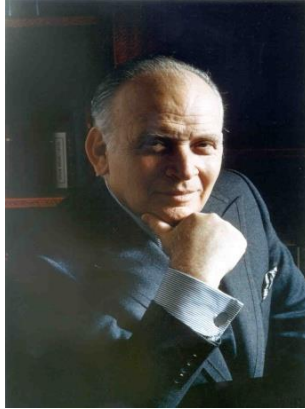
Vision

To promote informed national decisions in Israel through research and the analysis of well-established information

Mission

To be a leading research institute that identifies, formulates, and analyzes matters of policy of national importance in the areas of scientific–technological development, economics, and social issues in Israel. The Institute's activity is expected to encourage educated public debate, promote and assist the decision making process of the State of Israel, and bring its recommendations to their final adoption.

The Institute focuses primarily on formulating national policies in the fields of science and technology, industry, schooling and higher education, social integration, infrastructure, environment and energy, and other issues of national importance, where the Institute can provide valuable and unique contributions.



The Founder:
Samuel (Sam) Neaman
1913-2002

"I was born in Rosh-Pina in 1913 as the firstborn of my parents, Esther and Pinchas Neaman. My mother was also born in Rosh-Pina and my father was a pioneer who came to Israel with the Second Aliyah. My wanderings began when I was three years old." This is how Samuel (Sam) began his autobiographic story in the book *Land of Israel Inside and Out*, published by the Ministry of Defense. The book portrays the life story of Sam Neaman, describing his wanderings from Palestine to Lebanon, Syria, and France and back to Israel – to the battlefield of the Second World War in the Middle East and Europe.

During his wanderings, Sam Neaman never forgot his homeland, to which he felt strongly attached. His love for the land of Israel and the state of Israel motivated him to establish an institute for policy research, the "Samuel Neaman Institute," in the Technion, which is considered a leading non-profit research center in Israel, with the goal of transferring academic knowledge from the vast store accumulated in the State's academic institutions to applicable routes concerned with delineating a national policy, thus connecting research and the academe with national decision makers.

Samuel Neaman died on November 13, 2002, at the age of 89. To the last, he stayed involved in the Institute's activities, contributing significantly through his ideas and bestowing his vision. He left behind him a life work that continues to breathe and live, and to stimulate Israel's leading researchers and its decision makers.



The Chairman

Prof. Zehev Tadmor

**The Council for Higher Education Law and the Independence of
Research Universities**

The Neaman Research Institute has been working actively for many years on issues of science policy, higher education, and the structure and designation of research universities,¹ and therefore, in these opening remarks I would like to address several controversial issues that are currently on the public agenda.

The Academe is in the midst of a battle that will affect the independence of the higher education system in general and that of research universities in particular. The battle concerns mainly on the composition and management of the Council for Higher Education (CHE), which is in a state of dispute that has reached the Supreme Court, and of the Planning and Budgeting Committee (PBC). However, hidden beneath the surface are more fundamental issues that relate directly to the core structure of the higher education system in Israel.

¹ There are numerous publications by the Neaman Institute, and international conferences addressing these issues have been held by the Institute, which can be found on the Neaman Institute Website.

The Law of the Council for Higher Education 1958, which defined the role and nature of the CHE, was approved by the Knesset after lengthy discussions that lasted for several years,² and contains a number of principal statements of great importance for the discussion being held. First, the law states that two-thirds of the CHE members should be "of a standing in the field of higher education." From a review of the discussions in the Knesset at the time, one can understand that the intention was to appoint scholars of scientific caliber, so that their considerations would be national, not individual, and would arise solely out of concern for the quality of the system; the law further stipulates that a third of the members be respectable public figures, who consider only the public interest and the state, so that the decisions of the Council should be accepted by the public and the system without challenge. **In other words, the legislature clearly intended to establish a regulatory elitist body to ensure a higher education system of high academic and personal level, and not to establish a Council, which is 'representatively democratic,' that is, represents the interests of different sectors in higher education or the public, as is happening today.** The CHE was supposed to be created more in the image of the Supreme Court than of the Knesset. Second, the legislator stipulates: that the Minister of Education will be Chairman of the Council, but only in his capacity as Minister of Education; that is, the legislature's intention was to stress that the Minister of Education is not the head of the Council, but only an 'ex officio' Chairman, in contrast to what has been happening in practice for some time. Third, the legislature grants exceptionally extensive autonomy to academic institutions, headed by research universities,³ through Article 15, which states

"An accredited institution is free to conduct its academic and administrative affairs, within its budgetary framework, as it sees fit. In this section, "academic and administrative affairs" includes setting a research and teaching program, appointing the institution's authorities,

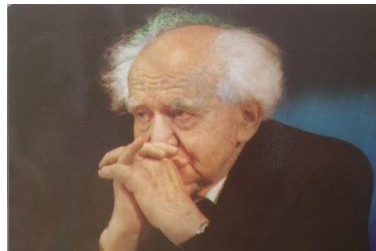
²See Ami Wollensky, "Academia in a Changing Environment", a comprehensive book written under the auspices of the Neaman Institute, published by Redline KM, 2005.

³When the Law was legislated, almost all institutions were research universities, except for some higher education institutions, such as the Academy of Music and Dance and Bezalel, the Academy of Art and Design.

the appointment and promotion of teachers, determining the method of teaching and learning, and any other scientific, educational or economic action."

Thus, the specific intention of the legislature was to guarantee to Israel an independent system of research universities, free of political or other interference.

This law, which has a vision and a deep understanding of the role of research universities, stems from the strong belief of the founders' generation of the State of Israel, led by David Ben-Gurion, regarding the crucial importance of science created in research universities for the construction of the nation and State. Here is what David Ben-Gurion said when he presented the guidelines for the first government, in the seventh meeting of the first Knesset, in 1949, in which he listed the three elements that would allow the new country to overcome the huge difficulties it faced, namely: the help of the Jewish People in the Diaspora; the power of creative pioneering pulsing in the hearts of young people in Israel and the Diaspora; and the third element,



Photograph: KKL-JNF Photo Archive

"...to generate this wonder, is the power of science and technology we will add to our work. In our own age, perhaps the greatest revolution in human life on earth is taking place, the revolution of human domination over the titanic forces of nature and the power of the atom, and the conquest of air and space and the mysteries of the universe. We cannot compare to many peoples in power, wealth, number, and resources, but we do not fall short from any other nation in our intellectual and moral capabilities".

However, over the years, the field of higher education has changed. First, there was a growing demand for higher education, as a result of social changes, the

natural population growth, and the large Russian immigration. In fact, Israel went through a process similar to that in the developed countries, which is a gradual transition from an elitist higher education system to one that is broadly accessible, and finally a system offering universal access, where all those who seek post-secondary education can be addressed.

In response to these needs in the nineties of the last century, a historic move was launched, that of establishing dozens of colleges, thus enabling broad access to higher education. The idea was to build a two-tiered higher education system: research universities on the one hand, which grant all degrees up to and including doctoral degrees and where all basic scientific research is performed, and colleges that grant only a bachelor's degree, and in which the emphasis is on teaching rather than research. Such a structure allows the education system, at a reasonable national cost, to satisfy the demands for higher education, to provide a wide variety of graduates to the economy, and to maintain a high scientific level.

These changes led to a system that contains today about 65 higher education institutions⁴ and over 300,000 students, at a total cost of nine billion shekels. With this expansion, it became clear that the regulatory bodies (CHE and PBC) in their present form are finding it difficult to cope with a higher education system of such magnitude. In addition, the increase was accompanied by growing political intervention in the higher education system, in light of the political potential of masses of students, as well as large government budgets.

Thus, ministers of education, acting out of political interests, began to gradually change the structure of the Council for Higher Education and appoint members to the Council, not as intended by the legislature, but according to their own political interests. Therefore, **the Council started inevitably to change its composition gradually from an elitist body, as the legislature intended it to be, to a political body, where sectorial and political interests are receiving increasing expression.**

A particularly flagrant intervention, both in the management of CHE and the appointment of its members, and in the appointment of the PBC members, characterizes the behavior of the current Education Minister, culminated in the

⁴ Not including teaching colleges that are intended to join the PBC and CHE.

‘explosion’ of the "Hagit Messer Yaron dismissal affair," which provoked considerable anger in the system, leading to a letter of protest signed by 1,500 professors; a sharp protest letter written by the rectors; a protest letter written by the BaShaar Association on behalf of its members; an appeal to the High Court by a number of professors, and the resignation of six members of the Council for Higher Education. Of particular concern is that some of the appointments do not seem worthy, at first glance, and most are painted in a political/ideological shade.

The affair began when the former Education Minister, Shai Piron, appointed a committee headed by Prof. Hagit Messer-Yaron, who was Vice Chairperson of the CHE, to reexamine the two regulatory bodies in terms of their composition and functioning, in order to adapt them to the needs of the day. Upon the completion of the Commission's comprehensive work, the results thereof were submitted to the Minister of Education, Shai Piron.

Then, as happens all too often in our country⁵, the government was replaced and Naftali Bennett was appointed in the capacity of Education Minister. Bennett rejected all the committee's recommendations, dismissed Prof. Messer-Yaron without explanation and without giving her a chance to present her position before the Council for Higher Education, and appointed in her stead a faculty member from one of the colleges, holding the position of Associate Professor, which seemed strange.⁶

⁵ For example, the Neaman Institute, together with the US-Israel Science and Technology Commission, formulated a comprehensive document entitled "Israel 2028 Vision and Socio-Economic Strategy in a Global World," led by a steering committee headed by Eli Horowitz and the management of David Brodet. The document was submitted to the Prime Minister in 2008, Ehud Olmert, who presented the document for a government discussion, which adopted it. The intention of PM Olmert and the Prime-Minister's Office CEO, Raanan Dinur, was to use the document as operational strategic courses of action. However, Ehud Olmert's resignation in September of that year halted its application.

⁶ Apparently, this appointment did not seem appropriate in terms of the candidate's academic status and because she has the rank only of Associate Professor and her promotion to the rank of Professor at the College is conditional on the Appointments Committee, which itself is appointed

In protest of the dismissal of Professor Messer-Yaron, six members of the Council for Higher Education resigned. Following the commotion generated as a result, the Minister of Education and head of the Committee of University Heads (CUH), Professor Peretz Lavie, the Technion President, reached a temporary compromise agreement on the appointment of replacements from a list of candidates compiled by the universities' presidents, and that the appointment of Vice Chairperson of the CHE would end with the termination of the current CHE tenure. Meanwhile, the Supreme Court decided that, although the CHE can continue to operate, it has to refrain from discussing long-term issues of importance, until the replacement appointments of those members who resigned is completed.

This affair exposed the internal conflicts and the complexities hidden in the structure of the current regulatory system. The recommendations of the Messer-Yaron Commission were intended to meet, inter alia, part of these problems. The committee's main goal was to preserve the autonomy of the institutions, namely, Article 15, and to establish mechanisms for the appointment of qualified and deserving members of the CHE and PBC, in the spirit of the law.

However, these amendments, which, as stated, were rejected by the Minister, important as they may be, do not address the central problem, the so-called upper drift, i.e., the aspiration of colleges to promote their status to that of research universities, with the possibility of granting doctorates – while conducting extensive scientific research and obtaining adequate resources – and the internal authority to promote staff members up to the rank of full professor. These are not merely academic ambitions, because they are accompanied by the enlargement of the PBC funding of colleges to the level of that of the universities, a considerable part of the budgets of which, as we all know, is dependent on the volume and quality of their scientific research. And if that happens, the whole system will descend into mediocrity, because Israel does not have the human and financial resources to maintain so many high level research institutes, and it will also lead to increased sectoral competition

by CHE. This raises concerns of conflict of interests that as the Vice Chairperson of CHE she may be involved in the selection of the committee members.

between colleges and universities for the resources that the state makes available to the system.

In other words, there is an open issue on the table concerning the structure, composition, and methods of appointment to the regulatory bodies, to which the Messer-Yaron Committee suggested solutions that were declined, and the general systemic problems have not yet been addressed. A proposed solution should meet two principles: first, it should maintain the principle of the diversity of the system, which trains a large variety of disciplines and provides the levels of study that a modern state needs; and second, it should maintain universal access, while preserving and promoting world-class scientific quality.

An incomplete but relatively simple solution that should have been considered is the adoption without legislation (as was the intention) of the method of appointment of members to the Council for Higher Education Planning and Budgeting Committee, as the Messer-Yaron Committee recommended, **and (slowly) shifting most of the funding given to universities for scientific research to competitive funds open to all.** It is likely that most of these funds will reach the best researchers and research groups, who are in the universities, and even among them, the funds will find their way to the best. This will reduce, on the one hand, the disparity in the PBC allocation between universities and colleges (because the bulk of the allocation will be given for teaching and not for research), and on the other hand competitive funds will keep the majority of funding for scientific research in research universities, which are the only institutions with the research infrastructure necessary to carry out modern research.⁷ Moreover, it will increase the competition between the universities themselves and will lead to a situation in which a few of the research universities will have sufficient funding to compete with the finest universities in the world.

A more radical solution is to set up two parallel regulatory systems, one for research universities and the other for colleges. This is a rather

⁷ Such a proposal is detailed in the document Israel 2028 (see footnote 5).

complicated step, but it would fundamentally solve the internal conflicts. The downside is that the universities – with a smaller number of students – would have to negotiate with the Finance Ministry alone. This would also require a national treaty between the government, universities, and colleges regarding their role in the system and the type of degrees that they are entitled to grant. But, maintaining the status quo, with the increasing politicization of appointments of members to the Council for Higher Education Planning and Budgeting Committee, who are far from the quality and scientific level intended by the legislatures in 1958, would be disastrous for the future and the quality of our research universities and Israeli science.



The Director

Prof. Omri Rand

The Samuel Neaman Institute for National Policy (SNI) serves as a thinking platform for decision making at the national level in Israel. The Institute fulfills the vision of its founder, Samuel (Sam) Neaman, gathering experts in various fields that require informed decisions for discussion and analysis of issues on the public agenda and formulating recommendations for national policy. The researchers leading the studies conducted at the Institute are highly experienced experts in their field and provide a broad overview of issues in the short and long-term that require decision making and national guidance. The Institute focuses on issues in the fields of science and technology, industry, education and higher education, physical infrastructure, environment and energy, as well as on issues that are of national importance to which it can make a unique contribution. In many areas, Israeli national policy interfaces the national policy in other countries, and therefore, the Institute researchers compete for research funds both in Israel and around the world, especially within the European research programs and public funding in the US.

Research at the Samuel Neaman Institute aims to be integrative, while exploiting effectively the freedom in choosing research topics and leveraging capabilities, multidimensional expertise, and the information databases accumulated over the years as a result of conducting hundreds of infrastructure studies. In addition, SNI initiates many seminars, expert workshops, and lectures to discuss the issues with which it deals.

Recently, SNI launched the SNI Wheels of Life Index, which summarizes Israel's status in five areas: society, governance and higher education, energy and environment, science and technology, innovation and economics. The data of this index, followed by the analysis and insights and inputs of the SNI experts make a real contribution to assessing the activity in Israel in the fields in question and adequately reflect the areas of activity in the institute.

In 2015, the Institute researchers worked on varied studies. Researchers led by Dr. Daphne Getz continued with the process of many years of developing and updating the status of science, technology, and innovation in Israel, through international comparison and the measurement of R&D outputs and the monitoring of publications and patents of Israeli researchers. In a European research study in which they participated, the researchers developed ways to create incentives for the creation of knowledge. A study, led by Prof. Dan Peled, deals with the position of research universities in the national R&D system in Israel.

Moreover, the Higher Education and Science and Technology Education Forum continued to discuss the major issues of the higher education system and secondary education. Prof. Kirsch led a study on online mass instruction and the Education Forum, led by Prof. Orit Hazzan, conducted an extensive comparison of matriculation exams in physics over the last forty years. In the field of environment protection, researchers, led by Prof. Ofira Ayalon, continued to study issues of national importance such as the reporting and registration of greenhouse gas emissions in Israel. In addition, Prof. Gershon Grossman headed several workshops of the Energy Forum, which discussed issues such as optimal utilization of domestic natural gas, including the issue of export. The Industrial Excellence Center, led by Dr. Gilead Fortuna, implemented an extensive project to formulate a plan to upgrade the economic system in the north. In addition, extensive studies have been conducted on the challenges of water use in the global industry, and researchers gave lectures to many professional audiences in Israel and the US. As part of the national infrastructure studies, Prof. Rachelle Alterman is leading a policy study on land policy in Israel and housing prices.

I hope the various studies described in this annual report will form an important foundation for formulating national policies on many issues in Israel, and that this will constitute the the Samuel Neaman Institute's contribution to making informed choices at the national level.

I thank those who work with us and wish them all success in the future.

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A. Wheels of Life

A.1 Israeli Innovation -- Bright Side & Dark Side

Prof. Shlomo Maital & Tsipy Buchnik

Israel, Startup Nation, greatly benefits from its image as a creative entrepreneurial country, populated by innovative young people, bold enough to launch a thousand startups or more a year. And it is indeed true that in many dimensions, Israel as a nation is highly innovative, relative to other nations.

But like the moon, there is a dark side, as well as a bright side. In the previous two SNI Annual Reports, we used the “Wheels of Life” visualization to show how Israel excels in Innovation and in Science & Technology, but far less so in the Economy and Society dimensions. In this essay, we examine both the bright and the dark side of Israel’s innovation ‘moon’, in a visual manner.

To do this, we will make use of the Global Innovation Index, published annually by Cornell University, INSEAD and WiPO. The 2015 edition presents data on 81 innovation indicators for each of 141 countries.

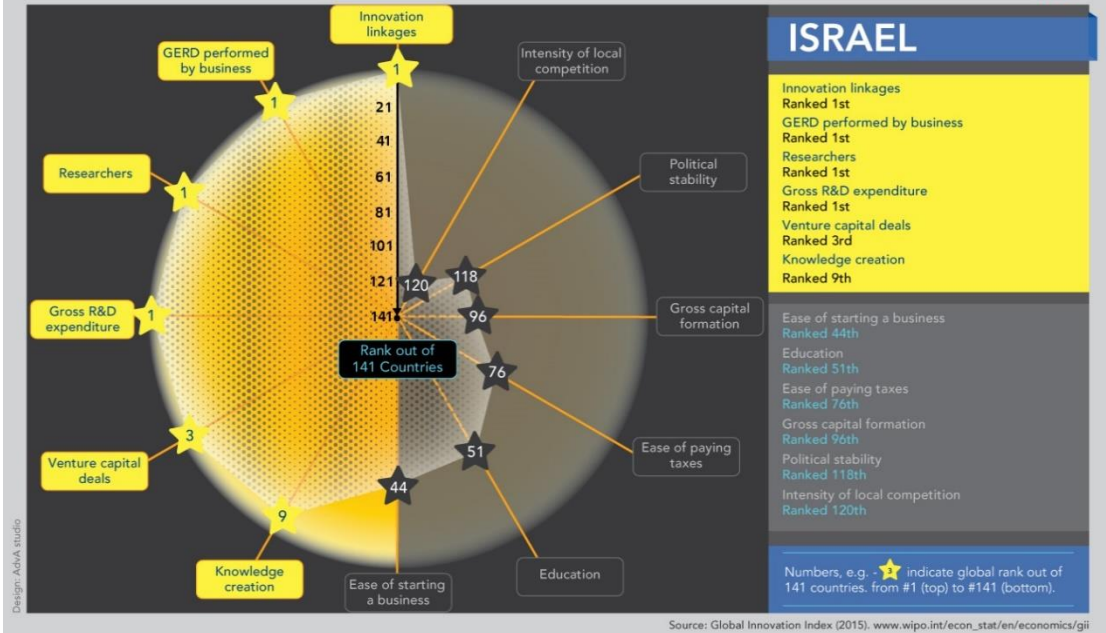
Figure 1 below shows the bright side and the dark side of Israel’s innovation capabilities.

Bright Side of the Moon: There are six innovation variables in which Israel ranks at the top, or among the top nations in the world. They are: (with Israel’s rank out of 141 globally competitive nations): Innovation linkages: (Rank #1); Gross R&D financed by business/ GDP: (#1); R&D Researchers/million people (#1); Gross R&D spending/GDP: (#1); Venture capital deals/GdP (#3); Knowledge creation (#9).

But is there a dark side? If so, what is it? Fig. 1 also shows the dark right-hand side, the six areas of primary weakness in innovation measures in the Global Innovation Index. They are: Ease of starting a business (Rank #44); Ease of paying taxes: (#76); Education (#51); Gross capital formation as % of GDP: (#96); Political stability; Intensity of local competition (#120);

Figure 1. Israel’s Innovation Variables: Bright Side, Dark Side

SNI Israel's - "wheels of innovation" 2015



There is no room for complacency in Startup Nation. Increasingly, other nations are building their innovation capabilities, and competition is becoming fiercer.

The top five nations in the global innovation rankings are Switzerland, UK, Sweden, Netherlands and the U.S. Israel must improve its overall ranking, #22 in the world, and can do so, by focusing on the ‘dark side’ measures. The educational system, must be greatly improved, the resources devoted to capital formation must be increased, the bureaucracy that hampers starting a business and paying taxes must be slashed. And perhaps hardest of all, Israel’s excessive democracy, that seems to generate elections almost every two years must somehow be stabilized.

B. Science, Technology, Industry, Economy and Human capital

B.1 Indices for Science, Technology and Innovation in Israel and International Comparison

Dr. Daphne Getz, Prof. Dan Peled, Tsipi Buchnik, and Ilia Zatzovetsky

At the beginning of the 21st century, the Samuel Neaman Institute identified the need to establish an infrastructure for advancing a systematic and ongoing process of forming a national policy on research, technology, and innovativeness.

The objective of this program is to improve the understanding of the R&D and innovation system through an infrastructure of data and indices and the analysis of trends as they change over time and in comparison with other countries. The infrastructure allows answers to be found to the question of how processes associated with the development of science, technology, and innovation contribute to increased knowledge, increased productivity, improved economic performance, professional employment, sustainable development, and social welfare.

Thus far, four reports were published on the subject of "Indices for science, technology, and innovativeness in Israel: A comparable database." Currently, we are working on the next edition, expected to be published at the beginning of 2016.

In this edition, we have changed the structure of the report so that it presents inputs and outputs for each segment (sliced by different subjects), which may give a clearer and more comprehensive picture of how each sector functions over time. In addition, new chapters have been added: gender inequality and spatial distribution, and international integrated indexes.

This program serves as a source of knowledge and provides policymakers with a broad and updated picture of the current state of science, technology, and innovation in Israel. The publications are written in a format similar to that of the brochures published by the agencies of other countries, and they are of great interest and are used in various studies carried out at the Neaman Institute and by other agencies in Israel.

B.2 R&D Outputs in Israel: International Comparison of Scientific Publications, 1996-2013

Dr. Daphne Getz, Dr. Noa Lavid, and Ella Barzani

This is the third in a series of studies financed by the Samuel Neaman Institution and the National Council for R&D (NCRD). The study's findings are as follows:

International comparison indicates that Israel's ranking continues a downward trend in various quantitative indices: number of publications, number of publications per capita, its share in global and OECD publishing, and its growth rate. This decrease stems from both Israel's internal factors (low growth rate that actually leads to stagnation in the number of publications and in particular in the number of publications per capita) and global factors.

Israel shows an increase in all quality indices; however, this increase is not in pace with the rate of increase in other countries, and therefore, Israel's ranking among the countries that published at least 0.5% of the world's publications is descending.

An analysis by area shows that in comparison to the world, Israel gives a higher priority to the areas of mathematics, psychology, and neuroscience and a lower priority to those of energy, environment studies, engineering, chemical engineering, and materials. An analysis of the areas by the general quality index shows that in most of the areas Israel's ranking is not high, although an analysis of individual quality components reveals that Israel displays excellence in a considerable proportion of these areas. The most outstanding area in Israel, according to all the quality parameters tested, is computer science.

A review of publications in the Middle East countries shows a clear trend of narrowing gaps between Israel and its neighbors in both the number of publications and quality indices, although today most of these gaps remain wide. This trend is steeply increasing and encompasses many different areas.

B.3 R&D Outputs in Israel: Quality Characteristics of Distinct Inventions

Dr. Eran Leck, Dr. Daphne Getz, Bella Zalmanovich, Tsipi Buchnick and Golan Tamir

In the past decade, substantial methodological progress has been made in the field of patent statistics. This progress can be mainly attributed to the extensive research activity conducted in universities and international research organizations. The outcome of this innovative research activity has resulted in the development of new tools that vastly improve data retrieval, data segmentation and data analysis capabilities. These provide a better understanding of the characteristics of inventive activity.

The main goal of this study is to provide decision makers with an in-depth picture on the scope and characteristics of Israeli inventive activity during the last two decades and to examine Israel's position in the inventive arena in relation to OECD countries. In addition to the quantitative description and analysis of Israel inventive activity through the "Distinct inventions" index developed in the previous study, the present research focuses on the analysis of quality indices, aimed at providing an evaluation of the economic and technological value of patents from an international comparative perspective.

B.4 RISIS (FP7 Project)

Dr. Daphne Getz, Dr. Emil Israel, and Dr. Eran Leck

RISIS (Research Infrastructure for Science and Innovation Policy Studies) is a European Consortium that brings together several research institutions. The aim of the project is to build an accessible infrastructure of data for research on scientific activities, technology, and innovation. In this project, the Samuel Neaman Institute leads Work Package No. 9 (WP9). The aim of this package is to develop geographical clustering methods that detect concentrations of spatial activity in the fields of science, technology, and innovation.

The importance of the spatial dimension is due to the growing interest in research concerning science, technology, and innovation (STI). However, Europe suffers in this respect, since it lacks a formal and acceptable definition of metropolitan areas equivalent to that of the U.S. This raises the need to develop a European method that would identify and further analyze spatial clusters of knowledge.

WP9 has three main objectives: to compare different approaches to spatial clustering; to propose a strategy of implementation that will integrate one or several clustering methods within RISIS datasets; and finally to develop and implement the selected method (or methods) in several RISIS primary datasets.

In 2015, SNI's activities within WP9 included participation in the annual RISIS conference and organizing a research workshop in Vienna aimed at determining the strategy for the project. The workshop yielded an update of WP9's work plan, the submission of a summary report for 2015, and the preparation for the 2016 RISIS annual conference.

B.5 Innovation in the ICT Sector in Israel

Authors: Dr. Daphne Getz and Dr. Itzhak Goldberg

Researchers: Eliezer Shein, Bahina Eidelman and Ella Barzani

SNI was commissioned by the World Bank to prepare a chapter for their World Development Report 2016 on the subject ‘Best Practices and Lessons Learned in ICT Sector Innovation: A Case Study of Israel.’ The study, led by Dr. Daphne Getz, analyzes and describes how government policies (national and local) have contributed to the development of a vibrant ecosystem that has spurred a high rate of both technological innovation (e.g., VoIP, security software) and entrepreneurship, and describes the environment it has created.

The analysis provides relevant recommendations for the World Bank’s client countries, ranging from middle-income developing countries such as ‘emerging markets’, to low-income, small-sized or challenged economies.

The study shows that government policies helped to enable to start the development of the ICT sector, as well as Israel's high-tech industry. The Israeli ICT Ecosystem was gradually built up in the Tel Aviv and Haifa areas, both close to leading academic institutes: Technion, Israel Institute of Technology, and Tel Aviv University. The companies in this ecosystem are mainly export-oriented. We also showed that as the ICT sector grew and branched out, multinational companies seeking innovative technology bought small startup companies and established local R&D centers.

The chapter, describes, using five case studies of ICT companies active in Israel, how startups have developed within the ICT Ecosystem. Among the lessons that developing countries and emerging markets can learn from the Israeli experience: nurturing an entrepreneurial focus that will develop into a combined ecosystem of innovation.

B.6 Edunano: Learning Infrastructures in the Field of Nanotechnology –Tempus

Vered Gilad, Bella Zalmanovich, and Dr. Daphne Getz

There is a need to involve the industry in the nanotechnology area, in defining the knowledge and skills required of nanotechnology graduates so that they can integrate better into the industry and meet both current and future requirements that are critical to the success of Israel in this field.

The EduNano project is part of TEMPUS, an EU program that supports the modernization of higher education. SNI participates in the project together with the Nano centers of Tel Aviv University, the Hebrew University, Ben-Gurion University, Bar-Ilan University, Weizmann Institute of Science and Elbit Systems. In addition, the Technical University of Sofia in Bulgaria, the Polytechnic Institute of Turin in Italy, and the Grenoble Institute of Technology in France participate in the project.

As part of the project, infrastructures for online learning are developed and courses are held in the field of nanotechnology toward master's degree, training courses for the industry, the usage of advanced equipment and courses to promote the image of the nano industries and nano-based industrial products.

In 2014-2015, SNI conducted a survey among industrial companies in the field of nanotechnology, the goal of which was to assess their needs regarding the courses to be developed in the project. An analysis of the data collected in the survey is included in the interim report of the project.

A meeting of the project team was held in Bulgaria on July 2015. The status of the projects was reviewed, feedback on the interim report was given, and the continued projects were planned.

B.7 Cyber in Israel: Human Capital and Academic Research

Dr. Daphne Getz, Oshrat Katz Shacham, Eliezer Shein, Ella Barzani, Dr. Noa Lavid,
and Dr. Eran Leck

The study was commissioned by the National Cyber Bureau at the Prime Minister's Office and funded jointly by the Cyber Bureau and SNI. The purpose of the research is to describe the current state of academic research and human capital in the field of Cyber Security, analyze major issues necessary for setting policies, and lay the foundation of data and indicators that will allow measurement over time, as well as to evaluate the outputs of the Bureau's activity and its effect on the growth of academic research and the needs in the area of human capital.

During last year, SNI submitted to the National Cyber Bureau a report that deals with human capital in the cyber security industry in Israel. This report contains interviews with representatives of industries in the field of cyber security and an analysis of professional development paths of workers in this field. The chapter sheds light on the industry's needs and sources of human capital.

At the same time, SNI is examining the state of research and training in cyber security in the Israeli academy in recent years and preparing an infrastructure for evaluating the development of academic research as a result of the Cyber Bureau's activities.

The data collected and tested in the study would help the National Cyber Bureau to formulate guidelines for strengthening Israel's leadership in cyber security, by advancing Israeli academic excellence and promoting programs of human capital empowerment.

B.8 UNESCO 2015: Science and Innovation in Israel

Authors: Dr. Daphne Getz and Prof. Zehev Tadmor

Researchers: Vered Gilad, Tsipi Buchnick, Dr. Eran Leck, Ella Barazany, Bella Zalmanovich, Idan Liebes, Oshrat Katz Shacham, Eliezer Shein, and Dr. Noa Lavid

At UNESCO's request from Dr. Daphne Getz, SNI has written a chapter about science, technology, and innovation (STI) in Israel. The chapter was published as part of the UNESCO Science Report 2015.

Experts from about 60 countries described in the report the trends and developments in STI policy in their country during 2009-2015.

The report provides vital information about the countries' priorities and the subjects on which they wish to focus and to continue to develop in the coming years.

The summary section of the report presents Israel's main objectives in the areas of STI, including the following.

- The Israeli economy is driven by industries based on electronics, computers, and communication technologies. The next waves of technologies are expected to arrive from other fields, such as molecular biology, nanotechnology, and materials science combined with ICT. In the absence of a national policy for the higher education system, educational institutions will find it difficult to provide the knowledge, skills, and manpower necessary for these industries.
- Formulating an STI strategy to be shared by all interested parties.
- In recent years, interdisciplinary scientific research in fields such as bioinformatics, nano-biology, computational biology, biomaterials, systems biology and neuroscience has developed in the Israeli academe, but has not yet reached the stage of implementation in the Israeli industry. For these areas to become the next growth engines, we must formulate focused regulation and policies that will enable the infrastructure necessary to adapt the results of academic research to these areas for economic and applied usage.

[The following is a link to UNESCO Science Report 2015](#)

B.9 Mapping Research and Innovation in the State of Israel

Editors: Dr. Eran Leck, Dr. Guillermo A. Lemarchand and April Tash
Researchers: Dr. Eran Leck, Prof. Zehev Tadmor, Dr. Daphne Getz, Prof. Dan Peled, Prof. Orit Hazzan, Prof. Ofira Ayalon, Orly Nathan, Eliezer Shein, Tsipy Buchnik, Iliia Zatskovetsky, Ella Barzani, Dr. Noa Lavid, Efrat Kerem, Oshrat Katz Shacham, Bahina Eidelman, Gilad Fortuna, Efrat Kerem, Vered Segal and Anat Even-Zahav

The present country profile is the result of a synergistic collaboration between the Samuel Neaman Institute (SNI) and UNESCO's Division of Science Policy and Capacity Building (Paris) at the invitation of the Israel Academy of Sciences and Humanities (IASH).

Mapping Research and Innovation in the State of Israel is the fifth of a series of country profiles prepared by UNESCO's Global Observatory of Science, Technology and Innovation Policy Instruments (GO→SPIN). The series is designed to expose – through the rigorous application of an assessment lens—usable insights about science, technology, engineering and innovation (SETI) policies and their context.

This country profile is an attempt to systematize the different dimensions of SETI policy in Israel from the late sixties to present. It compiles statistical information as well as presenting inventories of the fundamental instruments in order to create a reliable framework for policy analysis.

The volume is organized so as to present the following items: (a) a long-term description of the political, economic, social, cultural and educational contextual factors; (b) a study of R&D and innovation indicators; (c) a long-term scientometric analysis of scientific publications, patents, trademarks and utility models; (d) a historical background to SETI policies in Israel, (e) a description of the SETI policy cycle; (f) a standard content analysis of the explicit SETI policies, (f) a complete analysis of the SETI organizational chart at five different levels; (g) an inventory of all the SETI government bodies and organizations related to research and innovation activities and to science and technology services; (h) an inventory of the SETI legal frameworks; (i) an inventory of the SETI operational policy instruments which are in operation and (j) an analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) of the country's research and innovation landscape.

B.10 Promoting R&D and Innovation in the Israeli Periphery

Dr. Daphne Getz, Dr. Emil Israel, Dr. Eyal Salinger, Dr. Tzameret Rubin, Oshrat Katz Shacham, Tamar Dayan, Tsipi Buchnik, and Ella Barzani

The study, commissioned by the Israel National Council for Research and Development (MOLMOP) at the Ministry of Science, Technology and Space, was designed to provide decision makers with an updated report regarding innovation and R&D activities in Israel's peripheral areas. The study, completed during 2015, identified the potential of Israel's peripheral areas to stimulate innovative activities, while providing an understanding of the challenges and barriers.

The theory on the geography of innovation indicates that peripheral regions suffer from structural disadvantage, as the emergence of innovation tends to be diminished as the distance from metropolitan areas increases. A series of indicators, variables, and models presented in the study, confirm this tendency in Israel. Despite the gap, there is an increase in innovative activity in the periphery, in particular in the fields of high technology, as well as in areas close to Tel Aviv and the central region. This could be related to government policy, which in recent years has increased its support of innovative activity in the periphery. However, it is not clear whether sufficient support is given, in light of the needs and limitations of the periphery, as shown by the study.

The study recommends possible policy directions, mainly aimed at establishing a regional innovation authority that will be responsible for forming and updating an innovation database focusing on the periphery. This database is necessary for policy-making outlined by this regional authority.

B.11 Public Funding of R&D: PREF

Dr. Daphne Getz, Tsipi Buchnick, and Bella Zalmanovich

SNI is a partner of the PREF project, sponsored by the European Union (FP7).

The aim of the study on national public research funding (PREF) is to collect information and provide an analysis of national public research funding, by theme and by allocation mode (project based funding versus institutional funding) including an overview of the evolution and current state of public research funding in European and selected non-European Countries, including Israel.

The final report will provide an outline of the current state and an analysis of trends over the years 2000-2014 of public research funding in these countries.

SNI's role was to provide data on Israel and Turkey. The project had two phases:

In the first stage, the agencies responsible for public funding of research in Israel and Turkey were classified according to the categories of the research, for example:

- The public allocation to higher education institutions for research and development (in Israel - PBC).
- Public funding of government offices for R&D.
- Public financing of international programs such as CERN and ESO.
- Public funding of international organizations, the financing of which is then transferred to operations in the various countries (such as the R&D programs of the EU, FP-EU).

In the second phase, ways to transfer public funding for operations were presented. For example, the PBC disburses the budget to the universities, the Ministry of Economy disburses the Budget to the Chief Scientist, the Ministry of Agriculture disburses the budget to Volcani Institute, and so on. The second phase also included quantitative data about Israeli public funding for each track during 2005-2014.

B.12 Examining Companies that are Based on Technion Knowledge

Vered Gilad, Ella Barazany, Bella Zalmanovich, Bahina Eidelman and Dr. Daphne Getz,

Technion graduates established more than 1,600 companies within 20 years. These companies created more than 100,000 jobs and generated \$30 billion.

SNI was asked by the President of the Technion, Prof. Peretz Lavie, to conduct a study that consists of collecting and analyzing information on Technion graduates who founded companies or occupy senior management positions in Israel or abroad and of companies based on knowledge generated at the Technion.

The research findings show that from 1995 to 2015, about 1,300 Technion graduates were involved in the setting up and management of 1,600 companies in Israel; about half of these are still active today. These companies generated revenues of over 30 billion dollars and created about 100,000 jobs in Israel.

In addition, about 170 Technion graduates established or hold a senior position in overseas companies, and 134 companies were established on the basis of studies conducted by faculty members at the Technion. In total, in the last 20 years more than 1,900 companies have been established in Israel and abroad, involving alumni, faculty members, and knowledge generated at the Technion.

B.13 Tax Benefits for Business R&D in Israel

Prof. Dan Peled, Prof. Benjamin Bental, Avi Sasi, Ilia Zatzcovetsky

This study examines the merits of incentivizing R&D investments through tax credits based on a firm's R&D expenditures. Most OECD countries offer such incentives. The main advantage of such measures is their relative simplicity, being based on periodic tax returns while forgoing the complexities and restrictions associated with current R&D grants support programs. The study suggests adding R&D tax credits to existing R&D proposed programs, not to replace them, and points out the sectors that are likely to find such program attractive and effective.

The study includes a comprehensive review of R&D support measures offered by other countries and economic evaluations of their effectiveness. It presents an estimate of the effects of an R&D tax credit by using a simple linear model relating R&D to economic outcomes at the industry level. Employing coefficients estimated in other countries, the model predicts that each shekel of R&D tax credit generates in the long term between 1.3 and 2 additional shekels of output. In terms of returns on investment, this is equivalent to an impressive annual rate of return in the range of 30% to 100%.

The yields from R&D tax credits obtained in the model are higher in sectors with lower R&D intensity. This attribute, together with the great simplicity in applying it for this kind of support, make the R&D tax credit program highly suitable for firms in classic and classic-mixed industries, where traditional R&D projects are rare. The proposed program is expected to encourage firms to invest in various forms of R&D and technological innovation, thus improving Israel's productivity and competitive standing in global markets. Accordingly, the study proposes to complement the impressive array of R&D support programs in Israel by adding R&D tax credit.

B.14 Dual Use of Space Technologies and Satellites

Avi Blasberg

The National Commission of the NCRD in the field of space has commissioned a study from Samuel Neaman Institute on the subject of "R&D activities, infrastructure and manpower in the area of civilian space, in industry, the academia, and the education system in Israel." The goal of the study is to examine dual use of space technology and satellites and is a continuance of a series of studies under the umbrella of Dr. Daphne Getz on space related issues at the Neaman Institute.

The nature of spacecraft systems dictates development methods and system characteristics that create similarity between spacecraft systems for security and for civilian/commercial use. As a result, it could be said that a significant portion of the development products of these systems are suitable for dual use.

This synergy between the markets provides an opportunity to maximize resources for the benefit of the commercial/civil market, as well as for the DE

The report examined the following topics:

- **The consequences of "dual use"** in the ground segment and in the space segment of the following systems: high- and medium-resolution optical satellites, multi- and hyper-spectral satellites and communication satellites.
- **The main recommendations** of this study are relevant to the following areas: R&D gaps to maximize the value of dual use and recommendation for optimized work/operational method that would maximize the value of dual use.

C. Higher Education

C.1 Higher Education Forum

Prof. Omri Rand, the Director of Samuel Neaman Institute, Prof. Avinoam Nir, Representing the Bashaar Association, Adv. Avi Ronen, the CEO of Bashaar and Dr. Anat Lapidot Pirila, the CEO of the United States-Israel Educational Foundation

The Samuel Neaman Institute together with Bashaar, the Academic Community for Israeli Society, and the Fulbright Program have founded jointly the Higher Education Forum. The purpose of the Forum is to hold discussions on issues concerning the higher education system in Israel and to hold an open dialogue between universities, colleges, CHE and PBC, the Government, and other public agencies.

Three meetings were held during 2015, all at Tel Aviv University, all were filmed and recorded and can be watched on the SNI website.

January 30, 2015: "**Mobility in Higher Education**". The meeting was attended by: Prof. Sara Guri-Rosenblit, Dean, Development and Learning Technologies, Open University; Prof. Hagit Messer-Yaron, Vice Chairman of the Council of Higher Education (CHE); Prof. Raanan Rein, Vice President, Tel Aviv University; and Prof. Yuli Tamir, President of *Shenkar* College of Engineering and Design.

- March 27th, 2015: Adv. Itzhak Pasha's new book "**Cracks in the Academe: Academic Freedom, University Independence, Student Status and the Right of Higher Education**". The discussion panel included: Prof. Joshua Jortner of Tel Aviv University; Prof. Jacob Ziv, the Technion, the former President of the Israeli National Academy for Science and the chairman of PBC; Prof. Zehev Tadmor, Chairman of SNI, the Technion; and Prof. Yuli Tamir, President of *Shenkar* College of Engineering and Design.
- May 1st, 2015: "**MOOCs and Online Academic Study – Opportunities and Risks**," led by Prof. Uri Kirsh of SNI, dealing with the field of higher education policy. The meeting was attended by: Dr. Yoram Kalman, Prof. Nira Hatiba, and Prof. Sheizaf Refaeli.

C.2 The Higher Education System in Israel: Issues, Characteristics and Unique Aspects

Prof. Uri Kirsch

A broad view and updated data on the higher education system in Israel are presented. Issues, characteristics, and unique aspects are discussed.

The chapters of this report include:

- The development of universities until the establishment of Israel. Major landmarks are described and various related issues are discussed.
- The development of the system since the establishment of Israel. The development of the system consisting of universities and colleges is described. Data on the increase in the numbers of institutions and students are presented.
- The higher education institutions. Characteristics and functions of universities, colleges, and private institutions are described. Issues of governance, management, accountability, and independence are discussed.
- The higher education system. Issues related to the system's structure, accessibility, academic quality, and resources are presented. Global aspects, as well as the Israeli experience, are discussed.
- Regulation of higher education. Issues related to the regulatory bodies – the Council for Higher Education (CHE) and the Planning and Budgeting Committee (PBC) are described.
- Budgeting and national resources. International comparisons of the income sources of higher education institutions and data on the state funding of the institutions are described.
- Academic status and national contribution of universities. The research status of the universities, based on quantitative criteria, their international ranking, and their national contributions are presented.

C.3 Massive Open Online Courses: Disruptive Innovation for Universities? The Present State and Future Outlook

Prof. Uri Kirsch

The aim of this study is to examine and clarify aspects concerning Massive Open Online Courses (MOOCs), to present the current state, to evaluate their development and to assess their future impact on the universities. The report chapters cover the following topics:

- The development of online teaching. Major landmarks of MOOC courses development are presented and the characteristics, as well as the types of courses, are described.
- Academic aspects. Models of teaching and learning and the pedagogic rationale of the courses are described. Academic issues and potential advantages, disadvantages, and weaknesses are discussed.
- Economic aspects. The perspectives of the students and institutions are described, and issues related to business models and the economic impact of the development of MOOC courses are discussed.
- Disruptive innovation in universities. Aspects related to the disruption of the business model and its impact on the higher education system, and the universities, in particular, are discussed.
- Summary and of the future outlook. Past developments are summarized and the future impact on higher education is assessed.

C.4 Science and Technology Education Forum

chairperson: Prof. Orit Hazzan

Members of the Steering Committee: Shmuel (Muli) Adan, Senior VP at Intel and President of Intel Israel; Rabbi Dr. Zvi Elani, head of Lustig Institute, JCT Jerusalem; Lt. Keren Ben - Nathan Krueger, head of administration for technological and research personnel, Personnel Department, IDF; Prof. Mahmoud Khalil, President of Sakhnin College for training teaching staff; Rachel Matuki, Haifa District Director, Ministry of Education; Vera Sanitzki, teacher and the TOV project coordinator at Rogozin ORT school in Migdal Haemek, and lecturer at Nazareth Illith College; Prof. Omri Rand, CEO of Samuel Neaman Institute.

The Forum for Science and Technology Education was established in 2013. The purpose of the forum is to foster cooperation between different sectors in the Israeli society to promote science and technology education in K-12 education.

As a background for the forum's discussions, a report was prepared titled "Science and Technology Education in Israel: Selected Indicators towards Building a Risk Management Strategy for the Expected Shortage of High School Teachers in Science and Technology". The purpose of the report was to create a basis for developing a risk management strategy with respect to the anticipated shortage of teachers of science and technology (S&T).

On the basis of this report's, two major challenges facing the S&T education in Israel were defined: the expected shortage of S&T teachers and the relatively small number of students in technological education. In 2015, the forum's activity focused on exploring a risk management strategy of S&T education in Israel.

C.5 PROJECT "TRAFFIC LIGHT TO THE NORTH"

Prof. Nitsa Movshovitz-Hadar (PI), Prof. Atara Shriki (research coordinator), Varda Zigerson and Dr. Ruti Segal (instruction team), Dr. Ohad Zohar and Tal Zohar (Omnisol); Dr. Eyal Levy and Dr. Ofir Ris (UNICO), Naomi Buchnik and Noga Rivlin (quality control) Racheli Shacham – the project's administrator

Following the initiative of the Director of the Northern District of the Ministry of Education, Neamann Institute received a three-year grant from the Trump Foundation to launch the "Traffic Light to the North" project in the upper classes of secondary schools of all sectors in the northern region of Israel. During the project, the possibility of empowering mathematics teachers who teach for the first time at the level of 5 units through a combination of employing "Traffic Light" software and a mentoring process by well experienced colleagues in the same school was examined. Recommendations to the Ministry of Education, regarding educational policy and investment in the professional development of teachers, will be derived from the processes examined within the framework of the project.

During the school year 2014/15, 44 mentors and interns from 19 schools participated. The interns taught 10th-grade last year, they are continuing to 11th grade this year and will continue in 12th grade next year, up to the matriculation exam. All interns received the mandatory curriculum layout and permission to use the Traffic Light software. Using the software, and thanks to the ongoing guidance, they prepare in collaboration lesson plans, teaching programs and evaluation items. Lesson plans are checked by the project team for language and content quality only. The lesson plans are available to participants to use, change, and adapt to their classes' specific needs. The database currently includes over 600 math lesson plans. Accumulation of items suitable for evaluating achievements began in September 2015.

C.6 Where is Chemistry Education Heading?

Prof. Yehudit Dori, Dr. Zehavit Cohen and Dr. Orit Hershkovich

More than a decade ago, working groups at the Neaman Institute explored the future of the chemical industry in Israel. One of the four working groups focused on the question of education in chemistry and, under my leadership, we investigated chemists, chemical engineers, academics, and teachers, with an emphasis on the state of chemistry in Israel and the direction in which chemistry education is heading.

Today, there have been changes in the education system, in high schools and higher education, and the number of students in high school and university students who choose to study chemistry is shrinking. In addition, the number of chemistry teachers in Israel has decreased. Technion, through the MABATIM program, is taking action to increase the number of chemistry teachers, hoping to influence both the choice students make in high school and increase the number of students choosing to study chemistry at university.

The main research questions in this study after 15 years are:

1. What are the processes of students, teachers, industrialists, and academics in choosing chemistry and chemistry education?
2. Have there been any changes over the past decade (or since the previous research was conducted), and if so, what are they, in terms of choosing to study chemistry in high schools and universities?
3. What are the recommended steps to encourage the choice and persistence in studying chemistry, chemical engineering, and related disciplines?

C.7 Evaluating the Technion Excellence Program

Dr. Eran Leck, Dr. Daphne Getz, Bella Zalmanovich, Orly Nathan, and Vered Segal

The Technion Excellence Program was launched in 1992 and is intended for undergraduate students in the Faculties of Science and Engineering who have been identified as having exceptional abilities. The Program offers its participants a personalized academic study program designed to exploit their curiosity and creativity and enable them to focus intensively on knowledge areas. The Program offers students professional tools and broad opportunities to advance and develop their personal potential, by encouraging creativity, originality and curiosity through independent study and teamwork.

The goal of this study is to provide stakeholders and decision-makers at the Technion an in-depth analysis of the program, to map out its goals, to describe the contributions and achievements over the years and evaluate its success. The study will make use of a wide range of research methods, both quantitative and qualitative. It will include an analysis of various data sources to create a deep understanding of the program. This analysis will be performed while comparing the Technion Excellence Program to similar programs in Israel and abroad. A quantitative knowledge base will be formulated based on questionnaires and interviews that will be held with students and graduates of the program. This will allow to the program's outputs and achievements to be analyzed and assessed.

C.8 Models for Budgeting International Postgraduate Students at the Technion

Vered Gilad, Tsipi Buchnick, Orly Nathan, Ayelet Raveh, Dr. Tzameret Rubin, and Dr. Daphne Getz

SNI was asked by the Director General of the Technion, Prof. Matanyahu Engelman, to conduct a study of the options for increasing the number of international postgraduate students studying at the Technion.

Universities around the world are competing for the resource of best students. In recent decades, many universities have formulated policies to increase the number of international students, in particular for advanced degrees. This trend is expected to continue over the next decade.

The rate of international postgraduate students studying at the Technion is 2.8% (123 international students out of 4439 graduate students in 2015). This rate is low as compared to that of the world's leading universities.

As part of the study, SNI was requested to review the models used by leading universities around the world for international postgraduate students and to examine how these models can be sustainable for the Technion in order to expand its research potential and achieve other benefits, such as promoting the Technion's standing in international rankings, turning the Technion into an internationally-oriented organization, and using students' mobility to improve the processes of transferring international knowledge in research collaborations.

The study collected information on the existing models that support international postgraduate students at leading universities globally in the fields of science and technology, and a comparison was made between them and the existing model at the Technion. In particular, the current model existing at the College of Engineering at Cornell University was studied. The findings were submitted to the Technion management.

C.9 Holders of Academic Degrees and the Israeli National R&D System

Prof. Dan Peled, Prof. Benjamin Bental

This study is an extension of a previous study conducted at the SNI on the subject of The Role of the Israeli Research Universities in the National R&D System. The present study conducts a detailed examination of the supply and employment of academic degree holders (Bachelor, M.Sc., Ph.D.) in Israel by fields of study according to the Israeli Central Bureau of Statistics (CBS) classifications. The examination relies on data on academic degrees from the Council of Higher Education (CET), and on CBS data and special reports, including surveys of research and development in Israel, business innovation surveys, , manpower surveys, and careers of doctorate degree holders. The extension focuses on academic degree holders of all titles and their contributions to national R&D, and is trying to examine to what extent and in what areas a shortage of research manpower exists and constitutes a significant detriment to R&D.

C.10 Immigration and Career Choice of Scientific Staff Members

Dr. Emil Israel, Prof. Daniel Czmanski, Prof. Arnon Bentur and Tamar Dayan

The study, which is conducted as part of an evaluation that explores a possibility to establish a Technion branch at the Negev, examines the return of faculty members to Israel and their absorption into scientific research institutions. The purpose of the study is to understand the researches' location choices, preferring specific research institutions over other alternatives abroad, or vice versa.

Many countries are investing significant resources aimed at encouraging the return of young scholars who travelled abroad for post-doctoral training and Ph.D. studies. The present study examines the issue and focuses on the considerations underlying the return of young researchers to Israel in general and to the Technion in particular.

The research methods involve personal interviews and field surveys. In the first step, returning faculty members who were recently absorbed at the Technion were interviewed. In order to expand the scope and measure the phenomenon quantitatively, an online questionnaire was circulated, sampling young faculty members at the Technion. This sampling allows the collection of data on various personal characteristics and on the important factors that influence their location choices. In order to avoid bias, the questionnaire was distributed to other sample groups: initially, to returning scientists who were absorbed into other Israeli institutions and then also to those who decided not to return but to remain abroad.

The results of the study will help formulate measures to facilitate the absorption of new staff members (in Israel in general, and at the Technion in particular).

C.11 Israel-U.S. Academic Relations

Dr. Daphne Getz, Oshrat Katz Shacham, Bahina Eidelman,
and Ella Barazany

Israel on Campus Coalition (ICC) is a national network of students, faculty members, and professionals, whose goal is to strengthen the pro-Israel movement on campuses across the US. The research department of the ICC addressed SNI and requested a review of the development of academic relations between Israel and the United States over the past decade.

During 2015, the Samuel Neaman Institute submitted a report to the ICC describing trends in the development of academic relations between Israel and the US over the past decade, as reflected in the changes that occurred in the output of the joint studies by American and Israeli researchers. Among the topics examined are quantitative trends in joint research outputs, leading areas of joint research outputs, leading institutions in joint research outputs, and more. Special emphasis is placed on the fields of social sciences and humanities.

Currently, the Samuel Neaman Institute is conducting an examination of the development of academic relations between Israel and the US on the level of students' study programs abroad, i.e., student exchange programs (Study Abroad), and the mutual recognition of credits. As part of this research, quantitative data are being collected on the number of students who participated in these programs during the last two years, as well as qualitative research, in order to describe the trends and changes that occurred on those planes during the last decade.

Upon completion of the project, an integrated report will be submitted, which will include a broader picture of the academic relations between Israel and the US and the changes in them over the past decade.

C.12 POLICY INCENTIVES FOR KNOWLEDGE CREATION

Prof. Amnon Frenkel, Prof. Shlomo Maital, Dr. Daphne Getz, Dr. Eran Leck, Dr. Emil Israel, and Vered Segal

The project is implemented under the Seventh Program of the European Union (FP7), a consortium that consists of seven countries (Italy, Germany, France, Spain, Poland, the UK, and Israel). The purpose of the project is to examine, empirically, the role of the demand side in the creation of technological knowledge, recognition of technological and organizational innovation, and encouraging the increase in productivity. The project is formally complete and our contribution was expressed in five outputs.

In 2014, two reports that are part of the project were published. One involved applying a methodology developed by Frenkel that allows visual mapping of an ecosystem of national innovation, with which the ecosystem of technological innovation in Israel, Spain, Germany, France, and Netherlands was mapped. Not as part of the project, the implementation of the methodology was expanded to map the ecosystem of healthcare innovation in Ontario, Canada, in the high-tech industrial park in Shanghai, and in Singapore. The methodology and the results obtained from the analysis of the findings in these areas are presented in a book recently published by Edward Elgar Publishing in the UK. In addition to publishing the book, Frenkel was invited to apply this methodology to the State of Ceará in northeastern Brazil by the President of the Industrial Association in that country, and Frenkel and Maital have most recently applied it also in San Paulo, Brazil. The second report constituted an analysis of data collected during a field survey of the ecosystem created by the Rad Binat Group in Israel, which yielded about 130 companies. The study found that social and technological proximity encourages the tendency of companies to maintain business relationships, which probably contributes to knowledge exchange.

C.13 Mapping Agriculture R&D in Israel

Dr. Daphne Getz, Dr. Noa Lavid, Eliezer Shein, and Ella Barazani

The Science and Innovation Department of the British Council (through the British Embassy in Israel) has partnered with the Samuel Neaman Institute (SNI) in a joint project, the objective of which is to identify the relevant subjects in the area of Agricultural Science that have high synergy and high potential for cooperation between the United Kingdom and Israeli scientists.

The areas discussed in the report include the academe and government research organizations, as well as commercial companies involved in research and development of products for the agricultural market. It is hoped that this research policy paper and IP landscaping of the Israeli capacity, stakeholders, unique expertise, and critical infrastructure will produce knowledge that can be used by policy makers toward increasing the British-Israeli collaboration in Agri-Science and Agritech, enabling the UK and Israel to compete in the global economy of the 21st century.

How did Israel, despite the difficulties of water shortage and large arid areas, become a leading country in the field of agricultural production? The answer to this question is sought by agriculturists worldwide who wish to learn from its achievements. The report indicates four main factors that in combination led to this result: the resourcefulness and determination of the Israeli agriculturalist; research and teaching activity; effective agricultural training; and massive government support in the early years of statehood, which continues to this day.

By using its entire Agricultural Ecosystem, the Israeli Smart Agriculture meets high-tech innovation throughout the entire sector, thus leading to new innovative products.

D. National Strategy

D.1 The Overarching Strategy Forum

Prof. Uzi Arad, Adv. Dror Strum, Prof. Avi Ben-Basat, Prof. Aviad Kleinberg, Prof. Shlomo Ben-Ami, Mr. Efraim Halevi, Gen. (Res.) David Ivry, Prof. Itzhak Ben Israel, Prof. Zehev Tadmor, Prof. Yadin Dudai, Prof. Dov Schwartz

The State of Israel is facing a multitude of challenges. Among the external challenges - the regression in the global standing of the US, the nuclearization of Iran, threats of rockets, missiles, tunnels, and cyberwar. The Middle East is in a vortex of instability, in which states are disintegrating, forces of violent and extremist Islam are taking over, operating even far beyond the Middle East, and the dangers of a conflagration of terrorism is not fading.

On the internal front, Israel finds itself amidst widening socio-economic gaps, signs of erosion in its qualitative advantage in science and technology, and demographic changes of far-reaching and long-term ramifications. Moreover, the slackness of the executive branch in Israel, due to ossification and politicization, is all the more noticeable. Under these circumstances, and because of the rapid changes and developments that characterize this period, an updated and comprehensive strategy is needed.

Against this backdrop, the Grand-Strategy Forum has been assembled - to analyze, discuss, and develop policy courses at the national level to meet the challenges at home and abroad. It was established in 2013, at the initiative of Prof. Uzi Arad, and it operates under the auspices of SNI (Samuel Neaman Institute). The Forum members include approximately 200 leaders of science communities, business, government, academia, law, and the Israeli public.

The Forum's work is conducted through three main workgroups: economics-society-governance, diplomacy-security-foreign policy, and science-technology-education. All the Forum members share the conviction that Israel should harness its strengths and capabilities to meet the challenges and advance the country's security and prosperity. By the end of 2015 the work groups formulated their insights and recommendations. An integrated grand-strategy will be presented on Independence Day of 2016.

E. communication

E.1 Holistic Assessment of Science Communication Based on Positions of Scientists, Teachers, Undergraduate, High School Students and Various Parties

Prof. Yehudit Dori, Dr. Zehavit Cohen and Dr. Orit Hershkovich

In recent years, scientists have faced a rising demand to make science accessible to the general public, both for the purpose of sustaining and advancing a society that supports and promotes knowledge and to obtain public support and legitimacy to engage in science. The study is aimed to holistically analyze the positions of various interested parties toward the importance of science communication, platforms of science communication, and the structuring and sharing of scientific knowledge.

In particular, the study examines the contribution of communication between scientists and the community of learners through the ‘Basha’ar’ Website, which is an academic Website that allows teachers and students to direct questions through the network to scientific staff members and leading experts. The study consists of 350 subjects who represent four different interested parties, in descending order of level of knowledge and scientific literacy: scientists, teachers, STEM (Science Technology Engineering and Mathematics) students, and students of social sciences, representing the educated public at large, who have knowledge or scientific literacy of a low or moderate level. All the participants filled a questionnaire or were interviewed. The study findings suggest categories that allow the position of the various interested parties toward the importance of science communication, different communication platforms, and structuring and sharing scientific knowledge to be evaluated. An important finding is that the positions of the interested parties ranged from a preference for one-way communication, mostly prevalent among teachers, to a preference for two-way communication, which was common among STEM students. The positions of scientists and students of social sciences were in the middle, between a preference for one-way communication and for two-way communication.

F. ENERGY

F.1 ENERGY FORUM

Prof. Gershon Grossman, Yigal Evron

The purpose of the energy forum is to maintain a professional infrastructure in the field of energy in Israel, and to allow meetings, symposiums, and discussions that encourage the promotion of projects in the field of renewable energy, energy saving, and energy conservation. Through the forum, the Samuel Neaman Institute formulates professional and applicable positions, on which experts and interested parties in the field and decision makers in various government offices that participate in the forum agree.

In 2015, three Energy Forum meetings were held:

- a. Combined Heat and Power Generation: This meeting took place on 3/3/2015 and included a discussion of the business potential of co-generation – combined heat and power production, for the Israeli industry.
- b. Energy Storage in Electricity Production: This meeting took place on 15/6/2015 and included a discussion of the possibilities for savings and added flexibility to the electric grid obtainable by various storage methods.
- c. The Reform of the Israeli Electricity Sector. This meeting took place on 16/11/15 and included a discussion of the problems involved in unbundling segments of the electricity grid to create competition and increase the efficiency of the electricity sector.

F.2 An Analysis of Israel Renewable Energy Industry

Dr. Gilead Fortuna, Shiri Freund-Koren and Idan Liebes

This project is a part of the joint venture with the Newtech agency at the Ministry of Economics, and is continuing with the funding of the Samuel Neaman Institute, as part of the Industrial Excellence Center. The goal of the project is to leverage Israel's position as a leader in the field of renewable energy, including energy production and its integration into the energy system, efficiency improvements, and the development of fuel substitutes.

Work began in 2014 with a survey and mapping of global trends and the Israeli industry and its relative advantages vis-à-vis the global trends. Work proceeded on identifying current barriers and deriving policy recommendations that would allow the establishment of a thriving Israeli industry in this area.

During that year, a report was published, detailing the global trends in this sector today, showing an update of the current situation in Israel and the comparative advantage of the renewable energy industry in Israel. The report presented the tools available to the manufacturers, identified barriers to realizing technological and business opportunities for the Israeli industry, and suggested recommendations for a supporting policy. In addition, a database was built, containing all the Israeli companies operating in the field of renewable energy in various categories.

In 2015, the database of the report was expanded to include operative recommendations for removing barriers and updating policies. A Final Report detailing this work was distributed. In addition, the work was presented at the initiative of the Ministry of Economy to a broad inter-ministerial forum.

Toward the implementation of the emission reduction decisions reached in Paris in December 2015, interest in the report's recommendations has increased and the project was also presented to the Ministry of Finance, in order to take advantage of the opportunity to secure financing for the program recommended by us.

F.3 Innovation Policy for Clean Energy in Israel

Prof. Gershon Grossman

The purpose of the project is to analyze the policy lessons arising from Israel's successful efforts to initiate, guide, and accelerate the process of technological innovation in the field of clean energy. The intention is to identify the basic principles of policy shaping that can be applied to any set of technologies and to other countries in different political, economic, and technological contexts. Based on a detailed analysis of these principles, the project formulates a series of general recommendations of best practices for innovation policy in the field of clean energy.

In 2015, we continued our contact with the Israeli Association for Smart Energy. The discussions address ways to promote the subject of the smart grid in Israel, further to research conducted in collaboration with the London School of Economics in recent years.

G. Environment

The environment and energy team at the Samuel Neaman Institute conducts studies and produces white papers, reviews, and policy recommendations on a wide variety of environmental and energy subjects, which constitute the core issues of these sectors in Israel.

The Samuel Neaman Institute research team, headed by Prof. Ofira Ayalon, works with SNI researchers: the Lev-On Group, Shiri Freund-Koren, Idan Liebes, Maayan Zerbib, and Dr. Tzipi Eshet. It also works in collaboration with external partners, such as The Natural Resources and Environmental Research Center (NRERC) at University of Haifa, Adalya Economic Consulting, Kivun Strategic Consulting Ltd., Adv. Lior Shmueli of Ecofinance Ltd., and others.

The studies conducted over the years included topics such as waste management (municipal, hazardous, packaging in general and the issue of shopping bags in particular), reducing greenhouse gases emissions, adaptation to climate change, environmental aspects of agriculture, and various topics related to energy and to the planning of the energy economy in Israel. Documents on environmental national priorities, designed to provide a current picture of the situation in Israel and abroad and formulate the policy recommendations needed to reach the desired targets, are also produced.

The documents prepared by the staff are used by the managements of the relevant ministries, including the Ministry of Finance, Environmental Protection Ministry, National Infrastructures, Energy and Water Ministry, Ministry of Economy, the Information Center of the Knesset, and even Wikipedia editors. These papers are considered to be leading in Israel and form the basis of articles and editorials on environmental issues published in print and electronic media.

Prof. Ofira Ayalon, who heads the team, participated in the formal delegation of Israel to the Climate Conference (COP 21) held in Paris in 2015.

G.1 Israel's Greenhouse Gases Reporting and Registration System

Prof. Ofira Ayalon, the Lev-On group, Idan Liebes and Ma'ayan Zerbib Zion

Climate change is receiving worldwide attention because of the implications of environmental, economic, and social changes for the developing and developed world. The Israeli government is aware of the importance of taking steps to reduce greenhouse gas emissions and acts accordingly. Thus, a voluntary system to register greenhouse gas (GHG) emissions in Israel was launched in 2010. The project is conducted in collaboration with the Ministry of Environmental Protection and is designed for industrial, commercial, financial, and other organizations.

The system was introduced in mid-2010 (defined as a pilot year). In 2014 (reported in 2015), 53 organizations of a wide variety of sectors reported their emissions. Their emissions constitute more than two-thirds of the total emissions in the Israel economy. The process of designing the procedures and methods for the Israeli system, as well as the support and monitoring of the reports, were carried out by the environment and energy team at the Samuel Neaman Institute and the team of the Ministry of Environmental Protection in collaboration with a wide range of stakeholders.

Updates of the reporting system (protocol) and Excel files for FY 2014 include the following. A list of common refrigerants was distributed to update the calculation tables for leakage from air conditioning and cooling systems; updated global warming coefficients were adopted in accordance with the UN orders; and an interim procedure was published, allowing companies to report in detail GHG in scope 2 when they consume electricity from private electricity producers (PEP) and not only from the Israeli Electric Company, and a specific Excel file was developed for GHG emissions of heavy vehicle fleets who received the reporting instructions according to the Clean Air Act.

G.2 Designing the Israeli Climate Change Information Center (ICCIC) Website

Prof. Ofira Ayalon, Maayan Zerbib Zion and Golan Tamir

According to a government resolution, the Ministry of Environmental Protection was assigned to prepare a national plan for Israel's adaptation to climate change. For this purpose, the Ministry initiated the establishment of an Israeli knowledge center on the subject, to work on strengthening existing scientific knowledge regarding preparedness for climate change in Israel and even market the accumulated Israeli knowledge to other target countries.

The Israel Climate Change Information Center was established in March 2011 at Haifa University in collaboration with Tel Aviv University, the Technion, and the Samuel Neaman Institute at the Technion.

ICCIC-Israeli Climate Change Information Center

The Website is designed, maintained and funded by the Ministry of Environmental Protection. It allows access to all the areas examined as part of the knowledge center's work. The Website contains scientific articles from relevant databases, national and local programs on preparedness for climate change from around the world, reports and summaries of discussions, and more.

The Website serves as a platform for the use of both the scientific community and the general public.

The amount of information in this area is huge, and we call researchers, government officials, NGOs, and others to help us add "refined" content to the Website in order to enrich the existing knowledge.

G.3 Global Estimates Of Methane Emissions from Off-Shore Drilling Plants and Their Importance

Prof. Ofira Ayalon, Dr. Miriam Lev On, Dr. Perry Lev On and Maayan Zerbib Zion

The study reviews, for the Ministry of Environmental Protection, the world's regulations and methodologies for estimating methane emissions in the natural gas sector. In addition, the study presents an opinion that addresses the relevance of these methodologies and their application to estimating methane emissions from natural gas facilities in Israel.

Methane (CH₄) is emitted into the atmosphere from a variety of natural and anthropogenic sources. According to climate models, in terms of GWP (Global Warming Potential), methane affects global warming 25 times more than carbon dioxide (CO₂), according to a 100-year forecast. Since the time methane remains in the atmosphere is shorter than that of CO₂, the reduction of methane emissions from anthropogenic sources would be effective in reducing global warming in the near future.

Off-shore oil and gas extraction has been a growing industry in recent years. In marine gas production, it is necessary to extract and transport gas to shore, and as a result, gas may be released during the process or it may be necessary to burn it. Methane is emitted from non-focused leaks from the gas systems' equipment, controlled release, deliberate combustion of gas, processing facilities, gas transmission and distribution pipes, and gas storage facilities. Global figures show that Methane emissions from rigs constitute 25% of the emissions in the manufacturing sector and 9% of all methane emissions in the oil and gas industry.

G.4 Evaluating the Economic Damage of the Fuel Leak at Evrona

Prof. Ofira Ayalon, Dr. Tzipi Ethet of University of Haifa and Samuel Neaman
Institute with ADALYA consultants

The study evaluates the economic damage of fuel leaking from the EAPC pipe that occurred at the Be'er Ora (Evrona) intersection in 12/03/14. This study was conducted for the Adam Teva V'Din (IUED) Association.

The practical aim of environmental economics is to try to quantify the complex components of the damage incurred in an incident, in which the core damage was caused to the quality of the environment, so that decision makers and the public will be presented with as real and full a picture as possible of the damage costs, even if some of these are difficult to measure in a simple quantitative manner. For this purpose, environmental economics developed a variety of practices and research methods, and these have been further developed and updated at a rapid pace in recent years.

From the study, a complete and true picture of the damage caused by the leak event at Be'er Ora (Evrona) emerged. The study included a calculation of the cost of the socio-economic damage – a cost that reflects the public value of the damage to nature and landscape values affected by the leakage, and the cost of ecological-environmental damage – a cost that reflects the public value of restoring the unique ecosystem at this site until full recovery of this ecosystem (as well as the irreversible damage that can never be remedied).

The total long-term economic, social, and environmental damage, using a model developed by the US Environmental Protection Agency, caused by the oil spill at the Evrona Reserve on December 2014 is valued in the amount of ca. 530 million NIS.

G.5 Techno-Economic Examination of Waste Pneumatic Systems

Prof. Ofira Ayalon and Idan Liebes, in collaboration with Kivun Ltd.

The Ministry of Environmental Protection wishes to examine the environmental and economic feasibility of establishing a pneumatic waste collection system in densely built residential neighborhoods. The study surveys various technologies and the companies that are active in this field, and examines the experience gained in Israel in setting up these systems. It also presents an economic analysis from the perspective of all the parties involved, including the local authority and the economy as a whole.

The results of calculating the total costs for the constructing and operating company, the local authority that is responsible for waste management, the building contractor, the tenants, and the economy as a whole, show that such a project would offer no gain in terms of benefits or cost for the economy.

The main beneficiary is the building contractor, who enjoys a rise in the apartment premium (it is claimed that some of this premium can be allocated to the municipality by the imposition of fees and charges on the project.) The cost is borne mostly by the tenants and the value of the benefits they receive is lower.

Policy recommendations derived from this study are as follows- in a project of this nature, in particular because the supplier involved is a monopoly, there is no room for government intervention in the form of a capital subsidy, and in the end those elements who are already profiting would benefit more. It is very important to carry out the construction optimally to examine the economic and environmental significance to the local authority.

G.6 Preparing a Calculation in Principle for Collecting Business Waste Fee

Prof. Ofira Ayalon, Efrat Elimelech, and Maayan Zerbib Zion

Municipal and commercial waste management is an environmental and economic burden, both for the municipality and businesses. This study was conducted for the municipality of Tirat Hacarmel.

In comparison with household waste, commercial waste is usually cleaner and businesses can be coerced to separate it at source. Separation of waste at source in the business sector involves additional benefits, such as reducing the financial investment required both of the government and the local authority for implementing the separation, granting certainty to end facilities and increasing their profitability. Authorities that did not implement separation in households can introduce the process of separation in the commercial sector in a way that is simpler and easier to implement. Authorities that already separate waste will be able to expand and improve on the separation that presently relies on the existing systems.

In this study, a calculation was conducted regarding commercial waste collection, in order to create a mechanism that applies the principles of both the "polluter pays" and "simplified tax," and avoids discrimination. The mechanism is built in such a way that it will cater to the average production rate of waste, as well as to waste production on peak days.

A professional opinion will be given to support the calculation, while defining the rationale, the principles of calculation, the mode of operating the mechanism, and more was formulated.

H. Agriculture

H.1 Reduction of Food Loss due to Excess and Over-Production in the Israeli Agriculture

Prof. Ofira Ayalon, Dr. Tzipi Eshet of University of Haifa and Samuel Neaman Institute, and Ms. Yaarit Licht of University of Haifa

Wastage of food (raw and processed) is a global economic, environmental and social concern. The situation in Israel does not differ.

The study is conducted in collaboration with the Leket Israel organization.

According to the collected data, the research suggests that in Israel, about 200,000 tons of fruits and vegetables are left in the fields annually.

The study recommendations are divided into: reducing excess agricultural produce by planning the quantities and types of crops grown by farmers; subsidizing the transfer of agricultural produce for industrial and export purposes; disconnecting the binding relationships between farmers and the marketing networks; obligatory limitation of the mark-up between farmers and marketing networks; encouraging the marketing of agricultural produce directly from the farmer to the consumer; applying the prohibition on landfilling organic matter, which is expected to significantly influence the quantities of discarded products - mostly in marketing networks and households; and education, advertising, and advocacy, encouraging the consumption of "ugly" fruits and vegetables, and limiting crop destruction, as well as increasing the education for reasonable and sustainable consumption.

Additional recommendations made by the report include optimal utilization of the surplus once such a surplus has been created, some of which are in accordance with the law of 1973, article 60, requiring that all possibilities, particularly contributions to the needy, be exhausted before a decision on the destruction of crops is made. Detailed recommendations are given in the report.

The research was presented at an international convention held at Cornell University in the US in 2015.

H.2 Development of Sustainable Mariculture in Israel

Prof. Ofira Ayalon, Dr. Tzipi Eshet, Dr. Tamar Trop, Idan Liebes, Maayan Zerbib Zion in collaboration with Dr. Dan Tchernov of University of Haifa, Eng. Noam Mozes, Dr. Yael Kachel, of the Ministry of Agriculture and Prof. Amos Tandler of the National Center for Mariculture in Eilat

According to publications by the Food and Agriculture Organization of the United Nations, most of the fishing areas in the world have been exploited to the fullest or suffer from excessive fishing, while the demand for seafood (fish, mollusks, crustaceans, and algae) is increasing, because of their many nutritional benefits.

Growing fish in seawater enables the production of fresh, local, and healthy food without the use of fresh water or land near the sea, which are in short supply. Gradual and rational development of this industry will contribute to the development of the "blue economics," while maintaining the principles of sustainable development - including environmental economic and social aspects.

The report presents a policy document outlining guidelines for objectives, strategy, and tools for long-term planning, spatial deployment, sustainable development, and the interface of mariculture in the Israeli Mediterranean Sea. In addition, the report includes mapping of desired areas for locating mariculture in the Israeli Mediterranean Sea and supporting logistic sites on the shore, taking into consideration the plans, needs, and intentions of other interested parties concerning these areas.

The project's products will be assimilated in national policy documents in the field of agriculture and rural development and in policy documents on marine planning.

H.3 The Industry of Innovative Agricultural Technologies in the Shadow of the Global Food Crisis

Prof. Ofira Ayalon, Shiri Freund-Koren, Idan Liebes

As world's population grows, the demand for food is growing as well. The FAO expects that the global agricultural output will have to rise by 60% by 2050 to meet the needs of the growing population and the changes in dietary habits, together with the challenges arising from the climate change, the depletion of water and land resources, and reduced biodiversity.

The agricultural industry is large and diverse, and engaged in a wide range of activities and products, from growing and processing meat for food, through growing and processing plants for food, bio-fuels, textiles, to extracting medicinal and cosmetic substances. In addition, it is involved in R&D and entrepreneurship in the fields of genetic engineering, biological pesticides, precision agriculture, management and control, shipping and handling, packaging, trading, and selling to consumers.

The agricultural industry will have to change through the use of innovative agricultural technologies (AgriTech) in order to increase the efficiency of agricultural production, while reducing costs – environmental, social, and economic, of agricultural production. The aim is, therefore, to develop sustainable agriculture.

Given this trend, the Samuel Neaman Institute initiated a study on the subject of leveraging the Israeli Agritech industry in the shadow of the global food crisis.

The study presents the major trends affecting the technologies of the agricultural industry around the world, and sheds light on the obstacles faced by entrepreneurs, investors, and industrialists in Israel. In addition, the uniqueness and the relative advantage of the Israeli industry is mapped, while metrics are set for success and preliminary evaluation of the potential inherent in this industry for the national economy.

I. National Infrastructure

I.1 External Benefits of Tunneling - Carmel Tunnels as a Case Study

Prof. Ofira Ayalon, Shiri Freund Koren, Maayan Zerbib Zion in collaboration with
Adv. Lior Shmueli from Eco-Finance

This project, which was conducted for Carmelton, the company that operates the Carmel Tunnels, examined the economic and environmental benefits caused directly and indirectly by the use of the Carmel Tunnels as compared to alternative routes in the city of Haifa.

Direct user benefits include financial savings, by virtue of two parameters:

Time-saving: Driving through the tunnel reduces travel time as compared to other routes.

Fuel-saving: Fuel savings due to both the reduced travel time and the smooth route.

The indirect public benefits generated by the use of the tunnel include reductions in air pollution and greenhouse gas emissions (by virtue of fuel saving, reduced emissions of pollutants and greenhouse gases is achieved) and noise reduction – traveling through the tunnel reduces the transportation noise generated in the city.

It was found that in all cases driving in the tunnels showed a greater positive benefit than driving along various alternate routes (according to different reference scenarios), while the extent of the benefit depends on the type of vehicle (private, bus, or truck), the alternative route chosen, and the time of the drive (average as compared with the peak hours).

The project also examined the average benefit generated by each journey through the Carmel Tunnels according to vehicle type and time of travel. The study did not examine the benefits in terms of the cost of travel.

I.2 Future Trends in Israel Seamanship: Marine Manpower

Prof. Yehuda Hayuth. Professional advisor: Captain Akiva Hofman

This study, conducted by the Samuel Neaman Institute, was commissioned by the Shipping and Ports Authority, Ministry of Transport. The study goals focused on the analysis of the needs of the Israeli economy, taking into account the expected developments of Israeli shipping and the development of port infrastructure in Israel. Among other things, the research topics focused on the forecast of the needs of the Israeli economy in terms of the demand and supply of seamen, the target population for recruitment to the Israeli Merchant Navy, the main reasons for sailors' leaving the sea service, alternatives to the use of officers in the Israeli merchant fleet, and a comparison with how other countries, especially in Europe, handle the problem.

In the last decade, the number of ships remained virtually unchanged, but in 2015 there was a significant decrease in Israeli owned and controlled ships. At the same, the time the number of Israeli Sea Officers is dwindling. The reasons for leaving are varied. Among some of the sailors and cadets, a gap exists between expectations and reality, as well as slow progress through the ranks and salary, while others want to find their place in coastal careers in the long term.

The shrinkage of the Israeli vessels lowers the profile of the industry as a long-term guaranteed workplace that enables the development of a satisfying career. There used to be three main factors that attracted people to a marine career: income level for young people, traveling the world, and adventure. Over time, the difference between the wages at sea and on the shore has been shrinking and traveling the world is no longer an attraction.

I.3 Haifa Ports - The Growth Engines For the North of Israel

Prof. Yehuda Hayuth

The connection between the port and the port city and its surrounding area is a dynamic and multi-dimensional relationship. In this review, the interaction is examined from the economic dimension. Over the years, the port served as a strong economic anchor, although in many cases the question was asked whether the port contributes to the development of the city and the region, or, alternatively, the city contributes to the development of the port and the region.

Port Economic Impact Studies are very common among the ports of the world. The new Bay Port project and the and infrastructures and developments around it will include a financial investment of one billion dollars in a project that has many economic implications.

The activity around the building process of the new port is creating a demand for many goods and services: increased employment, development of direct and auxiliary businesses, upgrading of infrastructures, and a long list of topics. International experience shows that the project of constructing a new port introduces a substantial economic multiplier that affects the employment and the economy of the port city and its region.

In a preliminary examination that has been conducted recently, the difference between the number of importers and exporters in the city of Haifa and their number in northern Israel emphasizes the importance of the port of Haifa to the north. The number of importers and exporters in the north of the country (not including Haifa) is double that in Haifa.

J. Industry

J.1 The Center for Industrial Excellence

Dr. Gilead Fortuna, Giora Shalgi and Dr. Avigdor Zonnenshain

The Center for Industrial Excellence was established in 2011 and its objective is to promote a national industrial policy. The Center helps formulate and promote a proactive policy of industrial excellence, intended to sustain a balanced and high-quality national industry that maintains a healthy lifecycle, which highlights its global competitive advantage and the quality employment of all sectors of society. The Center for Industrial Excellence is part of the Israel 2028 Vision previously led by Samuel Neaman Institute.

In 2015, the Center focused on promoting the following subjects (described below in separate chapters):

- A. The North Project – an applied study to upgrade the socio economic system in the north of the country – a joint venture with the Ministry of Economics, the Strategy Department.
- B. Expanding the promotion of the Israeli water industry in the global economy, a joint venture with Newtech, the Unit for Promoting Water and Renewable Energy at the Ministry of Economics.
- C. Analyzing the renewable energy industry around the world and in Israel and initiating an effort to promote the global commercialization of this industry in collaboration with Newtech and IATI.
- D. Empowering classical/traditional industries.
- E. Promoting a strategy for a commercial space industry in Israel as part of the NCRD, in collaboration with the Ministry of Science.
- F. Promoting cooperation between academic institutions and industry, on all levels, on the subject of life sciences, as part of the NCRD, in collaboration with the Ministry of Science.
- G. National policy on the subject of promoting the chemical industry in Israel and implementing natural gas for the local economy and for export.
- H. Efforts to find solutions that will encourage and enable startups to grow into mature firms, including measuring the contribution of the large firms to the Israeli economy.

J.2 Upgrading the Economic System of the North

Dr. Avigdor Zonnenshain, Dr. Gilead Fortuna, Giora Shalgi, Prof. Yehuda Hayuth, Prof. Miriam Erez, Prof. Rassem Hamaisi, Dr. Eran Leck, Ms. Maisa Totry Fakhoury, Dr. Eran Keter, Dr. Iris Arbel, Ms. Tali Zehavi, Ms. Tamar Dayan, Dr. Reuven Gal, Mr. Yehuda Morgenstern, Dr. Eitan Adres, and Rafi Nave

In mid-2014, SNI joined a venture with the Ministry of Economic Affairs, aimed at drafting a plan for substantial improvement of the economic system in the North, and changing it into a unified, growing, and sustainable system. During 2015, the project was completed and a summary report, which includes an analysis of the socio-economic situation in the north, and recommendations for improvement and upgrading were submitted.

The plan's goals, as drafted, were to achieve growth of the economic system in the North, generate a significant improvement in the socio-economic status of the population in the North, promote a joint collaborative economy of the Arab and Jewish populations in the north, realize the potential of the Arab population as leverage for growth, change the negative migration trend from the North, and attract a strong population.

Recommendations:

Game changers - infrastructure anchors: Moving the IDF's VMSs to the North, the extension of the Haifa Port (the northern port), the construction of an international airport, and promotion and leveraging of transportation projects in the North as a socio-economic lever for all sectors.

Growth engines: Establishment and promotion of a life sciences cluster in the North, promoting a water industry cluster; promotion of innovation and productivity in the classical industries of the North; integration of the Arab sector into a united economy of the North as a common economy and growth engine; promotion of tourism and pilgrimage in the North; development of the ultra-Orthodox population in the North as a productive community; and promotion of small and medium-size businesses in the North.

J.3 Empowering Classical Industry

Giora Shalgi, Dr. Gilead Fortuna and Dr. Avigdor Zonnenshain

The activity in 2015 continued under the recommendations of the committee to empower classical industry, with expansion to other areas, mainly in the fields of education. This year it included the following areas.

- **Scientific, technological, and vocational education:** Giora Shalgi continued to act as an active partner in the National Committee for Technological-Vocational Education, the activities of which included a major upgrade of the New Bosmat School, with the blessing of the Ministry of Education, the Technion, and Haifa Municipality..
- **Organizational Excellence:** Targeting large organizations, based on the realization that they are capable of promoting quality and excellence in small and medium enterprises; strengthening the relationship between Industrial Excellence Program and the Manufacturers Association in the North; initiating a pilot program to duplicate the principles of the northern excellence program in the south of the country, as a branch of the southern MAOF program and NRCN as anchor industry.
- **Purchasing relationship:** A recommendations document addressed to ICA was concluded, professionally backed by the managers of the reciprocal procurement divisions of the major defense industries. The application was welcomed by the Director General of the Ministry of Economy.
- **Innovation and industrial productivity community:** The goal of this initiative is to contribute to improved innovation and industrial productivity, paying special attention to small and medium-sized traditional industries. Mode of operation: forming groups of interested parties who identify with the goal outlined above, while granting autonomy to each of the community members.

J.4 Promoting a Strategy for Commercial Space in Israel

Dr. Gilead Fortuna

Dr. Gilead Fortuna was appointed in 2012 to serve as a member of the NCRD Committee on Civilian Space and was later appointed to serve as the head of the sub-committee dealing with R&D strategy in commercial space. The sub-committee held a series of discussions, aimed at formulating major directions for a long-term program that combines the advantages for Israel of building a commercial industry and promoting the infrastructures of science and scientific education.

The role of the committee is to advise on formulating a long-term policy for R&D in the field of commercial space that will allow the strategic targets to be achieved effectively.

The role of the subcommittee is to develop strategic thinking that will allow a long-term plan to be presented in the field of commercial space, from which a tool for presenting indices of success and a baseline for update over the coming years will be derived.

At the end of 2014, the sub-committee's report was submitted to the committee's plenum. The report's recommendations were approved at the beginning of 2015 by the head of the NCRD, and were later adopted in principle by the Ministry of Science. During 2015, the activity included mainly steps to promote the application of the recommendations together with the Israel Space Agency.

J.5 Advanced Manufacturing – Formulating a National Policy

Dr. Gilead Fortuna, Dr. Avigdor Zonnenshain and Giora Shalgi

This study is intended to initiate and formulate a national policy proposal for promoting and implementing advanced manufacturing in Israel.

Most of Israeli industries are using conventional production methods, which turn raw materials and components into systems. Some industries apply automation techniques that increase efficiency and productivity. Unfortunately, much of Israeli industry, in particular the classical industry, suffers from low productivity, which leads to an inability to handle the export markets in terms of both competitive product prices and response times to market demands. Low productivity and the lack of trading in export markets lead to low salaries for workers in the traditional industries, and sometimes to the closure of non-competitive and non-profitable factories or to enterprises being moved abroad. Similar problems are faced by most Western countries - most industry is moving to the Far East or Eastern Europe. The production base in the West is being eroded.

To meet these challenges, several Western countries are formulating and implementing national policies to promote advanced manufacturing, such as the US, UK, Germany, and France, and several Eastern countries, such as China and Korea.

Advanced manufacturing entails the application of advanced technologies to the production of goods and systems, with the aim of "breaking the convention" of linear production that turns raw materials into goods and systems.

There is a large variety of advanced technologies and innovative processes that fall under the heading of advanced manufacturing, such as incremental production, 3D printing, application of Nano-technology to manufacturing and products, etc.

During 2015, global and domestic trends in this area were summarized in reports and documents published on the subject. In addition, preliminary recommendations for national policies on advanced manufacturing in Israeli industry were formulated.

J.6 Strengthening the Integration of the Arab Population into the Industry and the Economy – A Strategy for the Galilee Society

Dr. Gilead Fortuna and Dr. Avigdor Zonnenshain

SNI in collaboration with the Galilee Society, which is a regional R&D center supported by the Ministry of Science, are working together to strengthen a stable regional center that promotes knowledge industries and unified Jewish-Arab economics in the north.

The program began in late 2015 and is aimed to leverage the capabilities and experience of the Galilee Society as an outstanding regional R&D center and a catalyst to promote high-tech industries in the North and ensure the economic stability of the Center.

The strengthening of the Center will be achieved by increasing the support of the Ministry of Science and the Ministry of Economy. The long-term stabilization of the R&D center and its contribution to the economy of the Galilee will be achieved by the reorganization of the Center.

Phases of the program:

1. Analysis of professional past achievements and the economic leverage obtained, to gain insights and conclusions for the future.
2. Analysis of the current positioning of the Center - the assets, personnel, budgets, potential, and leverage plans.
3. Preparation of a position paper for the Ministry of Science and perhaps also the Ministry of the Economy regarding a long-term plan to make the Center a dominant regional R&D center.
4. Preparation of a reorganization plan for the Center, including the required budgets, to successfully lever the existing assets and those to be built in the future as part of the enhancement program.
5. Search and analysis of regional interfaces with the Academy, including colleges, other R&D centers, industrial areas, greenhouses, factories, and target companies to realize the products to be developed.

Phase 1 was completed in 2015 and it is planned that the program will be completed in 2016 and its implementation will be facilitated in the coming years.

K. Water

K.1 Challenges for Water Usage in the Global Industry

Dr. Gilead Fortuna and Shiri Freund-Koren

This research project began in 2011 and was designed to increase the competitiveness of the Israeli water industry in the world. The objective of the project is to map and survey water-intensive industrial sectors to highlight the opportunities for solutions that will enable Israeli water companies to increase their business. It operates at the Samuel Neaman Institute as part of the Center for Industrial Excellence.

The project is a joint venture with Newtech at the Ministry of Economic Affairs and includes an analysis of the water-intensive sectors among the global production industries, mapping water industries that can meet the challenges, linking industries to the identified challenges, initiating meetings with the relevant companies, and holding dedicated training seminars. In 2015, meetings were held and completed with the water industries and economic attachés in collaboration with Newtech. The mapping of the water industry, which includes over 200 leading companies, has been completed, and an increase in the industry's sales of over \$4 billion per year has been detected, of which exports account for over \$2 billion. In addition, a report on the industrial structure according to its division into various sectors has been completed. At the same time, an attempt to connect collaborations between large and small water industries facing global challenges has been launched.

As part of supporting international work relations, we participated in meetings with customers and potential partners in the USA, and we linked water companies with the appropriate USA business partners.

L. Immigration, Society and National Security

L.1 The Carob Tree:A Radical Evolutionary Systemic Solution to the Pension Crisis

Moshe Gerstenhaber, Shlomo Maital & Tsipy Buchnik

We propose an original, radical and systemic solution, based on an evolutionary social transformation of present-future choice toward increased saving; a proposal that addresses the roots of the pension crisis, not just the symptoms.

The purpose of this study is to provide a macroeconomic simulation of our proposal, should it be adopted, comparing no-change and radical-change scenarios for the Israel economy, and urge scholars to carry out similar projections and analyses for individual OECD countries. next the step shows how an increase in national saving and capital formation can contribute to ‘rebalancing’ the global economy, between low-saving Western nations and high-saving Asian ones. Finally the study outlines our “four pillar” radical proposal, which leverages persistent long-run saving and investment, and illustrates its impact with some macroeconomic projections for Israel, comparing two scenarios, one with low national saving, the second with increased national saving. An achievable increase in the national saving rate, implemented through the tax system and accompanied by intelligent capital formation, can have enormous impact, it is shown, not only on elderly poverty but on society as a whole.

A research paper has been submitted to a leading journal and accepted pending minor revision.

Gerstenhaber, M., S. Maital, T. Buchnik. The Carob Tree: A Radical Evolutionary Systemic Solution to the Pension Crisis. S. Neaman Institute: Technion, Haifa, Israel, June 2015.

*Began: 2014. Ended: November 2015. Funding: M. Gerstenhaber.

L.2 It Takes Two to Tango? Spatial and Social Implications of Joint Civil-Military Development

SNI: Dr. Reuven Gal, Dr. Emil Israel, Dr. Eran Leck and Orly Nathan
BGU: Prof. Miki Malul, Dr. Ophir Rubin and Mr. Shaul Hartal

The study, which started in 2015 and should last two years, examines the impact of the IDF bases' relocation to the Negev on strengthening urbanity in the Be'er Sheva metropolitan area. Relocation of military installations is conceived as a major mechanism for strengthening the towns located at the Be'er Sheva metropolitan area. The study is examining this thesis, in relation to empirical evidence, indicating that inequality is increasing within metropolitan regions. Thus, the study focuses on the potential influence that the military bases will have on strengthening the Negev's urban sector by increasing its social integration, or the opposite: on encouraging urban sprawl and spatial exclusion.

The study examines the housing planned supply and the demand for it. On the supply side, planning would be examined in the study area, through evaluating how institutional key players perceive the urban and regional development policy. Whether the perceived development is targeted at strengthening the urban sector in the region or weakening it. The main research tools employed in the process of this examination are interviews.

On the demand side, four sets of surveys are planned to be executed, examining the willingness of relevant groups to live in the Negev. The surveys includes also the subjects' willingness to emigrate and live in the Negev as part of communal arrangements. Another part of the study examines the likelihood that the sampled groups will emigrate to the Negev.

The study is conducted in collaboration with a team from Ben Gurion University.

L.3 The People Israel Project – The Guide to the Israeli Society

www.peopleil.org

Prof. Oz Almog and Dr. Tamar Almog

"People Israel" is an online publishing house, which is a comprehensive textual and visual guide to Israeli society. The project was launched based on the belief that by providing current, rich, varied, and reliable information, along with a comprehensive analysis and interpretation of different phenomena, the publishing house would contribute to an in-depth knowledge about the various sectors in Israel, formulating effective public policy and a reduction in prejudices and stereotypes among the Israeli public, to encourage tolerance for others and give legitimacy to the wealth of diversity.

Achievements during 2015:

The comprehensive research on the Israeli Y generation is now ending. To obtain feedback from the public before publication, the study chapters were uploaded to the People Israel Website. In addition, discussions and lectures were held in various organizations. An abbreviated version of the study, adapted to the general public, was published as a book by the Modan publishing house, and became immediately a best seller.

Following a request by the Head of the HR Department of the Israel police force, a sixth-month study of the Y-Generation in the Israeli police force was conducted (in collaboration with the Department of Behavioral Sciences of the police). The results pose many challenges for this large and complex organization.

In March 2015, Haifa University organized a conference on the **Israeli food culture** in cooperation with the university library and "People Israel". The seminar was followed by a historical photo exhibition, presented in the "Spirit of Israel" gallery.

L.4 Israelis in Berlin: A Community in the Making

Shuki Shtauber, Dr. Gilad Fortuna and Prof. Sybil Heilbrun

In recent years, an increased immigration movement to Europe has been discerned, mainly to two cities, London and Berlin. This study examines the motives of migration, lifestyles, and perceptions of Israelis who emigrated to Berlin, in light of the special relationship between Israel and Germany.

Three main questions were examined:

- A. What are the motives of Israelis to migrate to Berlin despite the language barrier and the horrors of the past?
- B. How does the community life of the Israelis in Berlin develop?
- C. How do Israelis in Berlin perceive their lives in the German capital?

The data were collected as part of qualitative research founded on participant observation and semi-structured interviews. The principal investigator lived in Berlin for 16 months, conducted 85 semi-structured interviews with Israelis in Berlin, with experts and key personnel, participated in 90 events, and visited relevant institutions and organizations. In addition, material was collected from reports, magazines, and Websites.

The study identified six main reasons for emigration from Israel and found three overarching frameworks for the formation of an Israeli community in Berlin. The findings and conclusions of the report will be used to formulate a national policy on the subject.

L.5 Ultra-orthodox Integration Project

Dr. Reuven Gal; Ilia Zatzovetsky; Yehuda Morgenstern

The Ultra-orthodox (U-O) Integration Project was inaugurated at the Samuel Neaman Institute in 2010, following the recommendations of the “Israel 2028” Project. The goals of the UOI Project were to monitor the changes within the U-O community and to provide recommendations as to how to enhance the participation of the U-O population in the labor market in Israel.

During the last six years, the project team has produced a multitude of analyses on various aspects of the subject matter and has published numerous reports, which in turn had a significant impact on the national policy in this area. In 2015, the project’s activities focused on the following areas: Consultation, providing data, and delivering policy papers to governmental bodies: various Knesset committees, government offices, military officials and more. The presentation of the subject at non-governmental forums and in the media.

The following reports were published and disseminated.

- **Ultra-Orthodox Jews in Israel: A Status Report, 2014** (2nd Edition).
- **Between (MACHAR) Tomorrow and Today: Academic System for Haredim at a Cross-Road**
- **How to Bring Haredim to Science and Technology?**
- **The Haredim in the Israeli Society: Characteristics, Transitions and Predictions.**

Moreover, during 2015 a survey was conducted among all relevant institutions in the country for the purpose of checking the success (or lack thereof) of the MACHAR Project (Haredi Settings) led by the PBC/CHE; activities were regularly conducted within the Haredi community in two main areas: a forum of social activists and contacts with rabbis and heads of the Orthodox community. Toward the end of the year, two research proposals were approved in principle, related to promoting academic excellence (for example, 5 study units for matriculation in mathematics and science) among the Ultra-Orthodox pupils. Work on the study will commence soon.

M. Real Estate

M.1 Israel's Land Policy and Housing Prices

Abstract – Summary of Pilot Study

Prof. Rachele Alterman; Advisor: Prof. Ezra Sadan; Researcher: Dr. Eyal Salinger

SNI has initiated a pilot research project having the field of land policy and housing prices in Israel. Without innovative policy efforts, housing prices will continue to soar in Israel. The State of Israel is unique in the developed world in two objective factors related to housing supply and demand: a high natural growth rate coupled with the country's small size, thus leading to high land prices. Nevertheless, the public and legislative discussion ignores the two main policy variables that characterize Israel alone among all OECD countries:

1. **National ownership and control of most of the land by the Israel Lands Authority.**
2. **Israel's extremely centralized planning and building system, which probably also contributes to the high land prices.** This topic is left to future stages.

The research questions:

Are the high housing prices due mostly to the objective factors described above, or perhaps the national land ownership is no longer appropriate for Israel, and it is time to reassess this policy.

Is it possible to measure the impact of ILA's control of land reserves on the housing prices?

The pilot study attempts to develop innovative methods to examine the research question and to apply them at a pilot scale. Using simulations, the models examine what would happen to the housing prices if ILA were to act in a similar way to the private market. The initial findings suggest

that the model developed is potentially interesting and should be further developed and applied on a larger scale.

N. Information

N.1 Information Centers of MAGNET Consortia

Dr. Daphne Getz; Coordinator: Josef Linhart
Information Specialists: Orly Nathan, Ayelet Raveh, Ella Barzani, Bella Zalmanovich and
Tamar Dayan; Information Systems Manager: Golan Tamir

A computerized information center, one of the largest in Israel, operates at the Samuel Neaman Institute. The center was established to fulfill the needs of knowledge management and to supply information science services to consortia that operate within the MAGNET program, and is part of the MAGNET program of the Ministry of Economy. The information centers are based on a computerized system which was designed according to the requirements of SNI and in collaboration with the consortia.

Consortia during 2015:

Advanced optical high-speed telecommunications networks (TERA SANTA): Technologies and building blocks to realize the next generation of optical networks. The Israeli Smart Grid Consortium (ISG): Technological infrastructure for integrating the communication network and elements of command and control in the electricity network through optimal utilization of the energy available in order to realize a greener world. Silicon Wafer Metrology (Metro450): Technologies involved in large wafers measurement equipment and the challenges common to all measurement machines. Brain Stimulation & Monitoring Toolbox Consortium (BSMT): Technologies for the integration of neuro stimulation with monitoring technologies for treating brain diseases with closed-loop feedback and personalized treatment. Network Programing (NEPTUN): Various technologies for communication networks programing. Transportation Electric Power Solutions (TEPS): Electrochemical energy and power sources for all-electric advanced vehicles. Printed Electronics (PRINTEL): Developing structures, components, and functional devices for printing in two or three dimensions on flexible and other substrates.

O. Samuel Neaman Website

www.neaman.org.il

The website is managed by Golan Tamir, Chen Bar-Lev, and Lior Ben Ami

The Samuel Neaman Institute's Website serves as an operational platform of the Institute activities and as its information center. All of the Institute's publications since 1987 can be downloaded from the Website, and visitors can register for the conferences organized and led by the Samuel Neaman Institute and contact the various researchers working at the Institute. The Website's languages are Hebrew and English and it is updated daily, thus exposing the Samuel Neaman Institute to both professionals and the general public. The home page of the Institute's Website shows research in progress, new publications, media, news, events, opinion pieces, media news, and other issues. On the Researcher Page, one can see all of the activities of each researcher at the Samuel Neaman Institute. In 2015, the number of visitors was 36,100, most of whom (71%) were new; about 10,000 were visitors from abroad. The number of publications downloaded from the Website is 4,000.

The five leading publications/projects in 2015: 1. The Ultra-Orthodox in Israeli Society: Update, 2014; 2. How to attract the Ultra-Orthodox to scientific and technological occupations. 3. The research status of Israeli universities, based on quantitative indices; 4. Measures of science, technology, and innovation in Israel: Comparative data infrastructure; 5. The Energy Forum; 6. Indices for Science, Technology and Innovation in Israel and International Comparison; 7. From "Israel 2020" to "Israel 2050".

The Samuel Neaman Institute distributes a quarterly newsletter to about 8500 subscribers, to which one can register on the Website.

In 2015, 5,205 visitors watched our YouTube channel:

<https://www.youtube.com/user/SamNeamanInstitute>

and our Facebook page: <http://www.facebook.com/NeamanInstitute>

Visitors can be notified about future events, news from the press, and recent publications; visitors can respond to and share any article or news.

List of Publications for 2015

Articles can be downloaded from the Samuel Neaman Institute's website
www.neaman.org.il

“Combined Production of Heat and Electricity - Summary and Recommendations of the 34th Energy Forum Discussion at the Samuel Neaman Institute:” Grossman, G; Evron, Y.

“Demand-driven Innovation: An integrative systems-based review of the literature.” International Journal of Innovation and Technology Management, 12 (2) 2015: Frenkel, A.; Maital, S.; Leck, E.; & Israel, E.

“Energy storage in electricity production. Summary and recommendations of the Energy Forum No. 35.” G. Grossman and Y. Evron. the Neaman Institute for National Policy Research, Haifa, Israel, June 6, 2015.

“Evaluating the Economic Damage of the Fuel Leak at the Beer Ora Junction 3.12.14.” Ayalon, O.; Eshet, Z.; Liebes, I.; & Tuvia, N.

“External Benefits of Tunneling – Carmel Tunnels as a Case Study.” Ayalon, O.; Freund Koren, S; Zorbib Zion, M.; in collaboration with Lior Shmueli from Eco- Finance.

“Holistic Evaluation of Science Communication according to Different Interested Parties: Scientists, Teachers, Students, Pupils, and the Public.” Dori, Y.; Cohen, Z.; & Hershkovich, O.

“Innovate Your Innovation Process: 100 Proven Tools. Forthcoming.” 2016 (World Scientific Publishing Co.) 83: Maital, S.

“Innovate your Innovation Process: Toward a borderless organization.” (on open innovation). L&T Journal of Management, issue 7, 2014/15: Maital, S.

“National strategies of smart development: Turning constraints into growth opportunities.” In: International Practices of Smart Development. Peter Lang GMBH: 2015/16.: Jucevicius, G; & Maital, S.

“Preparing a Calculation in Principle for Collecting Business Waste Fee.”
Ayalon, O.; Zarbiv Zion, M.; & Elimelech, E.

“Reducing the Loss of Food from Surpluses and Overproduction in Israeli Agriculture”. Ayalon, O.; Eshet, T.; & Licht, Y.

“Registration of Greenhouse Gas Emissions in Israel: Summary of Annual Reports for 2015”. Ayalon, O.; Lev-On, M.; Lev-On, P.; Liebes, I.; & Zarbiv Zion, M.

“Techno-Economic Examination of Waste Pneumatic Systems”. Ayalon, O.; & Liebes, I.; in collaboration with Kivun Ltd.

“The Carob Tree: A Radical Systemic Evolutionary Solution to the Pension Crisis”. 2015. Gerstenhaber, M.; Maital, S.; Buchnik, T.

“The evolution of innovation networks and Spin-off Entrepreneurship: The case of RAD”. European Planning Studies, 2015. Frenkel, A.; Israel, E.; & Maital, S.

“The existence of four Israeli education systems limits the choices of students and does not allow each student to learn the areas that interest them”. Ynet. Hazzan, O.; & Maital, S.: (Nov. 26, 2015).

“The Israeli electricity sector reform. Summary and recommendations of the Energy Forum No. 33”. G. Grossman, I Liebes and Y. Evron. the Neaman Institute for National Policy Research, Haifa, Israel, October 28, 2014 and November 11, 2015.

“Why can’t large ‘innovative’ organizations innovate? Six maladies in search of a remedy.” Forthcoming: NHRD Network Journal, special issue, People Management in Innovative Organizations, Ed by Prof. Rishiksha T. Krishnan, 2015. Maital, S.; & Ruttenberg, A.

“Smartonomics: How Macroeconomics Can Make You Wiser & Richer.” Maital, S.; & D.V.R. Seshadri, forthcoming, 2016, SAGE (India).

”Sustainable Mariculture in Israel.“ Ayalon, O.; Eshet, Z.; Trup, T.; Liebes, I.; Zarbiv Zion, M.; Tchernov, D.; Tendler, A; Kakhel, Y.; Mozes, N.; & Hershkovic, R.

Study Days, Seminars, and Conventions Held During 2015

Samuel Neaman Annual Lecture:

"Political Economy in Israel and the Captive Regulator – lessons from the 'silver tray' series." The 13th Samuel Neaman Annual Lecture was given on December 17, 2015. Lecturer: **Mr. Guy Rolnik.**

Higher Education Forum Meetings:

- On the new book by Prof. Amnon Rubinstein and Adv. Yitzhak Pasha: *Cracks in the Academe: Academic Freedom, Independence of universities, Student Status and the Right to Higher Education*, meeting No. 29 was held on 27 March, 2015. The session moderator was Professor Joshua Yortner. Lecturers: Prof. Jacob Ziv, Prof. Zehev Tadmor, and Prof. Yuli Tamir.
- **"MOOCs and Online Academic Study – Opportunities and Risks."** Meeting No. 30 was held on May 1st, 2015. Moderator: Prof. Uri Kirsh. Lecturers: Dr. Yoram Kalman, Prof. Nira Hatiba, Prof. Sheizaf Refaeli.

Energy Forum Meetings

- **"Combined Production of Heat and Electricity"**. Energy Forum No. 34, March 3, 2015.
- **"Energy Storage in Electricity Production"**, Energy Forum No. 35, June 15, 2015.
- **"The Reform in the Israeli Electricity Sector"** Energy Forum No. 36, November 16, 2015.

Participation of researchers in conferences in Israel

The Activities of the Center for Industrial Excellence

Date	Conference/ meeting	Location	Researcher	Subject
1/5/15	Higher Education Forum Meeting No. 3	Tel Aviv University	Prof. Uri Kirsh	MOOCs and Online Academic Study – Opportunities and Risks
6/15	The 6 th Conference on Science Communication in Israel	Weitzman Science Institute	Dr. Zehavit Cohen	Holistic Evaluation of Science Communication according to Different Interested Parties: Scientists, Teachers, Students, Pupils, and the Public
24.6.15	Elsevier Conference	Tel Aviv	Noa Lavid	Bibliometry at SNI – based on SciVal database
18.5.15	Promoting R&D and innovation in the periphery – presentation to the sub-committee of the NCRD	Tel Aviv Ministry of Science	Emil Israel, Daphne Getz and Tzameret Rubin	Promoting innovation in the Israeli periphery

Activities of the Industrial Excellence Center

Date	Conference/Meeting	Location	Researcher	Subject
24.11.15	The third Galilee Conference on Management and Economics – Management of National Natural Resources	Western Galilee Academic College	Prof. Gershon Grossman	Participating in Renewable Energies Panel
8.1.15 16.2.15	Overarching strategy for Israel	Meetings of the steering committee	Dr. Gilad Fortuna	Participation in discussions and participation in the science and technology group
13.7.15	A conference on the subject of scientific-industrial clusters in the north. Organized by the Industrialists Association and SNI	Samuel Neaman Institute	Dr. Gilad Fortuna Dr. Avigdor Zonnenshain	Initiating the conference and presenting the clusters of water and life sciences as part of the conference.
26.12.15	Annual Conference of the Chemical Engineering Association	TLV Convention Center	Dr. Gilad Fortuna	Commissioned lecture on "The Chemist Engineer - Where is he/she heading to? Challenges and Tasks"
15.10.15	Yearly meeting of the Chemistry Faculty	The Technion	Dr. Gilad Fortuna	Opening lecture about the chemical industry in Israel 2015.
24.11.15	The Committee to improve Cooperation between Industry and Academe in Life Sciences	Tel Aviv University	Dr. Gilad Fortuna	Leading a Brainstorming Discussion with the Participation of Representatives from the Industry, Academe, Venture Capital Funds, and Government
20.10.15	Energy Renewal Industries and Government Conference	Jerusalem, Ministry of the Economy	Dr. Gilad Fortuna	Presentation of a plan to establish a fund to realize opportunities in the renewable energy industry in Israel
	CEO Forum of the Western Galilee	Acre	Giora Shalgi	The Perception of Organizational Excellence

Study days, seminars and conferences on the subject of Quality of the Environment

Date	Conference/ meeting	Location	Researcher	Subject
24.2.15	Fish Farmers' Conference	Tel Aviv University	Ophira Ayalon Noam Mozes	Marine Agriculture in Israel: Current State and Future Planning
26.5.15	Marine Agriculture Workshop in Israel	Samuel Neaman Institute	Ophira Ayalon	Sustainable Development of Marine Agriculture in Israel
8.6.15	The Forum for Protecting the Marine and Beach Environment	Tel Aviv	Idan Liebes	Economic-Environmental Aspects of Marine Agriculture
7.9.15	Preparedness for Climatic Changes – The Environment Ministry	Bar-Ilan University	Ophira Ayalon	Plans for adaptation to climate change in the world
27.10.15	Nekudat Chen study day	Tel Aviv University	Ophira Ayalon Idan Liebes	Toward sustainable development of marine agriculture in Israel
9-10.11.15	The First Conference on Scientific and Economic Management of Sea and Shore Resources	Haifa University	Miriam Lev-On	Understanding Air Emissions from Offshore Oil and Gas Operations in the United States
13.10.15	The Israel Society of Ecology and environmental Sciences - 43th Annual Conference	Hebrew University Jerusalem	Idan Liebes	Life cycle analysis for the production of transportation fuels from waste in Israel

Activities of the Ultra-Orthodox Integration Project

Date	Conference/ meeting	Location	Researcher	Subject
10.3.15	The First Kinneret Conference on Education, Academe, and Periphery	Kinneret Academic College	Dr. Reuven Gal	Social and Economic Trends in the Periphery (among the Ultra-Orthodox public)
24.11.15	Sderot Conference for Society	Sapir College, Sderot	Dr. Reuven Gal	The Haredi Street Awakens
25.11.15	Sderot Conference for Society	Sapir College, Sderot	Dr. Reuven Gal	Who shall be given grants?

Lectures and study days on the "Israeli Generation Y"

Date	Conference/ meeting	Location	Researcher	Subject
6.01.15	A series of lectures to pensioners	Oz Almog	Yad Lebanim, Raanana	Generation gaps in the Israeli society
15.01.15	Departmental seminar – Department of Land of Israel Studies	Oz Almog and Tamar Almog	Haifa University	The Generation Y study
29.01.15	Family Day Conference	Tamar Almog	Kibbutzim Seminar	Parents and Courses – The Generation Y is raising children
8.03.15	A conference on learning disabilities in higher education	Tamar Almog	Haifa University	The Israeli Generation Y: Expectations and disappointments
9.03.15	Conference of the retired social workers division	Tamar Almog	Shfayim	What is special about the young relative to previous generations?
13.03.15	Beshvil Hahaim Association – bereaved families of children who committed suicide	Oz Almog	Kibbutz Ma'agan Michael	The young in Israel

Date	Conference/ meeting	Location	Researcher	Subject
18.03.15	Study day: The Israeli Food Culture	Oz Almog	Haifa University	The Israeli Food Culture
26.03.15	Directors' Course	Tamar Almog	Beit Berl Academic College	The Israeli Generation Y: How do they study and work?
26.04.15	Study Day on Behalf of the 50 th Anniversary of Israel-Germany Relationship	Oz Almog	Mishkanot Sha'ananim, Jerusalem	Panel on the subject of the young's immigration to Berlin
27.04.15	Jerusalem Convention for Parents	Tamar Almog	Jerusalem	Parents and Courses – The Generation Y is raising children. Psychological and sociological aspects of Israeli parenthood
7.05.15	Lecture to GSS seniors	Oz Almog and Tamar Almog	Center of Israel	Organizational meanings of the Generation Y characteristics
26.05.15	Conference of culture coordinators of the kibbutzim movement	Oz Almog	Kfar Maccabiah	Generation Y and the Kibbutz
10.06.15	A lecture to journalists and bloggers from the US who were invited by the Association to strengthen the relationship between the American people and Israel	Oz Almog	Hertzliya	A profile of the Israeli society
11.6.15	The staff of the psychiatric ward at Rambam Hospital	Oz Almog	Haifa	A portrait of Generation Y and its implications for medicine
11.06.15	Study day: collaborative work of a young person with a significant adult for personal and cognitive development	Tamar Almog	Department of Social Services, Tirat Carmel	How to the young learn?
16.06.15	Annual meeting – the staff and instructors of the Shlomit Association	Tamar Almog	Shitufim, Beit Yehoshua	The Characteristics of the Israeli Generation Y

Date	Conference/ meeting	Location	Researcher	Subject
17.06.15	A visit of veteran soldiers at the University on behalf of the Gross Foundation	Tamar Almog	Haifa University	Study and work patterns of the Israeli young
23.06.15	Creativity in teaching	Tamar Almog	ORANIM Academic College, Kiryat Tivon	The Israeli Generation Y: How would they like to learn?
16.08.15	Editors of legal and scientific journals from the US who were invited by the Association to strengthen the relationship between the American people and Israel	Oz Almog	Hertzliya	A profile of the Israeli society
6.10.15	Opening of the year lecture to the academic staff of the college	Tamar Almog	Gordon Academic College, Haifa	The Israeli Generation Y: How do they study?
12.10.15	Opening of the year lecture to the academic staff of the college	Tamar Almog	Rupin Academic College	The Israeli Generation Y: How would they like to learn?
13.10.15	Mathematics and Science Teacher Communities Conference	Oz Almog	Haifa	Who are our students? A portrait of Generation Y
13.10.15	Opening of the Year Convention of Mothers' Activity Center	Tamar Almog	Cinema City, Jerusalem	"Who's mother's genius?" Generation Y raises children
15.10.15	Opening of the year lecture to the academic staff of the college	Tamar Almog	Rupin Academic College	The Israeli Generation Y: How would they like to learn and work?
15.10.15	A meeting with the instruction department of the GSS	Tamar Almog	Center of Israel	Instruction of the young in organizations
19.10.15	Opening of the year convention of the center for meaningful parenthood and the Akhva Academic College	Tamar Almog	Ashdod	"Who's mother's / father's genius?" Generation Y raises children

Date	Conference/ meeting	Location	Researcher	Subject
27.10.15	GSS seniors in the northern district	Oz Almog	Haifa University	The young in the security systems
4.11.15	International training course: Heads of instruction departments from different police forces in the world	Oz Almog	Policemen's College Beit Shemesh	The young in the security systems
10.11.15	An international convention of state comptroller employees from different countries	Oz Almog	Van Leer Institute, Jerusalem	The young in the world of employment
2.12.15	Study day for baby clinics' nurses	Tamar Almog	Cinema City, Jerusalem	"Who's mother's / father's genius?" Generation Y raises children

Researchers' Participation in Conferences Abroad

Date	Name of Conference	Name of Speaker	Place	Subject
25-28.8.15	The 55 th European Congress of the Regional Science Association International	Amnon Frenkel	Lisbon	Spatial Aspects of Education-Job Matching and Job Selection in Israel
18-20.12. 15	Entrepreneurship Research	Shlomo Maital	Shantou Univ., China	Entrepreneurship
9.10.15	Entrepreneurship Anprotec: 25th Anprotec Conference on "Entrepreneurship & Innovative Environments" Cuiabo, Brazil – videoconference talk on ' Five lessons learned in Israel: Lessons for Brazlian Entrepreneurs	Shlomo Maital	Cuiabo, Brazil (by video conference)	Entrepreneurship
12.2015	Stanford University, CA, USA	Dr. Zehavit Kohen	CSET's Pond ering Excellence in Teaching Series	Promoting life-long learning skills in our teachers
12.2015	South Peninsula Hebrew Day School, CA, USA	Dr. Zehavit Kohen	Teachers conference	Promoting life-long learning skills in our teachers
10.9.15	RISIS - Working Package 9 Workshop	Emil Israel, with Daphne Getz and Eran Leck	Vienna – Austrian Institution of Technology (AIT)	Taking Space Seriously - Setting the Spatial Agenda of RISIS
28.01.15	RISIS Annual Week 2015	Emil Israel, with Daphne Getz	Rome - Centro Congressi Frentani	Redefining Urban - Presenting the OECD's New Way to Measure Metropolitan Areas

Environmental Conference

Date	Name of Conference	Name of Speaker	Place	Subject
13-15.7.15	German-Israeli Roundtable and Panel in Berlin	Ofira Ayalon	Berlin, Germany	Global Challenges, Regional Solutions: Climate Change
9-10.9.15	A&WMA Conference: Addressing Climate Change: Emerging Policies, Strategies, and Technological Solutions	Miriam Lev-On Perry Lev-On Ofira Ayalon	Oak Brook, Illinois, USA	On the Road to the Climate Change Summit in Paris 2015: Intended National GHG Emissions Reduction
11-14.10.15	2 nd international conference on Global Food Security 2015	Ofira Ayalon Tzipi Eshet Yaarit Licht	Cornell University, Ithaca, NY, USA	Agricultural produce surplus management-means to sustainability

Lectures and seminars on "Generation Y Israel"

Date	Name of Conference	Name of Speaker	Place	Subject
9-11.2.15	3rd International Conference on Interdisciplinary Research Innovation	Oz Almog and Tamar Almog	La Consolacion University Malolos City, Bulacan, Philippines	The Socio-Historical Background of the Generation Y, its Cultural Genome and the Implications to the World of Employment, Learning and Training.
27-30.40.15	"Rapprochement, Change, Perception and Shaping the Future: German-Israeli and Israeli-German Diplomatic Relations" (international conference on occasion of the anniversary of 50 years German-Israeli and Israeli-German diplomatic relations)	Oz Almog Keynote Speaker	the Institute of Political Science at the Johannes Gutenberg-University Held in the Parliament of Rhineland-Palatinate, Mainz, Germany	Images and Attitudes – Youths of both Countries (Germany-Israel) and their Views towards their Respective Counterparts

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